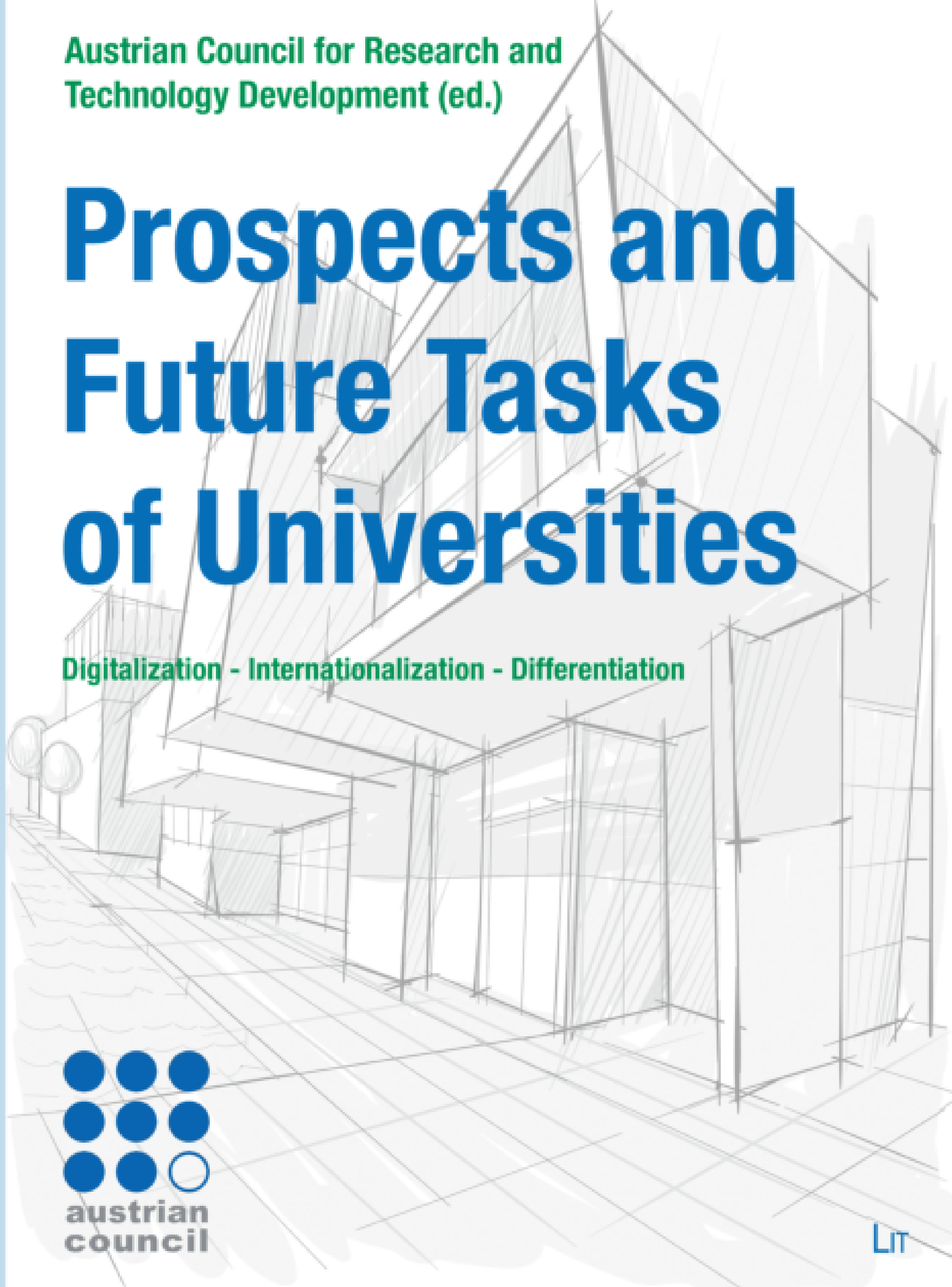
Austrian Council for Research and Technology Development (ed.)

Prospects and Future Tasks of Universities

Digitalization - Internationalization - Differentiation



austrian council

LIT

Prospects and Future Tasks of Universities

Austrian Council for Research and Technology Development (ed.)

LIT

The universities are undoubtedly undergoing an extraordinary transformation. Digital technologies alter research and teaching, modern communication media and social media promote an interactive exchange of information with society and accelerate international knowledge transfer. At the same time, new educational careers are enabled in a differentiated higher education area.

How can universities meet these and other challenges? The Council for Research and Technology Development has invited reputable experts to design scenarios for universities in the 21st century.

978-3-643-90937-4

9 783643 909374

LIT
www.lit-verlag.ch

Austrian Council
for Research and Technology Development (ed.)

Prospects and Future Tasks of Universities

Authors:

Hannes Androsch, Bilal Barakat, Gerald Bast,
Mats Benner, Günther Burkert, Jörg Dräger,
Daniel Fallon, Ulrike Felt, Max Fochler,
Julius David Friedrich, Johannes Gadner,
Anton Graschopf, Anita Gufler,
Markus Hengstschläger, Thomas Henzinger,
Bettina Hölker, Helmut Holzinger, Dieter Imboden,
Wolfgang Knoll, Wilhelm Krull, Gertraud Leimüller,
Dieter Lenzen, Antonio Loprieno, Wolfgang Lutz,
Lisa Mordhorst, Ruth Müller, Ulrich Müller,
Helga Nowotny, Hans Pechar, Elmar Pichl,
Wolfgang Rohe, Sylvia Schwaag Serger, Peter Scott,
Klara Sekanina, Sascha Spoun, Michael Stampfer,
Hans Sünkel, Antje Tepperwien, Marijk van der Wende,
Oliver Vitouch, Claudia von der Linden,
Sebastian Weiner, Barbara Weitgruber, Georg Winckler,
Martin Wirsing, Karl Wöber.

Austrian Council
for Research and Technology Development (ed.)

Prospects and Future Tasks of Universities

Digitalization – Internationalization – Differentiation

LIT

Project management: Anton Graschopf

Austrian Council for Research and Technology Development
http://www.rat-fte.at/
office@rat-fte.at

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche
Nationalbibliografie; detailed bibliographic data are available on the Internet at
http://dnb.d-nb.de.

ISBN 978-3-643-90937-4 (hc.)
ISBN 978-3-643-95937-9 (PDF)

A catalogue record for this book is available from the British Library

Klosbachstr. 107
CH-8032 Zürich
Tel. +41 (0) 44-251 75 05
E-Mail: zuerich@lit-verlag.ch http://www.lit-verlag.ch
Distribution:
In the UK: Global Book Marketing, e-mail: mo@centralbooks.com
In North America: International Specialized Book Services, e-mail: orders@isbs.com
In Germany: LIT Verlag Fresnostr. 2, D-48159 Münster
Tel. +49 (0) 2 51-620 32 22, Fax +49 (0) 2 51-922 60 99, e-mail: vertrieb@lit-verlag.de
In Austria: Medienlogistik Pichler-ÖBZ, e-mail: mlo@medien-logistik.at
e-books are available at www.litwebshop.de

CONTENTS

PREFACE

Hannes ANDROSCH, Markus HENGSTSCHLÄGER, Anton GRASCHOPF

Institutions of higher education, especially the universities, are undoubtedly undergoing an exceptional transformation. The great global upheavals and changes that are shaping today's world are driving the fourth industrial revolution onward. The changes of a present that is dramatically accelerating, the growing demands that society is placing on tertiary educational institutions, an increased (and desired) influx of new students, and, not least, technological change based on revolutionary communications and information technology all pose significant challenges for higher education. In light of these global trends, the classic and future tasks for higher education are increasingly under discussion. These tasks have to be adapted to fit the processes of development, and they must be redefined and re-assigned to meet the global challenges.

Education, science and research are the capital of a functioning, knowledge-based society; and will undoubtedly remain key tasks for universities, even in the future. However, it is not the only task of institutions of higher education to enable and support top-class university education. The necessary renewals, processes of reform and of further development in the higher education sector have to be re-thought and set in motion at all levels of education, politics and society in order to meet existing and new challenges, and to find new solutions.

One dimension for meeting these challenges has been opened up by the new communications and information technologies that have enabled rapid exchange of scientific papers and findings. Further, this global exchange of research results is no longer limited to researchers at universities and other research institutes. The entire (interested) public is included in the knowledge process. The universities are increasingly active in introducing society at large to questions about the use of results, and thus enable cooperation and "co-research". The role of students is changing. They are no longer exclusively consumers of knowledge, but are also increasingly active producers of knowledge and actors in, for example, peer learning. The term "third mission" of the universities encompasses this additional reach of universities, and the definition of the term ranges from engaged to entrepreneurial universities, networking with non-university and regional actors, as well as exchanges and coordination between institutions and society.

The Austrian Council for Research and Technology Development – the Austrian government's advisory board for topics of education, science, research and innovation policy – has in recent years increasingly engaged with the significant questions of the future of higher education and its tasks for the 21st century. For this collection of essays, the Council invited experts from various educational cultures to discuss future tasks of higher education, to describe the future of higher education and its tasks from their experiences, and thus to illuminate the range of topics from a variety of perspectives.

The goals of this publication are to take up current national and international trends in the development of higher education, and to discuss possible future scenarios for the higher education landscape in Austria. The starting point for the volume was asking questions about the tasks of universities in the technologically advanced societies and economies in the early 21st century, and about the role of universities in solving the global grand challenges. Digitalization, internationalization and differentiation are inherent in these processes.

This anthology consists of four parts. In the first part – development, importance and tasks – the various positions of the universities are taken into consideration. The individual essays debate the tasks of today and in the future. Proven systems and vital changes in cultural, socioeconomic and sociopolitical aspects are discussed. Changing structures are discussed and possible solutions are proposed. In the second part – management, organization and governance – the focus is mostly on the framework conditions for higher education systems. How much autonomy does a university need, and how far can or should the interests and influences of the state go?

The third part – global knowledge and digitization – focuses on internationalization. The essays give external perspectives, and position the universities within a global knowledge space, that, due to digital technologies, opens new possibilities of knowledge production and even new information, and thus also will change the future of university teaching. The fourth part draws a picture of diversity and differentiation of the higher education sector. The authors call for attention to alternative developments and necessary changes in the academic sector.

All these changes bring about a transition, which is comparable to that of a complex organism, adapted to an ecosystem but, with spontaneous mutations, able to settle in new habitats. Possibly, new "species of education" will arise from this differentiation. We remain curious to find out which developments will shape our higher education in the future.

SHORT BIOGRAPHIES

HANNES ANDROSCH, born 1938 in Vienna, former Vice Chancellor and Federal Minister of Finance of the Republic of Austria, former Director General of the Creditanstalt, is today an industrialist. He holds several honorary doctorates and is regarded as Elder Statesman in Austria. Hannes Androsch is author and editor of numerous publications. In his self-understanding as a citoyen, he is committed to social, economic and scientific policy. Among other things, he is initiator of a petition for a referendum on education, President of the Supervisory Board of Austrian Institute of Technology (AIT) and Chairman of the Austrian Council for Research and Technology Development (www.androsch.com).

MARKUS HENGSTSCHLÄGER, born 1968 in Linz, studied genetics and is expert in human genetics. He worked at Yale University and in 2003 he was appointed Professor of Medical Genetics at the Medical University of Vienna.
Since 2009, Hengstschläger chairs the Institute of Medical Genetics and since 2011, he is Director of the Center for Pathobiochemistry and Genetics at the Medical University of Vienna. He is active in basic research, teaching students, patient care and in the field of human genetics diagnostics and innovation consulting. Hengstschläger is a deputy chairman of the Austrian Council for Research and Technology Development, the Austrian Bioethics Commission, a member of the University Council of the Johannes Kepler University Linz, and Scientific director of the think tank "Academia Superior". He is also member of the board of trustees of the Vienna Science and Technology Fund (WWTF).

ANTON GRASCHOPF is scientific advisor of the Austrian Council for Research and Technology Development since 2009. His fields of activity cover the university development and university policy, life sciences, the promotion of basic research funding and open access strategies. Anton Graschopf holds a PhD degree in molecular biology. As a postdoctoral fellow, he was principal investigator in several research projects at the Research Center Max F. Perutz Laboratories (MFPL) of the University of Vienna and the Medical University of Vienna, between 1999 and 2009.

I.

DEVELOPMENT, IMPORTANCE AND TASKS

1.

What do we want from our universities?

Dieter M. Imboden & Wolfgang Rohe

Abstract

It is one of the peculiarities of the university that each of the three actors that seems justified in wanting something from the university – namely, scholarship, state and society – have not only identical and complementary but also contradictory interests in the university. The university would not be living up to its role if it attempted to solve this dilemma by committing itself to any single actor, e.g., scholarship. This essay examines which particular interests these actors bring to the table concerning the university, which mechanisms they use to do so, what the consequences of these interested actions are for the university, and how the university could optimally handle the varying requirements. The decisive factors are autonomy, governance and differentiation. Autonomy, if the freedom of action that it defines is not unreasonably limited, coupled with strong governance allows the university to define its individual approach to the process of differentiation, and to implement a strategy appropriate to this path.

Introduction: Three actors

"What do we want from our universities?" The indeterminate pronoun and the equally indeterminate possessive pronoun in the title question were chosen deliberately because there are disputes about who is allowed to want something from or with the universities. This dispute is long-running and in many senses fruitless. The dispute could be much more productive if the participants would mutually recognize each other's differing needs.

To the authors – a Swiss citizen and academic, and a German citizen and foundation manager – the justification of three actors seems plausible, and we would like to identify them very abstractly for the present as academia, state and society.

What is wanted from a university is decided in the first instance by scholarship. In research and teaching, scholarship deploys the permanent transformation of its methods, subjects and disciplines to create a dynamic that for the university has important consequences. The academic community is happy to see this dynamic as the primary, in many cases as the only, legitimate reason for deciding about the purpose and direction of *their* university. However, academia is not solely characterized by dynamism; in fact, it is in many cases much more characterized by a certain unworldliness, and even by rigidity. For these reasons alone, it would be wrong to leave the universities to the sole discretion of scholarship.

What is wanted from a university, at least from a public university, is in the second instance something for the state to join the discussion about. The state's duty to guarantee the freedom of research and teaching is not in opposition to setting expectations about performance in research and education, about standards, about categories of personnel or about certificates. In performing these tasks, the state will be selectively seen either "at a decent distance" or with "a certain countenance of a tense inspector" as Friedrich Nietzsche tellingly expressed this thought in a lecture in 1872 (Nietzsche 1872/2014, p. 63).

If society wants to be seen as the third actor that expects something from the universities, then the meaning of the term "society" as it is used here requires explanation. Scholarship and also the state, as the visible form of political order, are of course parts of society. What we mean here are all parts of society that have, neither through the academy nor through the state but rather through a specific interest, direct expectations from the universities. That includes, on the one hand, civil society with its manifold groups including parties, professional associations and NGOs, and on the other hand, business and the economy.

If one starts with the supposition of these three actors, then it is easier to determine, allocate, weigh and also criticize what can and should be wanted from the universities. In the following three chapters, we will examine which particular interests these actors bring to the table vis-à-vis universities, which mechanisms they use or attempt to use on universities, and what the consequences of this at least intended influence on universities are. In a final chapter, we take up the question of what these partially contradictory expectations mean for a university, and which legal framework as well as which internal structure of governance enables a university to address the expectations optimally.

At first glance it might seem that the approach sketched here would consider the university an institution as it were without its own goals that exist *a priori*, whose task was to find the right balance among the demands of the various actors. This apparent self-limitation to a pure service function is, however, deceptive, because it does not accurately reflect the true power relations for at least two reasons. First, the university gains, by balancing the interests acting upon it, its own institutional weight that secures for it *de facto* decisive influence. Second, the persons who work at the university and who shape it possess or develop their own ideas about goals, which, according to their dispositions, tend in the direction of one actor or another. To exaggerate: In the "neutral" institution of a university, neither is the institution's own weight neutral, nor are neutral agents acting within it. Thus the decisive question is how the internal and external systems of regulation can bring the internal and external agents' expectations to an optimal whole.

SCHOLARSHIP

We understand the term "scholarship" to mean the entirety of "multi-person" knowledge and the connections between the various insights that constitute this knowledge. The current system of scholarship is carried by the people active in research at that time, but as a system it is independent of them and knows, in contrast to an individual engaged in research, neither temporal nor thematic limits.

Scholarship can be understood as an enormous building, one that is constantly undergoing extensions, alterations, renovations or removals. The permanent construction process (of scholarly research) is in the hands of experts, the researchers themselves, from an array of specialties. Even if there is neither a comprehensive plan nor a supreme architect and new parts of the building seem to arise at random while old parts are torn down or merge with others, the process nevertheless follows a codex of set rules, the laws of statics and materials science or, to take up the topic of scholarship again, the rules of good academic practice that ensure that the edifice remains stable despite its continuous growth.

The form and size of a university certainly do not arise automatically from the permanent rebuilding process of scholarship, even if from the perspective of academia it appears desirable, perhaps nowadays even necessary, that the two edifices be identical. What are the crucial interests of scholarship, and how do they arise?

If in the past it was mostly individuals or small groups who as researchers – often in the service of princes, kings or emperors – endeavored to further develop scholarship, the Enlightenment changed the situation fundamentally, first with the founding of learned societies and academies, and then at the beginning of the 19th century with the formation of new types of universities, foremost among these the University of Berlin, founded by Wilhelm von Humboldt in 1810, which set uniting teaching and research as its goal. As a result, the Humboldt model shone a new light on the old European universities, which during their sometimes centuries-long histories had primarily existed solely for the training of theologians, jurists and doctors, and which had used this role to preserve and pass along knowledge, but seldom to expand it.

In this time, the state increasingly took over from previous patrons the role of supporting scholarship. To this end, it relied primarily on the institution of the "university," which led to the founding of numerous new universities in the 19th and early 20th centuries. With the rise of modern natural sciences and engineering, private industry also entered the field of research as a new actor. Because this research was primarily directed toward specific goals, the universities that were funded from public finances played an increasing role as something of a counterbalance, not only for research that was not primarily applied – what became known as free research – but especially for the training of future generations of scholars. Particularly because in many countries research that is financed by private business is quantitatively dominant, scholarship has a special interest in the university as the most important place for free research. A few figures on the topic: In Germany, in 2014 the share of total expenditures in research and development that came from private business was

67%, the public share was 29%, and the rest was contributed by the private sector (Wissenschaftsrat 2017, p. 4).

The scholarly community as an actor interested in the university does not command any strong institutions through which it can directly assert its interests in a university. Institutions are also not necessary, because the agents of the scholarly community are the scholars themselves, who are active in the universities. To clarify this point, let us return to the metaphor of scholarship as an edifice: the "construction activities" of the researchers who are active outside of private business, according to their self-understanding, must rely on a tacit consent between scholarship on the one hand, and state and society on the other. The latter provides the financial means; the former guarantees the maintenance and growth of the edifice of "scholarship," with its steadily expanding possibilities of usefulness and, so to speak as a by-product, the further education of (building) experts who are useful to society. This consent implies full autonomy in the building process from the scholarly point of view, and particularly includes the freedom to build, according to their own discretion, new wings, towers and battlements on the edifice of scholarship for which society has no, or as yet has no, direct use. The scholarly community happily legitimates its claim to absolute autonomy with the historical experience that shows that only under such conditions can good and innovative scholarship arise, and that apparently useless knowledge has later shown itself to be important, even decisive for answering new questions. Further, the process of research must be inherently subversive; that is, it should question everything that has seemed set in stone, and rigid construction plans as well as clients (state and society) who stick their noses in are a hindrance. The usefulness of this approach for the needs of society is not always visible, or only visible at a later date, but history has shown that any other approach sooner or later ends in a dead end, making the process of research inefficient or anemic, with the power of innovation finally running out.

The claim of the scholarly community to be the only legitimate actor for guiding the development of the university is, however, reaching its limits and threatens to make the university incapable of action. Peter Strohschneider recently described "disciplinarity and obstinacy" of scholarship as the constitutive preconditions of their productivity (Strohschneider 2015, pp. 35–47) and correctly noted that scholarship produces not only steady growth of knowledge but also a simultaneous specialization of knowledge, and thus of scholarly disciplines. That also holds true if, as a result of overlaps among existing disciplines, new interdisciplinary fields of knowledge arise because these lead, as the history of scholarship shows, not to a reduction of disciplines but inevitably develop into new scholarly disciplines. That scholarship as such knows neither a ranked hierarchy of knowledge nor of priorities in research can become an institutional disadvantage for a university. For universities, whose resources are always finite, the danger arises that scholarly structures develop an inertia that cannot be overcome. Which scholarly discipline has ever dissolved itself? If other actors – state and society – do not use priorities to set limits on the constant disciplinary, and thus structural, branching, then universities are in danger of being lamed by internal defensive and distributional struggles, and thus being unable to react with sufficient speed to changes in their societal surroundings.

The precarious state of young scholars at universities complicates this picture. New scholarly disciplines are often developed or taken up at an early stage by young researchers. The criteria for evaluating young researchers (e.g., publications and citations) and for making appointments to professorships, which are sharply aligned with classical, discipline-oriented parameters, run the danger that precisely the most dynamic share of upcoming scholars may get stuck in the evaluation filter of the professorial establishment, which is primarily oriented along classical and disciplinary lines, if additional criteria are not taken into account in the selection process. Other actors, particularly the state and society, are important for these additional criteria.

We abide by the idea that the scholarly community is an important, if not the most important, actor for the university. But the scholarly community also has its blind spots, above all the constant flux in disciplinary structures and society's requirements for the solutions to the great, complex questions of the future. It is thus sensible and smart for a university to listen not only to the voice of the scholarly community but also to those of other actors. We now turn to those.

State

Scholarship is a practice within society. This declaration is by no means trivial, because one of its consequences is that scholarship must not be induced from outside to open itself to claims from society. Scholarly methods, theories or standard, and even more so constellations of questions, research programs and institutional arrangements are in many ways societally mediated. But to rely solely on this way for society to enter into the university has seemed so far too simple or too risky to all theoreticians on the subject of universities, and even more so to their founders and financers. For publicly financed universities, the state still plays the role of the primary actor by which society asserts itself in the university.

It can only be noted here, but not more deeply discussed, that the state has first of all set up a legal framework that is relevant in many aspects, and within which universities must (also) operate. This framework ranges from the fundamental right of free research, through administrative and employment law, and laws concerning animal protection or protection of embryos, to the regulation of civil service exams or the relevant laws on higher education that cover recognition of the right to award doctoral degrees. In the following section, we will concentrate on the forms and processes by which the state is present for universities in their perception of their core tasks of research, teaching, continuing education and knowledge transfer. They have changed significantly over the last decade. The state's role has developed away from a detail-oriented oversight or even steering function and toward the role of a contractual partner who uses contracts and agreements about goals to negotiate what is expected of a university. This change is generally described as a trend in the direction of greater autonomy for institutions of higher education. This tendency includes the delegation of decision-making authority from ministries to the universities, at the same time enabling decisions to be made, at least according to the idea, at a level closer to scholarship. This can enable a university to improve its flexibility and its innovativeness, if it manages to organize its internal processes so that the agility and dynamism of scholarship can change and unfold. In turn, however, state intervention can no longer offer assistance to a more autonomous university if the university's internal blockages tend to brake scholarly dynamism.

If it is possible, when looking back at the last decade, to simplify a bit and speak of a retreat of state control in the universities in favor of self-direction that is closer to scholarship, then one should not go too far and give up the protective role of the state. State influence can protect the university, for example, from the dominance of particular disciplines or paradigms within a pluralistic spectrum of disciplines and missions. Moreover, the state is capable of limiting the influence that society seeks to exercise over the universities through other channels. From no side – neither from the scholarly nor from the governmental nor from the societal – is influence on the university *per se* more firmly grounded or even *per se* more beneficial for it. In fact, the influence of none of the three actors, scholarship, state or society, on the university is *per se* more firmly grounded or more beneficial.

It is worth taking a closer look at what has replaced the state's previous tight means of control. The first that should be mentioned are the goal and performance agreements or development plans that are reached between a university and the responsible ministry. Such documents do neither assign goals from the side of the state, nor should they define "how" the goals are achieved, but they do form the basis for the state to articulate its will and to remind the university of it. Second, beyond development plans that are specific to an individual university, a state can integrate all of its institutions of higher education into a country-wide development plan for higher education with the goal, for example, of achieving better coordination of research priorities or course offerings. Here, too the *modus operandi* will not be the state issuing directives; instead such a coordinated plan must align with the existing individual goal agreements that have already been reached with each institution of higher education. The national plan, however, always includes specifications and produces guidance effects that the universities will consider in their autonomous decision-making. A third element of state influence on universities works much more directly: the disbursement of funds based on indicators. This approach to funding enables the state to pursue its academic policy goals by coupling the distribution of funds to the achievement of the goals. This process is used primarily to implement targets for achieving equality.

The three elements noted above rest on direct negotiations between ministry and one or more universities. Two additional important elements for the state's exercise of influence come into play that are more indirect because they are directed at the framework conditions for the two most important tasks of the universities, research and teaching. First, public financing of universities for undertaking these two tasks has, in parallel with the process of granting increased autonomy, shifted away from general financing and toward time-limited funding and/or competitive processes for third-party funding. In 2011 Germany's Council of Science and Humanities had already called attention to this development, "Considering only financing for research, the relationship between basic funding and third-party funding has shifted noticeably: in 1995 for each euro of third-party finance for research there were nearly two euros of basic funding, but by 2008 there were only 85 cents" (Wissenschaftsrat 2011). This trend will mostly have increased, if one considers that the expenditures for joint academic-related programs by Germany's federal and state governments (which explicitly exclude basic financing!) have more than doubled from € 6.18 billion in 2007 to € 13 billion in 2014.

Second, a trend should be mentioned whose beginnings reach back more than 50 years and which has led to significant growth in the number and size of universities. It reflects the political will for expanding university-level education. The share of university entrants, that is, the portion of the population born in a particular year who are starting university studies, rose from 33.3 percent in 2000 to 55.5 percent in 2016 (Statista 2017). Steadily every year out of approximately 500,000 university entrants, about 60 percent start at a traditional university and about 40 percent at a university of applied sciences. It is clear that the shift in professional education toward universities has changed the character of the university itself, and particularly the influence of the scholarly community on the university.

In summary it can be said that the impression formulated above, that state control had decreased in favor of academic self-governance, is not false; it should, however, be relativized in view of the five listed elements. Even if direct state influence on and intervention in a university have come to be rare exceptions, the state has, as a result of contract management on the one hand and shaping the framework conditions for research and teaching on the other, by no means lost its power for regulation. One can sum up positively by saying that within a complex net of agreements and incentives, universities have won considerably more freedom to define their own strategies and to guide the implementation in its details. One can sum up more critically by saying that elements of external control had gained influence through a framework that is generally more competition-oriented and through financing that is either limited in time or tied to a particular end. From this perspective, one can speak of a gain in autonomy that, on the other hand, has to be exercised within a more regulated market. Like a lens focusing sunlight into burning beams, this captures the ambivalence about autonomy and competition in the debate about basic financing for institutions of higher education. In fact, the amount of third-party financing has on the whole risen continuously as a share of a university's budget. Whereas the share was on average 14.9 percent in German institutions of higher education in 2000, by 2010 that had risen to 22.3 percent. For universities that were particularly active in seeking third-party financing the share was much higher, for example at RWTH Aachen, where the share was 41 percent (Stiftverband 2012, p. 2).

SOCIETY

At large the importance of scholarship, and thus also the importance of universities, for the development of society has increased continuously since the 19th century. From the middle of the 20th century this process sped up rapidly. Contemporary politics, business, law and education are all massively dependent on academic expertise and progress. In developed societies, people's lives around the world, down to the most mundane activities, are based on academic knowledge. Terms like "knowledge society" and "knowledge economy" serve to describe our present. If they are truly accurate and all societal activities are more or less based on academic knowledge, then the responsibility for academia and for universities has simply become a component of the state's public services for its citizens. That explains again why the state may not refrain from articulating its will or from how it will exercise its responsibility for universities. In turn, it is also evident that the dependence of almost all societal activities on academic knowledge leads to a situation in which the state cannot be responsible for, let alone steer, the multifaceted trade-offs and interdependencies. In 2016 Germany's Council of Science and Humanities took a stance on this development with a position paper entitled "Knowledge and Technology Transfer as an Element of Institutional Strategies." In the paper, the Council uses the term "transfer" in a broad sense as the interactions between academic actors and partners outside of the academy in society, culture, business and politics (Wissenschaftsrat 2016). It is appropriate to pay particular attention to individual groups of actors that are included in the term "society" and that, beyond the state, want something from the universities.

To begin with, business is an important actor. Its interactions with academia and the universities are of course governed by the framework of state laws and regulations, but within this framework autonomous parties can freely shape their cooperative relations. In 2015, business contributed nearly two-thirds of research and development expenditures in Germany, which altogether just reached the goal of 3 percent of GDP. In 2014 in Austria, universities received about the same amount from companies as part of R&D projects (approximately € 158 million in each case) as they did from the public funds to support academic research that are aimed at basic research. Approximately € 81 million came from funds provided by the Austrian Research Promotion Agency, which is also public and concentrates on applied research (Wissenschaft in Österreich 2016, p. 26–30). The increasing intensity of cooperation between institutions of higher education and market listed companies as well as small and medium-sized enterprises has led to sophisticated contract management among the partners. Tying funding to work on research items that are narrowly or broadly defined, the rights to intellectual property, and publication rights are all regulated differently according to the type of project.

In addition to research, teaching, and the development of new curricula is a field in which business and universities exchange views. Although this exchange goes back to the founding of technical universities in the 19th century, the Bologna reform has turned it into a permanent and programmatic dialog. The debate about employability and employment of graduates was particularly intense. Since that time, in Germany business associations (e.g., Federation of German Industries, known by its German acronym BDI), trade unions (e.g., German Trade Union Confederation (DGB), Hans Böckler Foundation), and trade associations (above all the Association of German Engineers, VDI), based on their own data collection and analysis, have formulated their expectations about the development of institutions of higher education and curricula business associations (e.g., Federation of German Industries, known by its German acronym BDI), by trade union representatives (e.g., German Trade Union Confederation (DGB), Hans Böckler Foundation), and trade associations (above all the Association of German Engineers, VDI) based on data collection and analysis. Cooperation between higher education and business is particularly close in the development and implementation of dual study programs. The number of these programs tripled in Germany between 2004 and 2014, from approximately 500 to around 1500. The number of students participating in them grew over the same period from about 41,000 to roughly 95,000 (Bundesinstitut für Berufsbildung 2014, p. 7 and 12).

Another fairly new discussion concerns the question about whether society can only communicate its expectations about academia through politics and business, or whether civil society should or must also exercise direct influence. This discussion is, on the one hand, promoted by academia arising from the “open science” movement, which for many reasons is working on opening the academy to society. In detail, that can include activities that communicate academic results, activities that lead to participation by societal stakeholders in the production of academic knowledge, or open access to academic results both within and outside of academic communities. How “open science” will change scholarship and also universities is still open and is a part of, among other items, “Open Science Policy Platform,” a working group set up by the European Commission.

On the other hand, civil society actors are showing growing interest in exercising direct influence on research, whether in terms of setting priorities or, conversely, prohibiting certain topics or methods of research. In an idealized representative democracy, the general will would be put into practice by way of the legislative and executive powers. Whether this avenue is by itself sufficient and effective is a question that has been for about a decade a subject of academic studies that examine new forms of state action and the spread of democratic processes of legitimation (cf. Blühdorn 2013, Innerarity 2013, Michelsen and Walter 2013).

In the meantime, politics has also begun to seek ways to integrate civil society actors so that political decisions can be more efficiently prepared, formulated and implemented. This initially genuine political process gained importance for academia and the universities in that “solving major societal challenges” –the so-called “Grand Challenges” – became a new task to which both academia and politics are similarly committed. Whether in questions of migration flows or the dangers of climate change, energy or mobility, food security or the spread of infectious diseases, fundamental, at times global, processes of change are addressed, processes that demand broad involvement from society and that require more than the academic knowledge that has to date been produced in these societies.

In a different and oft-overlooked manner, society and the trends shaping it are influencing universities via reforms to their governance. Management and governance are some of the most complex challenges a university faces. Their arrangement is widely seen as a decisive deficit (IEKE 2016, pp. 20–23; Stifterverband 2016). That makes it understandable, on the one hand, that universities seek support from existing models of organization and management. On the other hand, there is a danger that methods will be imposed on universities that are not appropriate for their tasks and goals. Many critical reactions have already been written about the effects of "new public management" on the organization of higher education (representative works Münch 2009 and 2011). The methods of guidance, in many cases inspired by business practices and usually based on indicators, developed their own logic and effectiveness, regardless of the scholarly or state-mandated goals for which they were supposedly introduced. "Whatever you measure, you'll get more of it" describes one adaptation of academic production and university practice to what is often criticized as the "businessification" of scholarship and the university. As unobjectionable as a professionalization of university management might be, it would be naïve to assume that the management effects that accompany professionalization are neutral with regard to the dynamics that we have described above as genuinely scholarly.

The societal demand for the most barrier-free access to free universities stands to a certain extent in opposition to business principles. Making tuition fees taboo, combined with state-mandated limits on student head counts (set by the states in Germany with capacity regulations) limits universities' room for maneuver.

Conclusion

In the preceding chapters we have analyzed the interests of the three actors "scholarship," "state," and "society" toward universities. The last chapter takes up the question of how the institution of the university can optimally handle these expectations and influences.

As an interim result, we conclude that the three actors have identical, complementary and contradictory interests in the university. To make this clearer, we summarize below the commonalities and discrepancies between each of the pairs of actors.

Scholarship and state both want strong research, good academic education, and support the freedom of research. The scholarly community understands this freedom as an absolute freedom in terms of topics; the state has an interest in universities increasingly addressing the larger problems of society. In Austria, Germany and Switzerland, the state guarantees universities wide-ranging autonomy, but this autonomy is tied to legal and financial frameworks that can make it a double-edged "present" for a university. In the end, an ambivalent situation exists between the increasingly academic nature of professional education and the resulting rises in the number of students as well as the share of an age cohort that is studying at a university. Basic financing that is tied to the number of students makes this growth attractive for a university, but at the same time it changes the relationship between research and teaching, in favor of the latter, and thus threatens to marginalize research at universities.

Scholarship and society also both desire strong research. In academic teaching, society is pushing for a growing share of people who attend university and access to higher education without hurdles or out-of-pocket costs (no tuition fees). The scholarly community, by contrast, would like to at least not lower the qualitative requirements, and for universities to be able to choose their students freely. Similarly to the state, society would also like to steer research topics increasingly in concrete directions, although there is a wide disparity of views within society what these directions should be. Especially from the side of civil society, particular interests are presented to the university regarding the support of prohibition of certain fields of research such as genetic research, medicine, research with animals, energy, or climate, among others.

State and society agree that universities should enable good education, innovative research and strengthening the academic nature of career education. Both would like to exercise on the selection of topics for research and curricula, but their notions do not necessarily run in the same direction. The state sees initiating research programs to solve societal problems or support national industries as part of its sovereign responsibilities. Society, by contrast, would increasingly like to exercise its influence directly, i.e., not via the state, although the economic interests and the interests of civil society are often diametrically opposed. In this constellation, the state acquires a particular role as protector of the freedom of research.

What are the consequences of these partially diverging demands on universities, and how should they be handled? In the course of the debate on these matters in recent years, two concepts have proved stable, and they will clearly have a key role in the future development of universities: differentiation and governance. Differentiation can be directed inwardly, as a means of handling the multifarious expectations and demands made by the actors sketched above. Differentiation can, however, also be applied to the system of higher education as a whole, and the institutional differences that are introduced by different role models within the system. Governance denotes the organization and leadership of a university, as well as the decision-making and participation approaches that are necessary, not least for situating the institution within the external process of differentiation and for effective internal organization.

We begin our analysis with the statement that the university represents only *one* of many ways that scholarship can be made fruitful for state and society, and that knowledge can be passed on by teaching. In addition to universities there are independent research institutes, universities of applied sciences, vocational training schools, and others. It is entirely possible that the increasing role of the internet in professional and continuing education (key term, “massive open online course,” or MOOC) could in the near future strengthen the competition that other actors exert on universities. The lack of a monopoly position for universities is, however, not necessarily a drawback; instead, universities can use it as a chance to increasingly go their own way. That means, within the framework of the idea of a university, there is not just one model, but rather very different possibilities for passing on knowledge and doing research.

Taking advantage of these available possibilities is known as differentiation. Unfortunately, in public discussion the concept of differentiation is still competing with a unique "idea of the university" and the search for one motif that will integrate the institution. The idea of unity then allows variety, distinctions, and diversification to appear only as loss or depravation. To find a way out of this fruitless perspective, it is worth recalling how old the concept of differentiation is and how long it has accompanied the discussion about the state of universities. The insight that for 95 percent of our students the university is also a training school for the professions that are based on scholarship was diagnosed by Max Scheler as a "fundamental contradiction in the university of today" (Scheler 1926; here and following quoted according to Rohe (2008)). The university can no longer satisfy with *one* idea of a university the heterogeneous demands to which it already felt itself exposed long ago.

Scheler's proposal for a solution is differentiation. The Prussian Minister of Education at the time, Carl Heinrich Becker, came to a different conclusion. Both obviously had different understandings of differentiation – Becker seeing it as differentiation within an institution, and Scheler by contrast seeing it as differentiation among systems. Scheler's analysis of the problem and the options that he sketched for solutions are astonishingly contemporary. "Becker wants to eliminate the cited contradictions by means of the largest concentration of all tasks of German higher education into, if possible, a single fundamental and core institutional form: the university. He then wants to use internal extension and differentiation of the tasks and performance of this reformed educational institute to achieve what is necessary. I, by contrast, take the position that it is not possible to recreate the old and already highly concentrated 'universitas.' It seems far more necessary to me to divide, as possible, the fundamentally different tasks among a variety of institutions of higher education that of course are joined by certain directions and regulations, and which would then engage in lively exchange, but at the start would have to work out their places separately and divided from one another."

This analysis impressively shows that even 90 years ago new concepts of a university, which had become unwieldy, were developed that was better suited to the differentiated needs of society. The choice of the relative weight given to the two main pillars of a university, research and teaching, already represents an important element of what is known as *horizontal differentiation according to areas of performance* (Wissenschaftsrat 2010). The spectrum ranges from research universities that emphasize graduate and post-graduate education (similar to the model of California Institute of Technology, Caltech) to purely teaching universities, for example, with an emphasis on continuing education. A second dimension concerns *horizontal differentiation according to fields of study*, that is, concentration on certain disciplines and the simultaneous abstinence from other subjects. Spoun and Weiner (2016) remind German universities of the guiding principle of leading American universities and write, "No single university should claim to be good in every aspect, and thus to support everything."

The German Council of Science and Humanities note that in addition to the horizontal there is also *vertical differentiation*, which exists as a result of many factors, not least the widely varying financial capacity of universities within one country and among different countries (Wissenschaftsrat 2010). The term refers to the varying depths in addressing the knowledge of a discipline in teaching and research. It is obviously a part of the ritual of political correctness to see vertical differentiation as solely the regrettable result of external factors, and not as a possible conscious strategy of a university. This attitude seems outdated to us, particularly because of the increased share of people attending institutions of higher education. Just as a three-star hotel is not merely the failed attempt at a five-star hotel, but rather represents the conscious approach to a particular market segment, vertical differentiation can be volitional and meaningful, for example with the goal of being closer to applications at the cost of theoretical depth. Naturally, this takes us closer to the segment that is actually the realm of the universities of applied sciences, but that is no coincidence. The "quantum leap" between the types of institutions is anyway artificial. It would be more realistic, and the future will head in this direction, to have a continuum of types of institutions from leading research universities to practice-focused trade schools.

The decisive question is not whether differentiation in one direction or another makes sense, but rather how a university must be set up to be able to reflect on the process of differentiation and afterward implement the strategies that are developed. That brings us to the question of the university's *governance*. How decisive governance is was recently shown once again by a study in which more than 100 German leaders in higher education were polled (Stifterverband 2016). The result is sobering: there is no shortage of strategies being developed; rather, they are being inadequately implemented.

Autonomy and governance, the external and internal factors guiding a university, are tied to one another like the two sides of a coin. Olbertz (2016) correctly points out that autonomy is not only *guaranteed*; it must also be *exercised* by the university. For Olbertz, who as a former president of the Humboldt University in Berlin argues in his essay primarily for research-oriented universities, the decision-making mechanisms should be "scholarly-led," without losing sight of other elements such as co-management. Just as differentiation among institutions of higher education makes a broad spectrum of varying types of higher education institutions possible, the governance of an institution includes numerous variants that are aligned with specific differentiations. All of these models must, however, have in common that the university is *capable of acting*, and that its leadership and decision-making structures are located where responsibility for the results of decisions is assumed. According to Olbertz, the co-management of the various groups and the delegation of decisions to diverse bodies within the institution of higher education can make it difficult to come to good decisions or even prevent a decision at all by a *de facto* veto. Noteworthy is his call, obviously born out of his own experience, to tie co-management within the institution, which he says is essential, to certain rules to prevent the decision-making process from being lamed. These rules could include, for example, a provision that opposition to a proposed decision is only admissible if accompanied by an elaborate alternative on which could be voted.

The autonomous university needs external oversight. It would, however, contradict the principle of autonomy if this responsibility were handed over to the state, as was often done in the early years of autonomy in higher education. Nowadays, oversight boards are set up in which the various groups of actors are represented. In respect to both the composition and the effective operation of these boards, it is important to pay careful attention that *ex post* oversight does not mutate into *ex ante* guiding of the university. The board should, moreover, limits itself to overseeing and monitoring the process of reaching decisions to see whether the university does indeed follow the strategy that it has set out for itself. Obviously this self-imposed restraint does not rule out exchanges between the university and the supervisory board about strategies and prospective decisions in order that the university's leadership profits from the experience that is represented in the supervisory board.

Whether the state (the ministry) should be directly represented in a supervisory board as one of the three actors is deliberately left open here. In any event, the laws set by the state, especially the definition of autonomy for higher education, are decisive for a university's functioning. That brings us back to the external factors that determine a university's room for maneuver.

When we speak about autonomy in higher education, we may mean very different things. Aghion et al. (2010) examined the question of which factors are responsible for making a university one of the world's top institutions. Based on an analysis of American and European universities, the authors identified capacity for action, autonomy, and competition as decisive. Although these conclusions only apply to research universities, it is reasonable to ascribe high significance to autonomy for other kinds of higher education institutions as well.

It is instructive to consider which criteria are used in the study to evaluate the degree of autonomy. They include, for example, the question of whether the university determines its own curricula, whether it selects its own students and members of its faculty, and whether it has a differentiated, performance-driven system of compensation. Based on these criteria, the statement from chapter 3 can be substantiated, that autonomy in higher education may, under certain circumstances, lead to the reduction of a university's room for maneuver. The problem occurs es if autonomous and non-autonomous elements are not adjusted properly, for example, if the state decides on the university's budget, its compensation system and the subjects that must be taught while simultaneously mandating that the institution must admit all of the students who sign up, as is the case in Austria. In such cases, a university's leadership hardly has any room for maneuver, and autonomy degrades, as it were, into a straitjacket.

In Germany, the Länder (states), which are responsible for universities, have promulgated "capacity regulations," which set out, according to the size of the faculty, how many students must be admitted to a particular curriculum. Within the framework of the country's Excellence Initiative, these regulations have, for example, led to situations where the creation of additional professorships in selected key subjects to improve the student-faculty ratio and to improve ties between teaching and research resulted in the university being required to admit more students in these subjects because they had increased the size of the faculty. As a result, the concentration effect that the university had been aiming for was completely lost.

As a further example of lack of coordination between autonomous and non-autonomous regulation, we mention the numerous time-limited employment contracts for young scholars that result from the combination of special financial support programs by the state and academia's interest in growth. Support for young scholars and their integration into the institutional setup of the academic system was and is one of the universities' key tasks. If, however, between 1995 and 2012 in Germany the number of academic assistants – in most cases people who can be considered younger scholars with time-limited contracts – increased from 91,000 to 158,000 (Wissenschaftsrat 2014, p. 126), then it would be particularly foolish to presume that universities could come to terms with the accompanying tasks with just a good mentoring program for young scholars, no matter how carefully thought out (cf. Rohe 2014).

Let us sum up: Autonomy is a key factor for an institution of higher learning to find its own way between the expectations of the various external actors and to actually be able to follow its defined way. However, not everything that is sold today under the label of autonomy for higher education actually produces additional room for maneuver for a university. Conversely, autonomy for the university is not only a gift, it is also a duty to use the associated freedom to consciously shape the process of differentiation, which will only grow in importance. In both fields of action there is a need to take steps. The state needs to guarantee the elements of autonomy that are suitable and to provide the right systems of incentives. The university needs to provide the right form of governance, even if this is not always welcomed by everyone who is part of the institution.

Where are universities headed? Certain societal trends will hardly change. The trend to create more professions based on academic education will continue, and with it the necessity of universities seeing the universities of applied sciences not as competitors but as partners with whom they must find a proper division of labor in the education of growing numbers of students. The post-truth currents in politics and society will be additional burdens on the universities' autonomy. Freedom of research will be called more strongly into question from several directions, and there will be increasing attempts to instrumentalize scholarship, and thus primarily universities, for particular interests. Universities will only be able to master these conflicts with the help of the state as the guarantor of freedom of research.

The apparently unavoidable societal trends do not rule out the possibility that an individual university, in the sense of our discussion about differentiation, will be able to withstand one trend or another. That is particularly true of the trend toward growth. Particularly universities that want to position themselves at the top, should recall the principle of numerous leading American universities that a conscious choice to limit quantitative growth in favor of quality can be a smart strategy for the future.

That brings us back to the beginning: The conflict about who wants something with or from the universities is in many senses a fruitless one. It is in the nature of the institution of a university and its success over the centuries that it is the focus of various requirements. The continuous search for the right balance ultimately keeps it young and dynamic.

REFERENCES

Aghion, P. et al. (2010). "The governance and performance of universities: evidence from Europe and the US." *Economic Policy,* January 2010, pp. 7–59.

Blühdorn, I. (2013). *Simulative Demokratie: Neue Politik nach der postdemokratischen Wende*. Frankfurt am Main: Suhrkamp.

Bundesinstitut für Berufsbildung (2014). *Duales Studium in Zahlen, Trends und Analysen*. Bonn.

Innerarity, D. (2013). *Demokratie des Wissens. Plädoyer für eine lernfähige Gesellschaft*. Bielefeld.

Internationale Expertenkommission zur Evaluation der Exzellenzinitiative (IEKE) (2016). Final report.

Michelsen, D. und Walter, F. (2013). *Unpolitische Demokratie. Zur Krise der Repräsentation*. Frankfurt am Main: Suhrkamp.

Münch, R.(2009). *Globale Eliten, lokale Autoritäten: Bildung und Wissenschaft unter dem Regime von PISA*, McKinsey & Co. Frankfurt am Main: Suhrkamp.

Münch, R. (2011). *Akademischer Kapitalismus: Über die politische Ökonomie der Hochschulreform.* Frankfurt am Main: Suhrkamp.

Nietzsche, F. (1872/2014). *Über die Zukunft unserer Bildungs-Anstalten. Sechs, im Auftrag der "Academischen Gesellschaft" in Basel gehaltene, öffentliche Reden*. Berlin 2014.

Olbertz, J.-H., S. (2016). "'Good Governance' und akademische Selbstverwaltung – ein Widerspruch?" In *Hochschulgovernance*. Nadine Poppenhagen, Ed. Konrad-Adenauer-Stiftung.

Rohe, W. (2008). "Lehre, Forschung und Ausbildung in den Geisteswissenschaften als Aufgabe der Universitäten." In *Arts and Figures. GeisteswissenschaftlerInnen im Beruf*. Constantin Goschler, Jürgen Fohrmann, Harald Welzer und Markus Zwick. Eds. Göttingen. pp. 77-83.

Rohe, W. (2014). "Zwischen allen Stühlen: Postdoktoranden." *Frankfurter Allgemeine Zeitung* 3 January 2014.

Scheler, M. (1926). *Die Wissensformen und die Gesellschaft*. Leipzig. As quoted by Rohe (2008).

Spoun, S. & Weiner, S. (2016). "Hochschulgovernance im Dienste der Wissenschaft." In *Hochschulgovernance*. von Nadine Poppenhagen, Ed. Konrad-Adenauer-Stiftung. pp. 7-18.

Statista (2017), Das Statistik-Portal. Online: https://de.statista.com/statistik/daten/studie/72005/umfrage/entwicklung-der-studienanfängerquote

Stifterverband für die Deutsche Wissenschaft (2012). Ländercheck: Lehre und Forschung im föderalen Wettbewerb. Online: http://www.laendercheck-wissenschaft.de/drittmittel/laendercheck_drittmittel.pdf

Stifterverband für die Deutsche Wissenschaft (2016). Hochschulstrategie und Governance. Online: https://www.stifterverband.org/medien/hochschulstrategie-und-governance

Strohschneider, P. (2015). "Versuch über die Universität." *Konstanzer Universitätsreden Nr. 2015.*

Wissenschaft in Österreich (2016). Statistiken. Bundesministerium für Wissenschaft, Forschung und Wirtschaft.

Wissenschaftsrat (WR) (2010). Empfehlungen zur Differenzierung der Hochschulen. Online: http://www.wissenschaftsrat.de/download/archiv/10387-10.pdf

Wissenschaftsrat (WR) (2011). Neuere Entwicklungen der Hochschulfinanzierung in Deutschland. Online: http://www.wissenschaftsrat.de/download/archiv/VS_Bericht_Juli_2011.pdf

Wissenschaftsrat (WR) (2014). Empfehlungen zu Karrierezielen und –wegen an Universitäten. Online: http://www.wissenschaftsrat.de/download/archiv/4009-14.pdf

Wissenschaftsrat (WR) (2016). Wissens- und Technologietransfer als Gegenstand institutioneller Strategien. Online: http://www.wissenschaftsrat.de/download/archiv/5665-16.pdf

Wissenschaftsrat (WR) (2017). Basisdaten zu Hochschulen und Forschungseinrichtungen in Deutschland. Online: http://www.wissenschaftsrat.de/download/archiv/Basisdaten.pdf

Short Biographies

Dieter M. Imboden studied theoretical physics in Berlin and Basel and received his doctorate at the ETH Zurich. At the Swiss Federal Institute of Aquatic Sciences and Technology (EAWAG) he conducted research on physical processes in lakes and oceans. In 1987 he was one of the co-founders of the new curriculum at ETH Zurich in environmental sciences. He was professor for Environmental Physics at ETHZ until 2008. From 2005 to 2012 he was President of the research Council of the Swiss National Science Foundation (SNSF). He is the author of several text books.

Wolfgang Rohe is one of the members of the Executive Board of Stiftung Mercator in Essen. Before he worked for the Deutsche Forschungsgemeinschaft (DFG) and the German Council of Sciences and Humanities (Wissenschaftsrat). His interests lie in the field of university and research policy, especially the interaction of science, society and private foundations.

This report is originally published in German and has been translated into English.

2.

RE-IMAGINING AND RE-LEGITIMISING THE UNIVERSITY – WHERE PAST AND FUTURE IMAGINARIES MEET

Ulrike FELT, Maximilian FOCHLER, Ruth MÜLLER,
Helga NOWOTNY

ABSTRACT

In this contribution we explore the recent reforms and transformations of Austrian universities as processes that are in many ways shaped by explicit and implicit normative assumptions about the past, present and futures of universities in national and international contexts. We argue that a reflexive engagement with the prospective and retrospective technopolitical imaginaries is essential for a better understanding of the current tensions in (a) the governance of now-autonomous universities, (b) contemporary experiences of working and living in academia, and (c) the relationship between science and society. Our analysis of these influential imaginaries aims to develop an analytical basis for reflexively re-imagining and re-legitimizing Austrian universities taking into account both their national specificities and the importance of an international orientation.

INTRODUCTION

Universities have become key-actors in the shaping of contemporary societies and their futures. Not only do they contribute to our body of knowledge in essential ways. They also play a central role in training both the next generation of researchers and the ever-growing group of knowledge workers, who will contribute to innovation and occupy core positions shaping societal developments in many different ways.

Hence it is not surprising that the future of universities as institutions of research and higher education is the focus of multiple policy interventions. Universities have become policy laboratories and major sites of experimentation on how to re-align science and society in rapidly changing global environments. In specific national contexts, such as Austria, these interventions need to be understood and analysed against the background of a historically developed higher education system. At the same time these experiments are embedded in wider changes due to digitalization, globalization and privatization. These changes are often captured in policy buzzwords such as excellence, relevance and competitiveness. They point to a need for international alignment between different national science systems, while they at the same time often create tensions with specific national contexts and their distinct histories.

Thus, while the discourses on and visions for the university, captured in these buzzwords, seem to convey a convergence on a supranational level, we simultaneously can witness profound heterogeneities when it comes to their realisation (Felt 2009). Therefore, what "being a university" (Barnett 2011) might mean in a specific national context has become a highly challenging question. In this essay, we want to address this question from an Austrian perspective.

A short pre-history: reform and (self)experimentation

To understand the tensions that are visible in the contemporary Austrian university system, we have to look back to the 1970s. The University law of 1975 implemented a policy of general access to any Austrian university for anybody who fulfils the formal requirements, to any study program and with no tuition fees. This idea of greater inclusiveness was also translated into intra-university decision-making structures. These were re-structured with the aim of giving voice to all groups within universities, from professors, to the so-called *Mittelbau* (pre- and post-docs, assistant and associate professors, and external lecturers), to the students and the administration. Even though most important final decisions were handled at the level of the responsible ministry, a strong feeling prevailed that these structures, often labelled as democratic, would stand for inclusiveness, which would foster intra-institutional debate. Thus, a broader set of values would find its way into decision making, better reflecting societal diversity.

However, from the 1990s onwards Austrian universities started to undergo a series of significant transformations, often in opposition to these earlier conceptualizations. This is not surprising given the fact that universities in most European countries were undergoing quite profound reforms during this period, all reflecting a wider rethinking of the relation of science to technological development and innovation as well as their relation to society (Felt and Glanz 2003). This rethinking was clearly expressed in one of the first Austrian policy papers explicitly addressing science and technology policy issues in Austria, the so called *Grünbuch*, published in 1999 (BMWV 1999). In this document science and technology were not only clearly highlighted as "supporting the solving of societal challenges", but also as "the basis for economic competition" (ibid., 7). With regard to science-society interactions, the *Grünbuch* urged for more problem-oriented research as well as a "stronger involvement of society" (ibid., 81), clearly stating its preference for participatory approaches when it comes to addressing societal issues related to science and technology.

In Austria, many of the concrete reform steps that followed were taken – as we will argue in more detail later – in response to a rising critique of the established system, which was seen as not fulfilling contemporary expectations. In 1999, a new university law came into effect (the law had already been passed in 1993), marking a first step towards a partial autonomy. This was quickly followed by a further change of the legal status of universities (University law 2002), reaching full autonomy with the full implementation of this law in 2004. This law thoroughly reshaped universities. It introduced new governance structures, which centralized power in the rectorate; installed a board of governors (*Universitätsrat*) with the aim of representing society's visions on important decisions concerning the university's development; profoundly reshaped staff categories and working contracts (abandoning the civil servant status of future university staff); introduced a formal quality management system with the obligation of regular evaluation of research and teaching activities; and changed the study laws.

Given the profoundness of these changes, it is no exaggeration to state that over the past 20 years Austrian universities have been in a quasi-continuous process of (self)experimentation, with reforms often coming with a frequency that hardly allowed for an assessment of their impact before the next step was taken. We use the notion (self)experimentation, because it is both a policy experiment in the sense of trying to redefine the position of the university within a changing society, while, simultaneously, it is a self-experiment as university leaders and staff had to experiment with finding ways to live and work under these new conditions.

These experiments with new modes of university organization and governance were often accompanied by strong narratives about an unsatisfactory past. This past was depicted as having been devoid of international competition, lacking systematic quality control mechanisms, with low staff mobility and a recruitment policy too strongly focused on inside recruitment and offering too "comfortable" working conditions (Felt and Fochler 2010). The past of the Austrian university system was, therefore, discursively characterised as parochial, while the new reforms were imagined to elevate the system up to international standards of quality in research, thus becoming more up-to-date in its interaction with society.

(Re)Imagining the university

Starting from this short account of past reforms and the many tacit assumptions about the past, the present and desirable futures they perform, a key argument of this essay is that in order to understand contemporary change and its consequences, we have to move beyond focusing our attention on formal changes at the legal level or in intra-university governance structures, rules and regulations. Rather we consider it essential to reflect on the wider imaginaries of the university and its function in contemporary societies that are performed through these reforms. This approach takes inspiration from Jasanoff's (2015, 4) concept of "sociotechnical imaginaries", asking which "collectively held, institutionally stabilized, and publicly performed visions of desirable [societal and simultaneously academic] futures" relate to developing a specific form of a public university. We want to draw attention to how institutional developments are intertwined with ideals of what constitutes a good societal future as well as how wider social orders are reflected in institutions of knowledge production and higher education. Our approach aims to sensitize the reader to the fact that universities are not merely legally reformed – their relation to society needs to be continuously re-imagined, while trying to also re-legitimize them to attain and retain public support. It raises the question whether or not the imaginaries developed in policy realms actually match those developed by researchers or by wider society. Failure to do so could potentially lead to a de-legitimization, and, as a consequence, to a loss of the capacity to attract talented people and to a loss in public trust and appreciation.

Any university reform, therefore, must be accompanied by a collective re-imagining of the institution. This means being able to accommodate local/national histories and a political culture, which cherishes a specific relation to research and innovation (Felt, Fochler, and Winkler 2010), while at the same time taking wider international developments into account. This explains why we witness a positive feeling of departure and forward looking attitudes which claim to radically break with the past, while simultaneously indulging in nostalgic narratives of the "good old times" (Ylijoki 2005) in which research could develop based on its intrinsic values and speed. Thus, it is essential to reflect more recent efforts to restructure and reform universities in the Austrian context with the aim of understanding (1) what problems are articulated as the reason for these shifts, (2) how key-notions representing change (e.g. excellence, internationalisation, efficiency) are translated into actual structures and practices, (3) which ideas of society and its relation to knowledge and innovation are embedded in these reshaping exercises (e.g. increased societal relevance, problem-orientation, better public support), and finally, (4) which unintended consequences and unexpected tensions emerge from current reconfigurations, which might hinder the envisioned co-evolution of science, technology and society.

In what follows we will engage with these processes of change from three concrete perspectives. The first perspective will address issues of governance as an expression of newly emerging value structures in research and higher education. Secondly, we will reflect how, as an outcome of national and international changes, work and life in the university was re-imagined and re-structured. Finally, we will ask how the imagined relation of university and society has shifted. Bringing these three perspectives together will allow us to draw conclusions about central problems of the current Austrian university system and how we might address them more productively[1].

GOVERNING AN AUTONOMOUS UNIVERSITY

As sketched above, imaginaries of the profile of a modern university and its relation to politics and society were integral to the major governance reforms in the Austrian university system in the 2000s. In 2002, the new legal framework for universities promised to grant universities more autonomy from their main funder, the state. In the policy discourse accompanying the reform, emphasis was placed on the expectation that universities could and should use their increase in autonomy to debate and define their specific and distinct profiles (Pichl 2012).

On the operational level, however, this new autonomy was partial at best (de Boer, Enders, and Schimank 2007, Neuhauser 2004). A new system of performance agree-

1 The arguments in this paper build on research projects the authors have carried out over the last 20 years (on university governance, the dynamics of academic careers, and on science/society relations), as well as on their experiences in functions of university governance and in policy making.

ments (*Leistungsvereinbarungen*) between each single university and the responsible ministry became institutionalised. It couples financing to (lengthy and detailed) negotiations about the aims of the university in general, and particularly to its performance as measured according to standardized indicators. These indicators are provided by the knowledge balance sheets (*Wissensbilanzen*), which universities are legally required to provide according to the 2002 reform.

With the institutionalisation of the new indicator system, the observation and quantification of the work done at universities received an important, new role in their governance (Felt and Fochler 2010, Gläser et al. 2010). Transparency and comparability, both nationally and internationally, were important keywords in legitimising the introduction of the *Leistungsvereinbarungen* (Wodak 2009). On the one hand, they should provide a more objective basis for governance decisions by the ministry. On the other hand, a turn to performance monitoring was expected to be crucial for exposing Austrian universities and the scientists working in them to international quality standards.

More than a decade into the new governance scheme, two observations seem in order (see also Stampfer, this volume). Seen from the perspective of many actors in the system, university autonomy is considerably more constrained and partial than it had been imagined – not least due to the general austerity conditions and the corresponding considerable degree of micro-management in the negotiation of the performance agreements. The other observation is the fact that the importance of the role of indicator systems in the governance of universities has been greatly underestimated.

Rather than purely and objectively measuring the activities of universities, the indicators of the knowledge balance and the way they are defined also sketch an implicit imaginary of the university and its role in society. By definition, indicators are a reduction of complexity. They reduce the diversity of the practices at a university to aspects and features that can be counted. The quality of education, then, becomes measured in the absolute numbers of graduates or the relative rate of successful students, while the quality of research is measured in the number of publications in specific outlets or third-party funding acquired.

Some activities at universities, such as publication activity, can seemingly be quantified more easily than others. For example, it is hard to measure societal impact in numbers. Also, some categories of publications, such as international journal articles, can be monitored in more concise forms than others, e.g. books – not least due to the vastly different quality of international databases in both domains (Leydesdorff and Felt 2012). As different scientific fields have different channels and formats of communication, they are also affected by this dynamic in different ways (Laudel and Gläser 2006).

Austrian governance indicators do not exist in an empty space. Their definition is influenced by a plethora of international systems of indicators and their respective infrastructures. Different university rankings compare institutions of higher education on a global scale (Hazelkorn 2015). At the level of the European Union, the innovation performance of member states is compared along indicators, which to a considerable extent target universities as well. All these exercises are of high discursive relevance to university leaders and the ministry, as exemplified by the visibility and importance that international rankings have been given. Accordingly, indicators may be expected to impact the definition and perception of quality. Furthermore, they influence the perception of which fields of research contribute more to maintaining a good standing in the indicator systems.

Defining indicators for measuring the performance of universities, therefore, always means to implicitly sketch an imaginary of the comparative standing of the university and its future development. Governance instruments, such as the performance agreements, steer universities to orient their activities in ways which optimize their performance along the specified indicators. International studies have shown that higher education institutions show surprisingly little capacity to "buffer" the effects of performance indicator systems on their own practices and their employees (Sauder and Espeland 2009). Reactions range from "gaming" the indicator systems to redefining institutional missions and to reorganizing internal structure. This does not happen in order to develop a specific sense of quality, but rather to comply with the quantitative logics of performance measurement on which the financial success and, sometimes, the survival of the institution depends.

These dynamics are problematic for two reasons. First, rather than being seen *as tools* for achieving a more subtle and complex concept of quality, indicator systems are increasingly seen *as defining* quality by themselves. Within an institution, the full governance effects of this dynamic unfold as performance indicators are "handed down" to govern activities of faculties, departments or individual researchers in performance and tenure agreements. As a consequence, quality is more and more often defined as the production of an as-high-as-possible number of countable outputs in a specified time frame. Critical authors describe universities as institutions of knowledge production that seem to be transitioning from a "logic of discovery" to a "logic of delivery" (Felt 2017, Murphy 2015). Contemporary debates in many research fields stress that a higher quantity of publications does not necessarily correspond to, or may even hinder, the substantial progress of knowledge in a field or its ability to innovate (Alberts 2013). However, most would see the ability to foster innovation and to contribute to the solution of societal challenges as key missions of contemporary and future universities. Whether a "logic of delivery" as the main *movens* of the institution can foster this goal seems questionable.

Another, largely unintended consequence arises because performance indicators are standardized, often internationally, across institutions. These dynamics are likely to cause institutional isomorphism (Sauder and Espeland 2009). This means that rather than developing distinct profiles, universities are likely to develop similar structures and strategies to respond to the implicit governance exercised by indicator systems. Particularly in university systems characterized by a considerable historically developed multiplicity of functional and regional specialisations of universities, such as in the Austrian case, this is likely to result in a loss of diversity. Also, specific institutions and scientific fields may be better positioned to comply with the logic of quantitative indicator systems than others, thus creating a distorted competition. For example, the unequal student/teacher ratio across not only the twenty-two public

Austrian universities, but also across scientific fields in one and the same institution, creates a competitive disadvantage for some.

Summing up, the rising importance of the monitoring of performance through standardized sets of indicators in the governance of universities – as it is institutionalised in the Austrian *Leistungsvereinbarungen* – contributes to a narrowing of the imaginative capacity of universities in defining their profiles and futures. Management and governance by indicators runs the risk of attempting to optimize *within* the logic of quantitative performance instead of asking more complex and thorny questions about the meaning of quality at a university and in relation to societal expectations.

This absence of structured and more collective quality discourses across different fields and work realities is also connected to a further facet of the recent governance reforms. Participatory structures and arenas for having discussions on such crucial questions, have been reduced and, where they have remained, they only serve as advisory functions to a structure of top-down governance. While the efficiency of earlier forms of governance may be debated, their downscaling also has problematic effects that are often not considered. Such spaces actually are indispensable for arriving at institutionally sustainable and shared visions of the university in the future – including notions of quality and university-society relations. Substituting a substantive discourse about the complex meaning of quality for different scientific fields and in different contexts of practice with a homogenizing technical understanding of quality as expressed in standardized indicators seems one of the most central threats for the future of Austrian universities.

While the ways in which the *Leistungsvereinbarungen* seem to restrict a wider imagination of the university, we should highlight, on a more positive note, that the Austrian university system – in international comparison – has a relatively high degree of state financing. As a consequence, neither the competition for tuition revenues nor for private endowments play a significant role in Austrian university financing. And so far, Austrian universities' direct dependence on, for example, on their performance in international rankings, is still relatively low. Hence, there seems to be at least some room for re-imagining university governance and the role of indicators in it in more productive ways.

Living and Working in Academic Research

Austrian university reforms in recent decades have altered quite strongly the formal conditions of employment in research and the structure of scientific careers. Under the earlier system, once you held a university position, the awarding of a *habiliation* was in general sufficient to attain a lifetime employment (and the status as a civil servant). The new university laws abolished this possibility. At the time, these career patterns were viewed as too parochial and endangering the competitive capacity of research in Austria. In parallel, legal framework conditions had to be established for facilitating the strong increase in staff financed by third party projects. As a result, all employment below the level of the professoriate became temporary, with a maximum limit of six years in full time employment at one specific institution, in the framework of the *Kettenvertragsregelung.* In addition, and with significant delay, tenure track positions were put in place as a novel line of employment. However, these positions remained extremely few in numbers as compared to the enormous rise in the number of researchers working on research projects on short term contracts.

These changes in employment conditions mirror the tensions in contemporary science policy discourse concerning academic career development. One the one hand, policy documents assert that societies need universities to train more researchers (e.g., Gago et al. 2004). On the other hand, questions arise about whether universities are 'training too many scientists' (Trivedi 2006) for the available number of long term career opportunities (Stephan 2012). The latter would create already palpable effects, such as intense competition and long-term career insecurity, as a consequence of what some perceive as a lack of institutional accountability for a balanced relationship between scientific training, academic employment and societal capacity building. In the Austrian context, these tensions have lead some to question whether training at the level of the PhD should in principle remain as open as it is now, or if there should be a cap on how many new researchers are being trained.

In the following we will trace a number of the tensions that arise as a consequence. In some fields the trends described in this section are particularly pronounced and there are for sure disciplinary differences. Yet, the basic principles underlying many of our observations are valid across a wide variety of research fields and career paths. While the norms, values and practices of career development are currently studied in most detail in the natural sciences, they actually tend to travel to or be observable in other disciplines as well, shaping career structures and expectations through mimetic effects on the level of funding structures and evaluation practices (Felt 2009, Felt and Fochler 2010, Kaltenbrunner and de Rijcke 2017, Hackett 1990).

Distilling some of the key characteristics of careers in the 21st century university for the Austrian context results in the following observations. Contemporary academic careers have been subject to significant attempts to standardize their sequence and temporality. Some of these standardizing practices are explicit, e.g. cut off points for biological or academic age for specific fellowships, prizes or grants, while others are implicit. For example, the average duration of projects of three years has shaped the imagination of how long a PhD should take irrespective of field. Both these explicit and implicit aspects shape expectations of when a scientist should transition from one distinct period of academic work to another. For example, the new tenure track system at the University of Vienna prescribes that any applicant has to have at least two years of post-doctoral experience before applying to such a position, preferably in an international environment.

The specific temporal imaginary of an academic career is highly normative, linear and effective in re-organizing expectations of who counts as a suitable academic. Deviations from the path – e.g. a longer period of work outside academia – appear increasingly at odds with the expectations of academic careers (Fochler, Felt und Müller 2016), at least in many parts of the natural sciences. The social sciences, to take another example, do not show such clear patterns, but there are strong variations in expectations, resulting in a high degree of uncertainty for individual junior researchers (Felt 2009).

At the same time, the period when scholars still count as junior, hence as non-established, is extensive. Even scholars who adhere almost perfectly to the normative career path will be in their late thirties before they can assume some career stability. This tension is part of an affective economy in contemporary academia where highly trained scholars feel both existentially and emotionally dependent on academic success (Müller 2014, Fochler, Felt, and Müller 2016). They frequently experience their training and work practices as preparing them exclusively for academic careers, while these careers remain highly uncertain and alternative routes do not seem sufficiently valued. In interviews we carried out with researchers, they often attribute transgressions of good academic practice, ranging from semi-accepted practices such as the 'salami-slicing' of research results for publication to substantial fraud, to this locked-in situation and the resulting emotional dependence (see for example Martinson et al. 2006).

While institutions and senior staff are in one way or another aware of the problem, too little is being done to rethink academic training and work practices in ways that would accommodate this tension better, for example by actively preparing scientists for multiple career options. This lack creates a situation where junior researchers are asked to devote all their resources to academic career development; the responsibility to cope with the insecurities of an academic career, however, remains individualized, with (publicly funded) institutions failing to take responsibility for training researchers in ways that also prepares them for jobs in other sectors of society.

This individualization of responsibility has a number of corrosive effects on academic practice. First, it triggers a significant orientation towards mainstream indicators of academic success among researchers. We see that increasing importance is being given to quantitative performance indicators, such as publication numbers, journal impact factors or volume of funding, which have come to signify academic quality. In a setting where scholars experience high competition, uncertainty and emotional dependence this leads researchers to assess research questions and possible projects mainly in terms of their publishable results (Fochler, Felt, and Müller 2016). A good project needs to yield high-level publications – and in a relatively short timeframe. This generates a specific 'chronopolitics' of academic labour (Felt 2017) that is dominated by a rationale of selecting questions and projects that fit into the short-term logic of academic careers. Lengthy, unorthodox or uncertain approaches to a research problem become increasingly unattractive to junior scholars, significantly limiting the epistemic scope of available questions.

Furthermore, the individualization of uncertainty and responsibility generates tensions between individual career aspirations and collaborative working practices. In collaborative work practices, it is often uncertain who will be receiving the main credit for a distinct corpus of work. This question is pressing for all fields in which the order of the authors is codified (such as in many areas of the life sciences), but also for those fields where collaborative work is only starting to gain importance (such as in the social sciences) and no explicit internationally recognized rules exist. As has been shown for the life sciences, particularly in highly competitive periods, such as the postdoc stage, researchers tend to shy away from collaboration and try to focus on individualized projects to ensure career progress (Müller 2012). In the social sciences this debate takes a slightly different form, which can be traced by looking at the debates over the value of a dissertation based on the publication of journal articles in relation to the classical monograph. Suddenly, the ideal of a piece of research carried out by an individual, which is still strongly entrenched in many social science fields, is confronted with a project-funded PhD using co-authored papers. Authorship conflicts can present substantial burdens for the social cohesion of research groups and can hinder the exchange of expertise within groups. The focus on individuality is enhanced by the international character of most academic careers today, wherein a focus on individual achievements remains paramount, as they are easily transferable from one research context to another.

It is no coincidence that we have so far only addressed research and its relevance for career development. The contemporary norms of career development create a significant tension between research and other activities in teaching, supervision and academic service. In a ‘regime of evaluation’ (Fochler, Felt and Müller 2016) that is increasingly focused on quantitative performance metrics, non-research related tasks are progressively being reframed as non-productive and tend to become secondary (sometimes even invisible) for career progress. This is also reflected in the assessment criteria of many important national and international fellowships for postdoc researchers (e.g. for habilitation fellowships or junior group leader grants) that barely include achievements in teaching or engagement in third mission projects in their assessment criteria. Furthermore, as supervision at most Austrian universities *formally* can only be performed by persons after their *habilitation*, the intense and crucial engagement in supervision work by younger researchers is rendered invisible and, thus, not accounted for.

Finally, all of the observations above raise the question: which kind of researchers – and personalities – are being selected by the contemporary regimes of academic career development? Are we selecting the ‘best’ scientists, the brightest minds? What is meant by ‘the best’? Or are mainly those selected who can best comply – emotionally, socially and epistemically – with standardized career trajectories that emphasize competition, individualization and achievements in more easily quantifiable research in a shorter time? Might we loose important scholars who are more collectively minded, less narrow, but more focused on long-term questions and societal impact than on short-term success in publishing and attracting funds? Furthermore, it seems crucial to reflect how the profile of the researcher required in these career structures matches the imaginary of the wider role of the university in society described in the following section. What is the value accorded to teaching and engagement with society?

THE CHANGING RELATIONSHIP OF UNIVERSITIES TO SOCIETY

Much of the re-imagination of contemporary universities finds its expression in quite profound changes in university-society relations. Public discourse, over the past two decades, has called upon universities to move out of their well-entrenched "institutional body-language" (Wynne 1992) – 'we do good research and this is enough to warrant public support' – and to engage with societal actors on many different levels. While elsewhere the buzzword of *accountability* captured the imagination and guided changes, in Austria two other buzzwords embodied the idea of a deficient past that needed to be remedied. First, we encounter the (admittedly old) metaphor of the *ivory tower* which urges universities and their inhabitants to leave their protected spaces and to better connect and engage with the needs, expectations and concerns of society. The other buzzword is *Orchideenfächer* (literal translation: orchid disciplines), a notion trying to express the "luxury" of cultivating certain disciplines/fields at the university which have no obvious societal relevance. These two notions exemplify a "steering with big words" (Bos et al. 2014) by pointing to a deficient past and the imperative to move towards a radically different future.

At the turn of the century the Ministry responsible for research explicitly began to nudge universities, as publicly funded entities, to embrace a more problem-oriented approach in research. Universities were exhorted in order to show a greater commitment to work on issues affecting society directly and to seek solutions for the many challenges faced by it. This included calls for researchers not only to engage with industrial actors, but also to personally engage in improving the public visibility and understanding of science. This came at a time when analysts started to speak of medialization, i.e. the interwoven relationship of science and the media (Rödder, Franzen, and Weingart 2012). Along this logic universities also gradually realized the importance of strategic organizational communication (Davies and Horst 2016). Indeed, "the general legitimacy problem for science" had been "transformed into a legitimacy challenge for research organizations that – in a media society – also has to be addressed by public communication" (Peters 2012, 220). This lead to the "import [of] a number of practices from corporate communication in order to support the need for strategic communication" (Davies and Horst 2016, 113) with the aim of creating and maintaining a good public image. Thus, Austrian universities, even though later than many other European countries, gradually started to embrace the idea of creating a closer relation to society, in order to (re)gain the public's trust and support for innovation. In the Eurobarometer surveys, regularly conducted by the European Commission, Austria steadfastly ranks near the bottom of countries regarding the interest of its citizens in science and how well informed they feel. Even if we treat such surveys with some caution, it seems worth speculating whether this is due to a lack of media attention to science, the absence of open critical debate about contemporary developments in science and technology, or maybe also due to a late start of a more active engagement of universities with wider science-society issues.

More recently, a definite improvement of the level of classical science communication across all universities has taken place, including a multiplication of media channels (e.g., online news, blogs, twitter, etc.) through which research outcomes are strategically positioned in the public arena. We also perceive a rise in participation in more interactive and hands-on communication activities, such as *The Long Night of Research*; a diversification of formats and audiences, such as science slams or children universities; and many other efforts to make science more accessible to wider audiences. Most of the time a mixture of information and entertainment is chosen as an engagement format, with the aim of sparking a fascination for science in wider audiences. In these activities, researchers are expected to engage personally, because institutions hope that their communication efforts will gain in authenticity as researchers themselves are publicly present as human beings.

It is in this context that we also witness an increasing discourse about relevance and excellence, combined with classical institutional PR work, and a tendency to engage in what Nelkin (1995) has aptly described as "selling science". While this might be seen as unproblematic in the short term, Nowotny and co-authors (2001) remind us that we are in a moment in time, where science and society are more closely intertwined than ever before. Therefore, in order to create a stable trust relation between science and society, it becomes all the more important that "images of science [. . .] have a strong 'reality content', that is, [are] closer to actual practices and their rapid changes than the traditional and timeless images" (ibid., 259-260). Staying close to the reality of research will become one of the key-challenges when repositioning the university in contemporary societies. There is indeed a need to find an adequate balance between selling and PR work on the one hand, and serious engagement with citizens on the other. Citizens need to be able to look to science to provide reliable knowledge, while science has to remain open to being questioned.

While the activities mentioned above undoubtedly matter when it comes to reflecting on the place of universities in contemporary society, we need to consider both the underlying imaginations of society and the way these new tasks find their place in academic life and work. An obvious preference persists to teach 'the public', which is widely seen as ignorant about science. Accordingly, less time and attention is given to seriously engaging with societal values and concerns (beyond those of industrial actors), or with questions about the responsibility of science in relation to society[2]. Students are educated mostly along classical disciplinary lines and little effort is made to trigger their engagement with issues crossing disciplinary boundaries or positioned at the interface of science and society. Furthermore, little space is given to foster critical debate, as 'the public' is often still perceived in the classical deficit model: underinformed and, as a consequence, potentially not supportive or even hostile towards science. While this often remains implicit, some explicit traces of this vision of 'the public' can be found, for example, in the Austrian Nano Action Plan[3] by Federal Ministry of Agriculture, Forestry, Environment and Water Management.

---

2 At the University of Vienna, the platform "Responsible Research and Innovation in Academic Practice" (rri.univie.ac.at) experiments with how such questions can be debated within a university.

3 Austrian Nanotechnology Action Plan (Wien: Federal Ministry of Agriculture, Forestry, Environment and Water Management). Available at https://www.bmlfuw.gv.at/greentec/chemikalien/nanotechnologie/nano-umsetzungsb2012.html (accessed 22 April 2017).

It clearly expresses the fear that Austrian citizens might be prone to "technophobia due to ignorance" as they have already shown "'innovation resistance' in the light of former neo-technologies" – i.e. nuclear energy or agricultural biotechnologies.

Even though policy and institutional discourses insist on the importance of engaging with society, we see little translation of this demand into the norms of building academic recognition. Opening up towards society would mean creating time and space for new kinds of knowledge relations with civil society outside the classical settings of academia. Furthermore, complex societal problems often call for interdisciplinary collaborations. Thus, both transdisciplinary (collaborating with societal actors) as well as interdisciplinary research would need to find recognition within academia. This would mean giving time and space for mutual engagement and for developing new forms of thinking about the problems we are confronted with. New initiatives, such as citizen science, might show potentials in this direction, depending both how they will be realized and how universities will manage to collaborate. It remains to be seen whether the involvement of citizens will indeed allow them to substantially contribute to scientific knowledge production or whether they will mostly serve as researchers' handmaidens and again as subjects to be taught.

Recent research has shown (Felt et al. 2016, 752) that within contemporary academia "the normative imaginations of more open forms of knowledge production [i.e. integration of non-scientific actors into research] met numerous substantive but often implicit and unaddressed forms of reluctance or resistance". The 'new public management' logic, with competitiveness, efficiency and top publications as key indicators of quality does not adequately account for the time and resources that are necessary to perform knowledge production in more hybrid, collective ways. Even a more intensive engagement with different forms of science communication might turn out to be detrimental to a career model in which research performance is prized above everything else.

It, thus, remains unclear, particularly for younger researchers, how much time they should devote to these kinds of activities at a time when their career depends on classical indicators of publication and funding achievements. As Macfarlane (2007) has pointed out, the status of any activity is related to "the extent to which the activity is regarded as 'scholarly', whether the activity is internal or external to the university and the degree to which the activity is 'visible' to colleagues and rewarded in performance-related terms" (ibid., 264). Service to or engagement with society is, thus, often constructed as external to the core activities of academia and therefore less valued. Furthermore, this public engagement work is often unequally distributed, with female researchers taking on a larger share of what is considered to be care work (Kerr and Lorenz-Meyer 2009). The degree to which researchers are committed to activities that fall under the notion of responsible research and innovation reflects "the micro politics of life within modern universities" (Macfarlane 2007, 267). Therefore, we might ask if the ways research is governed and careers take shape really foster what Macfarlane (2007) calls "academic citizenship", i.e. supporting the civic purposes of the university and making researchers no longer solely see their duty as focusing only on research and teaching, but also as caring for the integration of societal concerns into the frameworks of their knowledge work.

CONCLUSION

In drawing these three lines of discussions together, we think that the following points deserve closer reflection when re-imagining and re-legitimizing contemporary universities in the Austrian context:

Throughout this essay, we have pointed to the idea(l)s that have come to underpin change, while highlighting the unintended consequences and tensions emerging when changes happen simultaneously on so many different levels, without time to carefully reflect on their impact. It is therefore not surprising that different top-down-policy driven visions of the university do not cohere with each other, nor match with bottom-up visions of university staff. Yet, in order for collectively shared and convincingly performed imaginaries of the university to become a reality within and beyond its institutional boundaries, the debate needs to be opened up: What kind of society should the university system contribute to? Are the assumptions on which the notion of an inclusive and open university was built 40 years ago still valid today? Which futures do we collectively find worth attaining, meaning what kind of future society should the university be a partner for? What should a notion like ‘relevance’ stand for and how could it be attained? What should be the characteristics of a good researcher? Finally, what does it mean to live a decent academic life, i.e. what are the conditions for younger researchers to become part of contemporary academia?

These are essential questions to be addressed, if the university is to become a place not only performing in the mainstream of international research and innovation, but also an institution embracing other functions, like thinking against the grain, i.e. being innovative, and asking questions of vital societal importance. These debates need to be rooted in the realities of their national context as well as connected to past trajectories in order to create a feeling of some continuity when facing disruptive change. A central problem, which we want to point out, is that these debates currently do not take place enough and with enough participation. Discourses on these issues are largely absent within Austrian universities and in Austrian society at large. This is partly related to the lack of participatory structures within universities, but the problem lies deeper. It seems that debating the role of universities in today’s societies has not managed to become one of the priorities – neither within nor outside the university – even though the claim that we live in a knowledge/innovation society is omnipresent. We argue, however, that more than ever, it is crucial not only for imagining the university of the future, but first and foremost for legitimizing its rightful place in wider contemporary society.

A second conclusion pertains to what we regard to be a problematic feature of current reforms. They do not start from the idea that a university needs to develop together with the society it finds itself in. Instead, reforms spring from a strong deficit narrative of a past that is seen as less productive, with lower quality standards, and not adhering to the ideal of efficiency. Such a deficit narrative of the past often overlooks the actual impact, and limitations, of reforms. While reforms can change governance and career structures and impose new values and ideals to strive for, the university will keep working with staff that carry the burden of having been part of the very past the reforms wish to overcome. This means, that great care needs to be devoted in re-imagining universities to assure that all members of the university – be they long established or newly arrived – can subscribe to the imaginary embodied by the reform. A productive institution needs a sustainable relation to its past as well as its future.

Third, we highlighted in all three sections, although in different ways, the salience of the indicator-drivenness of contemporary academia. Indicators seem to be reference points that are often used but not necessarily reflected upon. We have also pointed to the fact that competition in line with standardized indicators runs the risk of homogenising instead of diversifying the knowledge that we need to solve complex problems in contemporary societies. An excessive belief in indicators might also make us gradually lose the capacity to define quality by other means and to proactively develop this concept in a constant exchange within the research community and beyond. This is particularly important as different disciplines have different ways of defining quality and of weighing the different outputs researchers produce in their work. For example, very often the social sciences and humanities see themselves confronted with the fact that governance structures and indicators developed for the natural sciences are projected onto them without allowing for their own specificities.

Finally, synthesizing the arguments we made on governance, lives in science and science-society relations, we see several unintended tensions emerge. We show, for example, that ideals of governance, in line with indicators focusing solely on research productivity, can compete with – and contradict – the simultaneously emerging demands for greater engagement with values and concerns of society. These tensions, evidently, have potentially much stronger repercussions for the lives of younger researchers whose positions within the institution are still fragile and in need of strategic alignment in order to become successful careers. Addressing these tensions explicitly is a priority. The diverse roles of a university in society need to be reflected and acknowledged also in the imaginary of what it means to be a good researcher in a specific field. Otherwise, we run the risk that, due to the dynamics of international competition, both individual researchers and universities will focus even more strongly on delivering output that counts on intra-scientific markets, while doing only lip service to fulfilling the university's mission in teaching and in its relation to society. This in turn will endanger the public legitimacy of universities, in Austria and elsewhere.

In conclusion, this essay is a call to open up spaces for re-imagining and relegitimizing the role of universities, both in Austria and wider international contexts. Doing so requires debates with a high degree of openness and the readiness to address potentially risky topics. This could for example mean questioning whether the openness of the Austrian university system on all levels of its teaching mission needs to be a non-debatable value in itself or whether we need more differentiated approaches to training the next generation of researchers. Debates will also need to address how we attribute value to the different kinds of work in the university and how serious we are about our engagement with society. After all, deciding where the university should go might be more important than arriving somewhere first.

REFERENCES

Alberts, Bruce. 2013. "Impact Factor Distortions." *Science* 340 (6134):787. doi: 10.1126/science.1240319.

Barnett, Ronald. 2011. *Being a University*. London: Routledge.

BMWV. 1999. Grünbuch zur Österreichischen Forschungspolitik.

Bos, Colette, Bart Walhout, Alexander Peine, and Harro van Lente. 2014. "Steering with big words: articulating ideographs in research programs." *Journal of Responsible Innovation* 1 (2):151-170. doi: 10.1080/23299460.2014.922732.

Davies, Sarah Rachel, and Maja Horst. 2016. *Science Communication: Culture, Identity and Citizenship*. London: Palgrave.

de Boer, Harry, Jürgen Enders, and Uwe Schimank. 2007. "On the Way towards New Public Management? The Governance of University Systems in England, the Netherlands, Austria, and Germany." In *New Forms of Governance in Research Organizations: Disciplinary Approaches, Interfaces and Integration*, edited by Dorothea Jansen, 137-152. Dordrecht: Springer Netherlands.

Felt, Ulrike, ed. 2009. *Knowing and Living in Academic Research. Convergence and Heterogeneity in Research Cultures in the European Context*. Prague: Academy of Sciences of the Czech Republic.

Felt, Ulrike. 2017. "Under the shadow of time: Where indicators and academic values meet." *Engaging Science, Technology, and Society 3:* 53-63. doi:10.17351/ests2017.10.

Felt, Ulrike, and Maximilian Fochler. 2010. "Riskante Verwicklungen des Epistemischen, Strukturellen und Biographischen: Governance-Strukturen und deren mikropolitische Implikationen für das akademische Leben." In *Steuerung von Wissenschaft? Die Governance des österreichischen Innovationssystems. Innovationsmuster in der österreichischen Wirtschaftsgeschichte, Band 7*, edited by Peter Biegelbauer, 297-328. Innsbruck: StudienVerlag.

Felt, Ulrike, Maximilian Fochler, and Peter Winkler. 2010. "Coming to Terms with Biomedical Technologies in Different Technopolitical Cultures: A Comparative Analysis of Focus Groups on Organ Transplantation and Genetic Testing in Austria, France, and the Netherlands." *Science, Technology & Human Values* 35 (4):525-553. doi: 10.1177/0162243909345839.

Felt, Ulrike, and Michaela Glanz. 2003. "University Autonomy in Europe: Changing Paradigms in Higher Education Policy." In *Managing University Autonomy. Collective Decision Making and Human Resources Policy. Proceedings of the Seminar of the Magna Charta Observatory, 17 September 2002*, edited by Magna Charta Universitatum Observatory, 13-104. Bologna: Bononia University Press.

Felt, Ulrike, Judith Igelsböck, Andrea Schikowitz, and Thomas Völker. 2016. "Transdisciplinary Sustainability Research in Practice: Between Imaginaries of Collective Experimentation and Entrenched Academic Value Orders." *Science, Technology & Human Values* 41 (4):732-761. doi: 10.1177/0162243915626989.

Fochler, Maximilian, Ulrike Felt, and Ruth Müller. 2016. "Unsustainable Growth, Hyper-competition, and Worth in Life Science Research: Narrowing Evaluative Repertoires in Doctoral and Postdoctoral Scientists' Work and Lives." *Minerva* 54 (2):175-200.

Gago, José Mariano, John Ziman, Paul Caro, Costas Constantinou, Graham Davies, Ilka Parchmannn, Miia Rannikmäe, and Svein Sjøberg. 2004. *Europe Needs More Scientists: Report by the High Level Group on Increasing Human Resources for Science and Technology*. Brussels: European Commission.

Gläser, Jochen, Stefan Lange, Grit Laudel, and Uwe Schimank. 2010. "The Limits of Universality: How Field-Specific Epistemic Conditions Affect Authority Relations and their Consequences." In *Reconfiguring Knowledge Production. Changing Authority Relationships in the Sciences and their*

Consequences for Intellectual Innovation, edited by Richard Whitley, Jochen Gläser and Lars Engwall, 291-324. Oxford: Oxford University Press.

Hackett, Edward J. 1990. "Science as vocation in the 1990s: The changing organizational culture of academic science." *Journal of Higher Education Policy and Management* 61 (3):241-279.

Hazelkorn, Ellen. 2015. *Rankings and the Reshaping of Higher Education: The Battle for World-Class Excellence*. London: Palgrave Macmillan UK.

Jasanoff, Sheila. 2015. "Future Imperfect: Science, Technology, and the Imaginations of Modernity." In *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, edited by Sheila Jasanoff and Sang-Hyun Kim, 1-47. Chicago: Chicago University Press.

Kaltenbrunner, Wolfgang, and Sarah de Rijcke. 2017. "Quantifying 'Output' for Evaluation: Administrative Knowledge Politics and Changing Epistemic Cultures in Dutch Law Faculties." *Science and Public Policy*: 44 (2): 284-293. doi: 10.1093/scipol/scw064.

Kerr, Anne, and Dagmar Lorenz-Meyer. 2009. "Working Together Apart." In *Knowing and Living in Academic Research. Convergence and Heterogeneity in Research Cultures in the European Context.*, edited by Ulrike Felt, 127-168. Prague: Academy of Sciences of the Czech Republic.

Laudel, Grit, and Jochen Gläser. 2006. "Tensions between evaluations and communication practices." *Journal of Higher Education Policy and Management* 28 (3):289-295. doi: 10.1080/13600800600980130.

Leydesdorff, Loet, and Ulrike Felt. 2012. "'Books' and 'book chapters' in the book citation index (BKCI) and science citation index (SCI, SoSCI, A&HCI)." *Proceedings of the American Society for Information Science and Technology* 49 (1):1-7. doi: 10.1002/meet.14504901027.

Macfarlane, Bruce. 2007. "Defining and Rewarding Academic Citizenship: The implications for university promotions policy." *Journal of Higher Education Policy and Management* 29 (3):261-273. doi: 10.1080/13600800701457863.

Martinson, Brian C., Melissa S. Anderson, A. Lauren Crain, and Raymond De Vries. 2006. "Scientists' perceptions of organizational justice and self-reported misbehaviors." *Journal of Empirical Research on Human Research Ethics* 1 (1):51-66.

Müller, Ruth. 2012. "Collaborating in Life Science Research Groups: The Question of Authorship." *Higher Education Policy* 25 (3):289-311.

Müller, Ruth. 2014. "Racing for What? Anticipation and Acceleration in the Work and Career Practices of Academic Life Science Postdocs." *Forum: Qualitative Social Research* 15 (3).

Murphy, Peter. 2015. "Discovery and delivery: time schemas and the bureaucratic university." In *Universities in the Flux of Time: An Exploration of Time and Temporality in University Life*, edited by Paul Gibbs, Oili-Helena Ylijoki, Carolina Guzmán-Valenzuela and Roland Barnett, 137-153. London: Routledge.

Nelkin, Dorothy. 1995. *Selling Science: How the Press Covers Science and Technology*. New York: W. H. Freeman.

Neuhauser, Rudolf. 2004. "Institutional Autonomy Versus Government Control. The New University Act in Austria." *Higher Education Management and Policy* 16 (3):19-26.

Nowotny, Helga, Peter Scott, and Michael Gibbons. 2001. *Re-thinking Science. Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity Press.

Peters, Hans Peter. 2012. "Scientific sources and the mass media: Forms and consequences of medialization." In *The Sciences' Media Connection – Public Communication and its Repercussions, Sociology of the Sciences Yearbook*, edited by S. Rödder, M. Franzen and P. Weingart, 217–240. Dordrecht: Springer.

Pichl, Elmar. 2012. "Universitäre Profilbildung im Kontext des österreichischen Hochschulraums und des Universitätsgesetzes 2002." *Zeitschrift für Hochschulrecht, Hochschulmanagement und Hochschulpolitik: zfhr* 11 (6):195-206. doi: 10.1007/s00741-012-0064-x.

Rödder, S., M. Franzen, and P. Weingart, eds. 2012. *The Sciences' Media Connection – Communication to the Public and its Repercussions. Yearbook of the Sociology of the Sciences*. Dortrecht: Springer.

Sauder, Michael, and Wendy Nelson Espeland. 2009. "The Discipline of Rankings: Tight Coupling and Organizational Change." *American Sociological Review* 74 (1):63-82. doi: 10.1177/000312240907400104.

Stephan, Paula E. 2012. *How Economics Shapes Science*. Cambridge, MA: Harvard University Press.

Trivedi, Bijal P. 2006. "Are We Training Too Many Scientists?" *The Scientist* (September):42.

Wodak, Ruth. 2009. "Von Wissensbilanzen und Benchmarking: Die fortschreitende Ökonomisierung der Universitäten. Eine Diskursanalyse." In *Diskurs und Ökonomie: Diskursanalytische Perspektiven auf Märkte und Organisationen*, edited by Rainer Diaz-Bone and Gertraude Krell, 317-335. Wiesbaden: VS Verlag für Sozialwissenschaften.

Wynne, Brian. 1992. "Misunderstood misunderstandings: social identities and public uptake of science." *Public Understanding of Science* 1 (3):281-304.

Ylijoki, Olili-Helena. 2005. "Academic nostalgia: A narrative approach to academic work." *Human Relations* 58 (5):555-576. doi: 10.1177/0018726705055963.

SHORT BIOGRAPHIES

ULRIKE FELT (PhD Physics/habilitation Science Studies) is Professor of Science and Technology Studies and head of the interfaculty research platform "Research and Innovation in Academic Practice" at the University of Vienna. Her research focuses on governance, democracy and public participation, on shifting research cultures and on time/future in research and society. Studies cover the life science/(bio)medicine, nanotechnologies, nuclear energy and sustainability research. She was editor-in-chief of Science, Technology, & Human Values and of the Handbook of Science and Technology Studies (MIT Press 2017). Since 2017 she has been president of European Association for the Study of Science and Technology.

MAXIMILIAN FOCHLER is Assistant Professor at the Department of Science and Technology Studies at the University of Vienna. He also is a member of the interfaculty research platform "Responsible Research and Innovation in Academic Practice". His main current research interests are forms of knowledge production at the interface of science and other societal domains (such as the economy), as well as the impact of new forms of governing science on processes of valuation and subjectification in academia. He has also published on the relations between technosciences and their publics as well as on publics' engagement with science.

RUTH MÜLLER is Assistant Professor of Science and Technology Policy at the Munich Center for Technology in Society (MCTS) and the School of Life Sciences Weihenstephan, Technical University of Munich. She holds degrees in Molecular Biology (MSc) and Science & Technology Studies (PhD) from the University of Vienna. She has been a visiting researcher at the University of California Santa Cruz and a postdoc at Lund University. Her research explores the interactions of science, technology and policy with a focus on the relationship between science governance, institutional values and academic knowledge production; as well as the social and political dimensions of the (postgenomic) life sciences.

HELGA NOWOTNY is Professor emerita of ETH Zurich and Former President of the European Research Council. She is Chair of the ERA Council Forum Austria and Member of the Austrian Council as well as Visiting Professor at Nanyang Technological University, Singapore. Among others she is a member of the Board of Trustees of the Walling Falls Foundation, Berlin; Vice-Chair of the Lindau Nobel Laureate Meetings and Chair of the Scientific Advisory Board of the Complexity Science Hub, Vienna. Her latest publications are "The Cunning of Uncertainty" (2015) and "An Orderly Mess" (forthcoming).

3.

The future of the university calls for a paradigm change

Gerald Bast

Abstract

While our societies have become increasingly complex and characterized by change, uncertainty and ambiguity, universities are dominated by a culture of clarity, specialization and fragmentation. The technological revolution is destroying jobs, forcing a new definition of the term "work," and changing the demands placed on skills. Creative capabilities as the new cultural skills are revolutionizing labor markets and providers of education. The universities of the future are digital, while simultaneously being person-centered and interactive. They will admit more students than ever before, but increasingly in new, interdisciplinary curricula whose goals include holistic thinking and knowledge that adapts to change. University research will be highly specialized, but also have a cross-discipline focus on the "global challenges" that are relevant to society.

The inheritance of the industrial age

Our current systems of education and scholarship still largely function according to the principles of the industrial age in the 18th and 19th centuries: production of knowledge, acquisition of knowledge, multiplication of knowledge, all via division of intellectual labor. The fragmentation of the landscape of knowledge has rapidly advanced in recent decades. In parallel, our societies have grown constantly more complex, and the parameters for having effects on society have shrunk correspondingly. Everything is connected. We live in a world that is characterized by change, uncertainty, insecurity and ambiguity. By contrast, our educational institutions – at least outside of the art universities – are dominated by a culture of clarity: yes or no, true or false, correct or incorrect. The secondary schools are primarily oriented toward transmitting standards of education that each only concern a single subject. At many universities, this culture, born amid the adversity of insufficient resources for a growing number of students in "mass universities," is increasingly reinforced by multiple-choice tests. How strongly this form of intellectual socialization affects the growing social acceptance of simple political solutions is a highly non-trivial, and thus much more interesting, question.

The complexity of our societies and the challenges they face require a culture of questioning and seeking connections, not a culture of answers and quantification. The recognition of the interesting and important questions, and the selective evaluation of interdependencies and approaches to solutions are far wiser than fast, simple and apparently valid answers.

Almost a century after Heisenberg formulated his Uncertainty Principle, and his theories of quantum mechanics broke the paradigms of physics and even philosophy, we are still used to generally arguing and acting in isolated disciplinary silos with fragmented knowledge, according to linear patterns of causality.

CHANGES TO THE WORLD OF WORK IN THE DIGITAL AGE

As once the Silesian weavers were unable to stop the Industrial Revolution, neither can we halt the current changes in our working world caused by digitalization and automation. And the coming changes that will be brought about by biotechnology and quantum physics are even more difficult to comprehend. The remarkable rates of automation in China and India already show the dimensions of the coming job losses. The strategies of re-industrialization that American and European politicians are calling for will only lead to technology, in the form of algorithm-driven robots, moving from developing countries to the Western industrial states. These re-industrialization strategies will bring only a very few jobs, if any, back to the industrialized countries.

Everywhere that work, or individual aspects of work, can be standardized or determined by algorithms humans will be replaced by machines. Computers and robots are faster, more flexible, more precise, and above all cheaper than human labor.

That will not only affect manufacturing businesses, but also transport, finance, insurance, significant parts of the service sector, parts of the creative economy, middle management, administration, educational professions, security jobs, legal professions, even medical diagnostics.

Serious studies estimate that 40 percent to 50 percent of current jobs will disappear within 20 years.[1] The effects of this fourth Industrial Revolution will, for the first time, reach deep into the supposedly well-educated middle class.

It does not take much imagination to recognize the enormous social and politically explosive potential if half of what we understand as work were to collapse in less than a single generation.

These developments are impossible to stop. One can demonize them, ignore them, play them down, or one can face up to them. At the present, they are generally being ignored or played down, by political leadership as well as by business.

Facing up to the challenge would mean developing proactive strategies for the far-reaching changes in education and the economy, communicating them widely, and implementing them.

The technological revolution that has already accumulated will massively change our ways of working and living, our entire culture. It is not comparable to earlier

1 For example, Frey, Carl Benedict and Michael Osborne (2013), The Future of Employment, Oxford Martin School, http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf

technological revolutions because it is faster and further reaching than any previous one. The current technologies, from artificial intelligence and robotics to genetic engineering and nanotechnology will, within a few years, affect practically every aspect of life and have serious effects on human life. Even if certain technologies are not immediately and directly available to everyone, their use by even a part of humanity will have effects on the others.

The changes to work, education and leisure, along with the changes to our societies wrought by demographic developments and migration, will pose new social challenges in many areas of common human life.

The technological revolution as a challenge for the role of humans

In a world shaped by artificial intelligence, digitalization and robotics, humans will only be able to attain social and economic effectiveness through creative thought processes. That is, through processes that create connections that had not previously been thought of, or that had been considered unthinkable among known, and thus increasingly automated, areas of knowledge and action. For the first time in the history of civilization, machines are replacing not only the power of human muscles but also complex collections of human thoughts. Self-learning machines are entering into a directly competitive relationship to humans as autonomous shapers of the course of the world. The worldview of the Enlightenment, which used the power of human reason to free people from self-inflicted dependence or dependence inflicted by gods and god-anointed rulers, is faltering.

The social, political and economic realities are getting more and more complex. An increasing number of factors that are tied together by intransparent relationships, and whose relationships are themselves factors, determine this new reality. Nevertheless, politicians and business are desperately attempting to keep the linear courses of action from the industrial age going. The academic system also continues to function according to the principles of the fragmentation of knowledge and intellectual division of labor. For decades, the opinion sections have regularly complained about the crisis in academia, in particular in the humanities and social sciences, but the dominant career mechanisms in universities favor a focus on the number of publications, on self-referentiality, and constricted content.

Given the potential effects of a technological revolution that has already arrived and that has unprecedented disruptive power, our thinking and actions today face very different challenges than they did in the pre-digital age.

People's power to make things happen will no longer express itself as much through putting their thoughts into material form, but will instead manifest itself in linking intellectual, intuitive, social, and emotional processes. Machines cannot do that – or at least not yet. Machines can recognize patterns from a multitude of processes that have already taken place and systematize these for a particular purpose. Intuition and emotion remain (for now) the domain of humans, even if machines can recognize emotions and even simulate them with emotional patterns that are already stored. As paradoxical as it sounds, it is precisely a far-reaching technological revolution that will lead to a renaissance of reflection about the evolution of humanity beyond materialism and virtuality, to reflection about civilization as a cultural process. The dichotomy constructed by Aristotle between *vita activa* and *vita contemplativa*, which depended on dividing people into citizens and slaves, could be interpreted in completely new ways in the age of digital machines.

Just as the first Industrial Revolution brought about grave, even paradigm-breaking changes in the educational system, it is now necessary to have structural and content-related renewal of the educational system that measures up to the radicalism of this revolution.

Creative ability as a new cultural skill

At the end of 20th century, the classical canon of cultural skills – speaking, reading, writing, and arithmetic – was extended to include the ability to communicate and articulate oneself digitally. People who did not master this skill were punished with social marginalization as digital illiterates and suffered significant disadvantages in the labor market.

In the 21st century, this canon of cultural skills must be extended again. Creative abilities will be some of the most important skills for managing life. These include:

- Handling multiple meanings and uncertainty;
- Imaginative and associative abilities;
- Intuitive ability;
- Thinking in the form of alternatives;
- Questioning existing structures and appearances;
- Establishing unconventional contexts;
- Questioning the status quo;
- Seeking new perspectives; and
- Recognizing that there are forms of communication other than verbal.

Fragmentation, multiplication and connection of knowledge

In its documents on the development of the European Higher Education Area, the European Union again demands an increase of the share of people with a university degree and prescribes “employability” as one of the content goals for the European system of higher education. In recent years, the EU has also consistently indicated that “employability” also and particularly means that people will be able to cope with changing conditions, and with labor markets that are changing at a constantly increasing pace. But are graduates of our tertiary institutions really ready for a world in which the great social challenges can only be solved with trans-disciplinary and trans-cultural cooperation?

While educated citizens complain about the downfall of a long-lost ideal of encyclopedic education, and the main actors in education policy – from government to universities – pursue a policy of cosmetic repairs of the symptoms, our education system continues to speed further down the dead-end road formed by the ways of thinking in the pre-digital age.

Education and scholarship shape themselves around the paradigm of progress in knowledge, which is primarily defined within disciplines or sub-disciplinary niches, and measured by quantitative bibliometric indicators. That complex mechanisms of effect increasingly cross the borders of academic disciplines is largely ignored in our system of education and scholarship.

Education, which once carried the hopes for solving the problems of human society and its environment, is now in danger of becoming a part of the problem itself, if it holds on to disciplinary specialization as the sole guiding principle for the qualitative development of the system of scholarship.

Never before in history has humanity produced so much knowledge. At present, there are 34,550 peer-reviewed scientific journals around the world. Every year, 2.5 million academic papers are published; every 12 seconds a scholarly article appears in a journal. Given this explosion of knowledge, an encyclopedic approach to education seems an absurd claim. Since we have had access to the technology to save unlimited amounts of knowledge and to be able to retrieve it at previously unknown speeds in every desirable degree of detail, the preparation and connection of knowledge should have been made more of a topic than in the past. That is all the more important because mono-discipline knowledge without some sort of interdisciplinary connection can no longer fulfill what both the national authority for laws on universities[2] and the European Union have declared to be the top priority for universities: "responsible for contributing to the solution of the problems of humanity, as well as to the successful development of society and the natural environment"[3] and to make graduates employable.[4]

The acquisition of knowledge about the potential for connections between the disciplines and about the synergistic potential of connected specialist knowledge is a type of expertise that, as a supplement to expertise in highly specialized areas of knowledge, is indispensable. The speed of progress in scientific and technological knowledge as well as the increasingly urgent need for solutions to global challenges such as aging societies, climate change, migration, and human-machine merging make it seem irresponsible to do without systematic acquisition of expertise in cross-discipline, analytical approaches to seeking synergistic potential to solve complex challenges.

---

2 Österreichisches Universitätsgesetz [Austrian Law on Universities] 2002

3 Universitätsgesetz [Law on Universities] 2002, § 1, BGBl. I Nr. 120/2002 i.d.g.F

4 European Commission (2014), Modernisation of Higher Education in Europe. Access, Retention and Employability.

A NEW DEFINITION OF EDUCATION

It is not just a matter of a new definition of the concept of human work – or as Ralf Dahrendorf put it in a visionary phrase, "meaningful activity"[5] – but also a new definition of education, not least tertiary education, which is at least as urgent.

In 2009 the European Research Area Board had already called for a paradigm change in thinking and in the role of science. A new "holistic thinking" was necessary; science and research should pay more attention to systemic effects than on narrow goals. The report's remarkable title was "Preparing Europe for a New Renaissance."[6]

And the reality? At Austria's traditional universities and universities of applied sciences more than 1600 programs of study have been established. That is an impressive spectrum of specialized knowledge, mostly with various jargon and communications channels. Bringing knowledge together from the various disciplines is not on the academic agenda, quite the contrary.

"We are all surely in agreement that the task of education … was, is, and probably will remain preparing young people for life. If this is in fact the case, then education (including university education) is now in the deepest and most radical crisis of its crisis-rich history," declared Zygmunt Bauman in a lecture at the University of Padua.[7] He was referring to his theory of "liquid modernity," which he described as follows: "The forms of modern life can be differentiated in various ways, but what ties all of them together is their fragility, temporality, vulnerability, and tendency toward constant change."[8]

EMPLOYABILITY AND SKILLS IN LIQUID TIMES

Out of the six most valuable publicly traded companies in 2016, five came from the digital economy: Apple, Alphabet, Microsoft and Amazon were first through fourth, and Facebook was sixth. Only 10 years previously just one of these companies was in the top six: Microsoft. In 2006, ExxonMobil was first, but had fallen back to fifth by 2016.[9]

According to the World Economic Forum, in 2020 the following skills will be the most important for the requirements of the fourth Industrial Revolution – in order:

1. Complex problem solving;
2. Critical thinking;
3. Creativity;

---

5 Dahrendorf, Ralf, "Wenn aus Arbeit sinnvolles Tun wird. Die Alternativen zur Arbeitsgesellschaft," in: *Die Zeit*, 3 December 1982.

6 European Commission (2009), Preparing Europe for a New Renaissance, A Strategic View of the European Research Area.

7 Bauman, Zygmunt (2011), Liquid modern – challenges to education, Lecture given at the Coimbra Group Annual Conference – Padua, 26 May 2011.

8 Bauman, Zygmunt (2000), *Liquid Modernity*, p. viii, Polity Press, Cambridge, UK.

9 Statista.

4. People management;
5. Coordinating with others;
6. Emotional intelligence;
7. Judgment and decision-making;
8. Service orientation;
9. Negotiation;
10. Cognitive flexibility.

The change in the structures of the economy and the world of work is thus well underway. "Liquid times," in the truest sense of the phrase, have begun. Work is changing, and work as it is currently known will partly disappear. That means that the term "employability," on the one hand, has to be adapted to the changed structures and requirements, and on the other has to include the ability to adapt to new forms of work. Education, particularly university education can no longer limit itself, as in the past had increasingly been the case, to producing employability for *existing* professional fields. University education – and research! – must actively contribute to the development of completely new fields of human work. Further, they must contribute to the new definition of the term "work" and on the conceptual formation of the social framework that will be necessary for it. That means the universities are facing entirely new challenges. If the social and economic realities rapidly follow a completely new logic in their structure and contents, thanks to the technological revolution, that will not take place without significant consequences for universities' self-understanding, for established approaches to education, and for the social position of universities.

Universities in upheaval

"German professors mainly feel that the reality speeding rapidly around them is disturbing their work," writes Manuel Hartung polemically in *Die Zeit*.[10] The background of this polemic is quite real. It is a matter of the dramatically progressing specialization in the scholarly landscape, and the attendant increasing tendency of scholars to exhaust themselves in detailed analyses. The innovative, *integrative* work on ideas for solutions to the great challenges of the 21st century is getting lost along the way. It has gone so far that pointing to the universities' "third mission" is misunderstood as an attempted attack on academic freedom. Curricula and academic careers are constructed in increasingly narrow channels of knowledge. One can, however, only partly reproach the scholars who are active in the system because in recent decades politics and industry have pushed the universities to produce graduates who are directly ready and available for the current realities of work as quickly as possible. The scholarly journals that are relevant for careers have concentrated on increasingly narrow disciplines, and the pressure to publish quickly and as voluminously as possible has systematically repressed labor-intensive and time-consuming publications such as monographs or cross-discipline papers. Shaped by political powers and the

10 Hartung, Manuel J., "Krise der Klugen," in: *Die Zeit*, 23 February 2017.

relative simplicity of the culture of rankings, universities have in the meantime largely internalized the primacy of quantitative measurement of scholarship. In light of the efficiency monitoring that is supposed to guide the development of universities' performance with quantitative targets and annual milestones, but which is increasingly designed around short-term effects, a motto adapted from Goethe, more resignedly than humorously, may even hold true for the academic business: "Half drawn by her, halfway sinking in . . . "

The EU and the OECD have proclaimed the goal for modern societies of having the largest possible share of the population complete tertiary education. Given the foreseeable changes in society and the economy that will result from technological developments, that seems all too logical. Automatable work, manual as well as mental, will be taken over by machines within a few years. Fields of work that cannot be automated, whether they already exist or are newly developed, will require higher education – but one that is significantly different from what is currently offered. Furthermore, the fact that in the future humans will be in competition with "intelligent" robots, for which the recognition of basic rights and admission to suffrage are already being seriously discussed, makes clear how important education will be for the question of human self-image. In a situation of competition with artificial intelligence and synthetic biology, humanity will not over the long term be able to afford allowing education (or art) to be a method of distinguishing among various population groups, much less actively instrumentalizing it in that way. Education, including university education, in the "industrialized countries" will (have to) become even more essentially a good that is used by broad swathes of the population. It will, however, largely be a different kind of education, not least in the universities.

Concerning university academic programs, the link between "mass universities" and almost exclusively specialized curricula makes no sense, either for labor policy or for social policy. This constellation will also not last much longer because it is insufficiently accepted by society. The appropriate consequence, however, cannot be a reduction in the number of students because that would contradict the arguments laid out above for the long-term necessity of a generally high level of education in the population as a whole.

Perspectives on the Futures of Universities in the Digital Age

The universities – and probably even more so the universities of applied sciences, which are focused on contents and oriented toward rapid entry into existing professional fields – will have to complete a paradigm change in their contents. By themselves, new financing mechanisms or regulations about access will not be able to solve the universities' basic problem: social recognition based on the relevance of their content.

- The university of the future will, naturally, continue the *link between research and teaching*. Only institutional, research-driven teaching can ensure that the curricula are up to date and able to keep up with the changing content requirements.

- The university will be *more digital and more personal than ever before*. The organization of MOOCs and other online classes will increase, not least as an image-building function of universities. Much more important, however, for the majority of universities around the world will be the use of such digital offerings produced by a small number of universities or knowledge institutions (e.g., TED) with significant financial and technical investment. At the same time, however, online teaching will make the universities more personable because digital lectures will just be the basis for interpersonal, discourse-intense discussion sections in small groups, led and moderated not only by instructors but also by more advanced students. Furthermore, artificial intelligence in the form of academic chatbots with powerful databanks in the background will play a substantial role in the operations of university studies.
- The university of the future will be an institution that is actively devoted to *lifelong learning*. The rapid growth of knowledge and the near permanent changing of social and economic conditions make this indispensable. The widespread break in university education between introductory courses as career preparation and upper-level courses is anachronistic and does not correspond to social and economic needs. If education is to be an important aspect of the new definition of work, which can be assumed in light of the technologically driven revolutionizing of labor markets, then the university will in the future be one place of periodic employment among other increasingly changing work relations.
- At the university of the future, in addition to highly specialized research areas there will be *cross-discipline, thematically focused research structures* concentrating on "global and regional challenges." That does not mean a relativization of the importance of basic research. Basic research is not necessarily monodisciplinary, nor does this claim speak of a utilitarian obligation for research. The desire to want to understand the world and the contexts of how the great challenges to our society work has nothing to do with utilitarianism. It is not a matter of the self-referentiality of utilitarianism, but rather openness to the world in the true sense of the words, in which trans-disciplinary research is led out of its career-damaging pariah existence. Scientific and scientific-artistic publications for project-oriented, multi-discipline research on research agendas that are "relevant to society" ("global challenges") will be promoted at a supra-university, ideally European, level. Review boards comprised of first-class scholars will provide these publications with recognition in the scientific and artistic communities, and thus also with career decisions at universities.
- The university of the future will have *more total students than today*. That will be true not only in the programs that prepare people for professions but also in the sector of lifelong learning. Alongside traditional curricula with specialized content (which are largely subject to limits on access) there additional *interdisciplinary and inter-university curricula will be offered for a large number of students* (without quantitative limits on access) to gain knowledge that is adaptable to change. These have in particular the following explicitly declared goals:
  - Critical thinking;

– Skills in cross-discipline communication and cooperation;
– Handling ambiguity and uncertainty;
– Thinking in unusual contexts;
– Imagination and intuition; and
– Aspiration and ability to investigate potential for trans-disciplinary effects.

National and European institutions have the responsibility of setting up regulatory measures in the form of incentives for starting and continuing university change processes.

The university of the future will impart the skills to be a scientific or artistic specialist, as well as the skills for science and art based, cross-disciplinary, holistic thinking and acting. As an institution that has obligations to science, art and society, it will exercise them through its members, not only within the scientific and artistic communities but also to society as a whole.

SHORT BIOGRAPHY

GERALD BAST is Rector of the University of Applied Arts Vienna, member of the European Academy of Arts and Sciences, a board member of the European League of Institutes of the Arts, and a member of the Scientific Advisory Board of the European Forum Alpbach. He studied law and economics, and holds a doctorate in law. As an author and lecturer he has concentrated on education and cultural policy, as well as the ties among science, art, and innovation.

This report is originally published in German and has been translated into English.

4.

Animating the Value of the Liberal Arts for the University of the Future

Daniel Fallon

Professor of Psychology, Emeritus
Professor of Public policy, Emeritus
University of Maryland
College Park, Maryland, USA

Wer fertig ist, dem ist nichts rechts zu machen,
Ein werdender wird immer dankbar sein.
– Goethe: Faust, erster Teil. Vorspiel

Abstract

Prospects for universities today and for the future have fundamentally shifted in recent decades by the advent of mass higher education and the emergence of a knowledge-dependent economy. Among the consequences are increasing pressure for accountability, which places a premium on the practical at the expense of the essential. It is the responsibility of universities to protect their historic core values, which include rigorous pursuit of knowledge through scholarship and fundamental research, and preparation of students to assume roles as responsible citizens in a democratic society. These are virtues associated with the classic values of the liberal arts, which are described here in historic and contemporary language as a challenge to the faculty in their role as stewards of the university curriculum.

Introduction

Since ancient times educators have imagined organized societies comprised of well-educated citizens, suggesting that an educated citizenry will lead to a higher quality of life for its society. The relationship is likely far more complex, however, than the simple logic of cause and effect implies. In our modern era, the rise of democracy has produced a steady increase in the proportion of citizens who are educated. This increase has broad consequences, both positive and negative, some of which dynamically impact the system of education itself. A higher proportion of educated citizens ultimately changes the nature of the political economy, and, in turn, a modernized political economy affects the conditions under which citizens are educated.

Growth in the density of educated persons does not readily produce predictable outcomes. More intellectual capital makes for a livelier, ever changing, and thus in some respects less stable society. Democracies have in recent centuries performed so well in enabling citizens to participate in higher education that the world has changed rapidly around us, often in ways that are confusing. The world of higher education, largely responsible for this new environment, now senses that these altered conditions may surprisingly pose a threat to its own founding ideals. Unable to proceed reliably as we have in the past, and uncertain about strategies for the future, we in higher education must act boldly to secure our fundamental values, or we risk becoming classic victims of our own success. I argue here that the university can play a significant role in shaping a positive future for society by rigorously focusing on its own core tenets and adapting them to contemporary reality.

Some fundamental features of universities stem from the germ that led to the rise of these institutions many centuries ago. Central among these is devotion to what was known in medieval life as the liberal arts. Other characteristics of universities reflect patterns that have persisted from their inception, such as their international character. For example, current trends toward globalization are easier for modern universities to accommodate because modern universities began as transnational attractions. "In the beginning was the Road," wrote the celebrated French medieval historian Joseph Bédier (1921, *iii*, p. 367), describing the origins of intellectual centers in Europe. Scholars seeking knowledge had to travel, and they congregated in trade centers such as Bologna, Paris, and Salamanca, where they formed trade guilds that eventually took the Latin name *universitas societas magistrorum discipulorumque*. The international students who studied within these guilds, which soon were simply called universities, often organized themselves by national identity into "nations."

ANALYTICAL FRAMEWORK

My analysis of higher education has led me to the conclusion that there are four inevitable consequences of a highly educated citizenry that every advanced economy will face. The new knowledge-dependent political economy:

- ... causes an increasing differentiation of role and mission of institutions within the higher education sector.
- ... transcends the borders of nation states, bringing about globalization. Globalization, in turn, forces a greater standardization of academic curricula and degrees, of the kind we see today in Europe with the introduction of Bachelor's and Master's degrees.
- ... forces higher education to struggle with increasing relative cost and thus produces new financing models.
- ... stresses the value of production of human capital, bringing into play new pressures for outcome accountability.

As important as each of these trends may be, the last is likely the most urgent for higher education today because the societal imperative for "accountability" places a premium on the practical at the expense of the essential.

In this chapter I focus on the value of the ancient tradition embedded in the idea of the liberal arts. Before turning to that subject, let me first define three key concepts I have introduced: the new political economy, a highly educated citizenry, and the university itself.

A New Political Economy

What do we mean by the "new political economy?" In the United States and other advanced economies new wealth today is now being created more by information, management, services, and technology than by the mainstays of the preceding industrial revolution: agriculture, heavy industry, and manufacturing. This distinctive shift in resource production creates a knowledge-dependent economy, and it thrives upon stable governments, international legal conventions, transparency in the flow of information, and other features that are characteristic of the ideals of modern democracies. At the same time the new economy requires a critical mass of intellectual capital, and this requirement sustains pressure toward a high level of education for the general citizenry.

A Highly Educated Citizenry

What do we mean by a "highly educated citizenry" or by "mass higher education?" In the United States there has been since 1950, but especially since 1960, a stunning increase in participation in higher education among ordinary citizens. The phrase "mass higher education" is commonly used to refer to this phenomenon, but it is poorly understood, and is sometimes casually used to describe structural inadequacies such as overcrowded classrooms. I use the term to mean an increasing proportion of citizens enrolling in higher education and receiving credentials of completion. I am not referring to the size or number of universities, or high student-faculty ratios.

The term mass higher education deserves a more precise definition. There is a sociologically justifiable definition of mass higher education that is quite precise. For U.S. researchers, it is an easy and convenient measure. A government agency called the Bureau of the Census was established in the U.S. constitution in the 18th century to determine the number of citizens and their characteristics. The kinds of question asked of citizens to describe the composition of the populace has multiplied over the years. Beginning in 1890, every year the census has asked U.S. citizens this question: "How many years of schooling have you completed?" The results have been collected in different ways, but one consistent measure has been of all adults over the age of 25 years. For this group, the average number of years of schooling has been increasing gradually each year since the question was first asked.

In 1910 for the first time, more than 50% of the respondents said they had completed 8.1 years of schooling. This was the first time the number had exceeded eight years. Since the first eight years of school in the U.S. is considered primary school, and anything more than that is considered secondary, 1910 can be marked as the year when the U.S. crossed the threshold to mass secondary education. A majority of adult U.S. citizens had some exposure to secondary school in that year.

In 1968 for the first time, the average number of years of schooling completed by U.S. citizens aged 25 or older was 12.1 (U.S. Department of Commerce, 1969). Since in the U.S. secondary school ends with 12 years, and anything beyond that is higher education, we can take 1968 as the year in which the USA crossed the threshold to mass higher education. A majority of adult U.S. citizens had some exposure to higher education in that year. Strictly comparable figures do not exist for other countries, but clearly in the early 21st century most countries with advanced economies are rapidly approaching this milestone and several have crossed it.

THE UNIVERSITY

It is valuable to distinguish the idea of higher education, which encompasses a broad range of institutions and purposes, from the idea of the university, which is usually defined by the authority to award the Ph.D. and other doctoral degrees. Mass higher education is widely understood in the United States, in part because it has developed in that nation as a diverse highly differentiated collection of very different kinds of institutions, providing many alternatives to students at varying cost and accessibility. These features do not characterize much of Western Europe, where higher education is associated more generally with the idea of a single kind of institution, the university, which in the past principally served the elite in a class-based society. My argument for recapturing the liberal arts as a core tenet of the modern university can be applied in some form to all sectors of postsecondary education. Nonetheless, I am in this chapter focusing on the one institution that I personally know best and whose traditions have loomed large as a symbol of higher education, the university.

We can arrive at a definition of the university by, as usual, examining its origins. Trade guilds in medieval Europe taught their trades and made distinctions based upon certified expertise, a bachelor certification for beginners and a master for journeyman. These ancient roots can still be seen in many countries, as in the United States, where after a period of study one can become a "bachelor plumber," or with more study as an apprentice one can claim a certificate and title, for example, as a "master electrician." This ancient trade system forms the elegant basis for Richard Wagner's stirring comic opera, *Die Meistersinger von Nürnberg*, which describes how an adventurous knight seeks to become a master singer to win the hand of the maid he loves, thus succumbing to the guild of master singers. The final scene of the opera presents the various trade guilds triumphantly marching in for a celebration: cobblers, tailors, bakers, apprentices, journeymen, etc.

For scholars in the university guild the trade was liberal arts and thus the degree "bachelor of arts" signified that a student had achieved a beginning level of understanding of scholarship certified by the faculty. If one wanted, however, to join the guild as a teaching scholar, one had to be certified as "master of arts." The certification typically required several years of further study, presentation of a scholarly work, an oral examination by the master scholars, and the presentation of an exemplary lecture. Usually, licenses from a guild could only be granted upon permission by the local ruling authority, whether a monarch, duke, or emergent nation state. These "royal licenses" granted permission to teach, or, as it was called then, to read. Therefore, the Latin license was called *pro venia legendi*, where *legend* is the gerund for the Latin verb to read, *legere*.

One further complication is that in medieval times there were three established professions: Law, Medicine, and Theology. For these professions to be recognized within the university liberal arts trade guild, special procedures were introduced. Typically, practitioners of these professions had already achieved at least bachelor of arts status, and in some cases were masters. The scholars in the liberal arts trade then devised special examinations for the best practitioners of these professions. If the candidate passed, the license of *jus ubique docendi* was awarded. The new scholar could then be addressed as *"doctor."* The key Latin words were derived from the verb *docere*, meaning to teach, *docendi* coming from the gerund and *doctor* from the past participle. Thus, for example, the title Doctor of Medicine meant that the scholar as a practitioner had been qualified to teach the discipline of medicine among the scholars at the university. Thus, in many European universities, the right to grant the doctoral degree, authorized by the state, came to define a university.

This short historical sketch explains why in many European countries the right to award a doctoral degree is the defining characteristic of what is called a university. National traditions in this regard are no longer universal. Universities in the United Kingdom, for example, persisted with the Master of Arts as the highest degree awarded until late in the nineteenth century, and did not formally adopt the PhD degree until 1917. In the United States, there are more than 5,000 institutions of higher education, but only 62 institutions in the United States and Canada have qualified for admission to the American Association of Universities, considered the elite group of private and public major comprehensive research universities (AAU, 2017). Many institutions in the United States call themselves "universities," for example, San Francisco State University, but by law are prohibited from offering doctoral degrees except in unusual instances involving partnership with a doctoral-granting university. In this chapter, therefore, I define the term university to mean an institution that awards a significant number of doctoral degrees annually across a significant number of disciplines, while also offering traditional bachelor and master degrees. These institutions are usually called research universities.

The Liberal Arts

Now we are ready to discuss the study of the liberal arts which gave us the traditions we celebrate today when we use the English phrase "liberal education," and the German words "*Bildung*" and "*Wissenschaft*." My thesis is that *Bildung* and *Wissenschaft* were at the center of the enlightenment reforms that characterized the formation of the modern university, especially in the founding of that icon of enlightened modernity, the University of Berlin, in 1810 (Fallon, 1980). Today, however, as we cross the threshold of mass higher education into a knowledge-based society, we are in danger of losing liberal education as a fundamental element of higher education. At the same time, our evolving society needs the virtues associated with *Bildung* and *Wissenschaft* perhaps more than ever before. The solution I suggest for meeting this challenge is to reconstruct a future-oriented version of the ancient concept of the liberal arts. Let's begin by looking at the origin and meaning of this concept.

ORIGINS OF THE LIBERAL ARTS

Even with the finest scholarship we can't determine with satisfying specifics when or how the general notion of liberal education began. Nonetheless, we do know that the organization of knowledge in the Western world developed in the past 3,000 years and originated primarily in ancient Egypt, the Middle East, and Greece, influenced by neighboring civilizations. With greater certainty we can assert that the particular structure of the liberal arts, as such, emerged in Europe, and not until the middle ages.

There were potent analytical precursors of liberal education, even at the time of Periclean Athens, identified in the phrase "*Enkuklios Paideia*." This Greek phrase can be translated many ways. *Paideia* is straightforward. It means education, or rearing or upbringing. *Enkuklios,* however, is a word with many meanings, depending on the context. It can mean such ideas as circular, cyclical, common, general, or regular. The usual translation of *Enkuklios Paideia* is *general education*, but in my view a better translation arising from the treatments of it by Isocrates and Aristotle would be *complete education.* That is, education that brings together many different facts and principles and integrates them into a coherent philosophy.

The somewhat sturdier Roman construct of the Latin "*Artes Liberales*" arose four centuries later, toward the era of the emperor Augustus. The Roman orator Cicero used the phrase *Artes Liberales*, elevating it from Greek sources and adding features of Roman education. The concept was praised by such stoic philosophers as Seneca, and appeared to emphasize ways of thinking. Even then, however, there was no accepted standard course of study.

THE MAGIC NUMBER SEVEN

It is not until the fifth century C.E. that we first get a textual reference to seven specific liberal arts. They appear in a lengthy and lively text by Martianus Capella, where these liberal arts serve as handmaidens to an allegorical marriage between utilitarianism, represented in the text by Mercury, and broad humane learning, represented by Philology (Stahl, et al., 1992). Cappela apparently retrieved these seven liberal arts from older texts that are long lost. His book was so enthusiastically received that no learned person could ignore it, and its influence persisted for many centuries thereafter. Saint Augustine was a contemporary of Capella, and a fellow North African, who wrote about the intellectual value of Capella's seven liberal arts, thus helping to establish them as the cornerstone of scholarship (Leff, 1976).

In the sixth century the king of the Visigoths imprisoned a gifted and passionate philosopher named Boethius, who he ultimately executed. While in prison Boethius wrote extensively about the consolations of philosophy and continued a brilliant reflection he had begun earlier on four of the seven liberal arts, calling them the four-fold way, or *quadrivium*, literally the place where four roads meet. These were the most mathematical of the liberal arts: arithmetic, geometry, astronomy, and music. It wasn't until three centuries later, in the early ninth century, when Charlemagne brought in the English priest Alcuin to strengthen schooling in the Holy Roman Empire, that the remaining three liberal arts began to be called the three-fold way or *trivium*. These three were the liberal arts that were most related to language: grammar, rhetoric, and logic. With the passage of time the *trivium* began to be called simply "arts," and the *quadrivium* "sciences," which led to the more general Latin phrase "*ars et scientia,*" which we recognize in the English-speaking world as the modern construct of "arts and sciences."

Aristotle and the Moors

The solidification of the liberal arts into the *trivium* and the *quadrivium* or the arts and sciences took place in the middle ages not long after the reign of Charlemagne and occurred at more or less the same time as the beginnings of what would become universities. By the time we get to the thirteenth century we are approaching the boundary between what we might call the late Middle Ages and the Renaissance. Before this time, most of the works of Aristotle were unknown to scholars in Europe because the texts had been lost in antiquity. But most of Aristotle's copious works had indeed been preserved and translated into Arabic by Islamic scholars, who brought these texts to Europe via the Moorish invasion of Spain. Thus, at the beginning of the thirteenth century, about the year 1200, these works, gradually but cumulatively translated into Latin, produced a flood of essays by Aristotle, causing a profound and disorienting impact on European scholarly thinking.

Aquinas and a Multiplicity of Specializations

St. Thomas Aquinas was deeply inspired by Aristotle's comprehensive understanding of the world. St. Thomas parsed and analyzed the newly discovered essays, allowing them to join his own thinking, thus producing a new logical philosophy and theology. The radical influence of Aristotle created such profound new knowledge that St. Thomas could easily declare that confining scholarship to just seven liberal arts was obsolete. The concept of liberal arts comprising the bedrock of higher education continued beyond the time of St. Thomas, but the arbitrary number of seven no longer put a boundary around it. Instead, liberal arts expanded to include all of what scholars agreed would constitute a common understanding of the world known to human intelligence. In many European countries, the concept of the liberal arts was subsumed by the Latin word *philosophia*, or, as the scholars associated with the liberal arts were called in German, *die philosophische Fakultät*. In the English-speaking world, these scholars continued to be called the faculty of liberal arts, or the arts and sciences.

WILHELM VON HUMBOLDT

You can see by this transition from a guild of scholars associated with seven specific liberal arts to the idea of *die philosophische Fakultät* or faculty of arts and sciences that from today's point of view the liberal arts might be considered a collection of disciplines. At the time that Wilhelm von Humboldt accepted the challenge from Prussian King Friedrich Wilhelm III in February of 1809 to design a university in Berlin, however, the concept of an academic discipline in today's sense of the word did not exist. The historic European university of the eighteenth century contained only four faculties. The general faculty was that of *Philosophy*, which provided instruction in what had been known historically as the liberal arts. The remaining faculties were for the three professions that had been recognized since the Middle Ages: *Medicine, Theology,* and *Law.*

In the transformative founding of the University of Berlin in 1810, Wilhelm von Humboldt created the modern university as it is widely understood today. Since in Humboldt's day all scholars first had to study in philosophy before continuing to professional study, the faculty of philosophy had come to be called "the lower faculty." Furthermore, since the scholars in the faculty of philosophy were the basis of the university, they had been assumed, by definition, as qualified to teach. Scholars in the faculty of philosophy had passed examinations, generally published widely, and many carried the title of Doctor of Philosophy. Nonetheless, the means by which they became licensed teaching scholars were perceived as neither coherent nor thorough.

Humboldt asserted that there should be nothing "lower" about philosophy, and, further, that scholars in philosophy should qualify as teachers in the university through a rigorous procedure. He proposed a new qualifying examination for university teachers, the *pro facultate docendi*, to be administered to candidates in philosophy. Instead of adopting this new label and examination that went with it, the faculty at the University of Berlin decided to strengthen the practices that had led in some places to qualification as Doctor of Philosophy. These examinations were administered in the special field of philosophy in which a candidate claimed to be an authority. These fields, such as history, literature, linguistics, chemistry, physics, or mathematics, are what are called disciplines today.

Wilhelm von Humboldt was himself a great linguistic scholar, who admired Aristotle, and promoted principles consistent with Aristotle's conception of the world. For Humboldt, as for Aristotle, an important function of advanced learning was the formation of character that promoted in students a sense of responsible citizenship. Of course, Humboldt understood the need of any professor at the university to pursue specialized scholarship, but only in the context of a deep commitment to *Wissenschaft* and to *Bildung*. To get to this point, Humboldt assumed that one function of the University would in fact be the strengthening of a student's liberal education. Thus, he wrote to the King on July 24, 1809, laying out his proposal for a University in Berlin, that a university, "... proceeding from the proper perspective of a liberal education, can neither rule out any academic subject nor, from a more elevated point of view (since universities clearly operate only at the highest level), begin to limit itself in the end to purely practical exercises" (Humboldt, 1996, *Antrag*, pp. 115-16).

In a later essay, he was very clear about the University's responsibility for *Wissenschaft*. He wrote, "This is because *Wissenschaft* alone, which comes from and can be planted in the depths of spirit, also transforms character; and for the state, just as for humanity, facts and discourse matter less than character and behavior" (Humboldt, 1996, *Anstalten*, p. 258). In writing about *Bildung* to the King in December 1809, he stressed, "Therefore, the primary objective for the whole nation ... must depend on the understanding of clear and well-defined concepts, and to plant those concepts so deeply that they are evident in character and behavior" (Humboldt, 1996, *Bericht*, p. 212.)

Ideas about *Bildung* und *Wissenschaft* were critical to Humboldt's understanding about the meaning of a university. They also were deeply in debt to the spirit of the liberal arts that had been the heart of universities in Europe from their very beginning. To see this relationship more clearly, we need to examine the spirit of the liberal arts more closely.

A Contemporary Framework for the Liberal Arts

From my own perspective, the legacy of the liberal arts for today's world is made up of three broad concepts that aim to build an educated citizen.

Three Pillars

General education (*Grundwissen*) is the acquisition and possession of a repertoire of reliable information about a variety of important facts, systems, events, people, and phenomena.

Liberal education (*allgemeine Bildung*) is the acquisition and possession of the means of determining the value, purpose, and meaning of information. It is this facility that permits one to know, for example, the beautiful from the ordinary, the just from the unjust, and better from worse. Liberal education also teaches students how to make connections among the elements within general education, and to discern patterns that convey understanding. Liberal education is dependent upon general education and thus cannot exist without it.

Scholarly Inquiry (*Wissenschaftspropädeutik*) is the acquisition and possession of modes of inquiry by which students acquire general and liberal education. They include, for example, the scientific method, bibliographic techniques, rhetoric and composition, critical theory, and dialectical, inductive, and deductive reasoning.

Not everyone in academic life would define general education, liberal education, or scholarly inquiry in the same way, and some might think of them quite differently than I've described them here. Nonetheless, a university education seeks to provide students with some level of competence at least in KNOWLEDGE (general education), VALUES (liberal education), and SKILLS (scholarly inquiry). These three ideas are not strictly separable. Although some instruction may emphasize, say, knowledge, over values and skills, in fact all three end up being taught simultaneously.

CITIZENSHIP

Another common mode of analysis of the liberal arts is through the lens of civic virtue or citizenship. A broad social purpose of education is evident from ancient times in many cultures worldwide. In the Western tradition it can be clearly seen in treatments by Solon, Isocrates, Plato, and Aristotle, through Cicero, St. Augustine, Boethius, and Aquinas, to Humboldt. This aim is the cultivation of character, the pursuit of virtue, and, above all, the use of higher education to prepare free citizens to govern themselves in a democracy. Indeed, it is through one etymological meaning of liberal, "suitable for a free person," that the phrase liberal arts arose. Humboldt's conception of state and society brought him, like his mentor, Aristotle, to understand this function and thus to stress the importance of a university education to strengthen character and behavior, that is, to elevate the function of *Bildung*.

FROM THE 19TH CENTURY TO THE 21ST CENTURY

As we have seen, Wilhelm von Humboldt never lost sight of the essential tradition of the liberal arts, in the form of *Bildung* und *Wissenschaft*, to be at the center of a university education. This objective was possible, at least in the early nineteenth Century, when only a small elite group of students was expected to attend the University, and when, to use Humboldt's words, it was the responsibility of the state "... to organize its schools so that they work hand in hand with the institutions of higher learning" (Humboldt, 1996, *Anstalten*, p. 260). The enormous advances in research and knowledge that occurred in the following 200 years, plus the systematic advance of social democracy and the broadening franchise for education, have since then posed increasing challenges to maintaining *Bildung* as a priority for the university.

There is no precedent for how a highly educated society should arrange its educational institutions or pursue a broad educational purpose. In this new dynamic environment, the liberal arts, historically central to the purposes of the university, are increasingly becoming peripheral. Our emergence into a knowledge-based economy has brought us many benefits, including, for example, personal computers, the Internet, and extraordinary improvements in medicine. At the same time, increases in knowledge and education have brought about malicious computer viruses, sophisticated schemes for financial fraud, and medical and biological possibilities that conflict with our ethical and moral understanding of what it means to be human. What is needed is a means to temper the rapid creation of new knowledge and wealth with ethical intelligence, an acceptance of responsibility for a healthy social order, and the commitment to good citizenship in a democracy. This is exactly the domain of the liberal arts. In short, what is needed today for the university of the future is a renewed focus for all students on *Bildung*.

We cannot, as was appropriate in Humboldt's era, allow *Bildung* to emerge through free curricular choices by students informed by a wise and collegial faculty. Modern institutions are too many, large, diverse and complex. We also can no longer assume, as Humboldt did, that preparation for university study at the secondary school level, the high school or *Gymnasium*, would provide much of the necessary elements of a liberal education. University scholars have an intrinsic responsibility for protection of the liberal arts and must assert their historic professional duty to ensure that today's students are prepared to assume roles as citizens in a modern political economy.

A Responsibility for Today's Faculty and Today's Students

What is required at a university is coordinated action by the faculty, in their role as keepers of the university ideal. A structured focus on *Bildung* cannot occur by each separate academic department operating in disciplinary isolation for its own students. The university must commit to a single curriculum, shared by all students, and taught by faculty from many departments. In a three- or four-year course of study, this shared curriculum could occupy perhaps as little as one semester or as much as one year. This "cultivated curriculum" (*Bildungsstudium*) need not be the same at all universities, but wherever it is offered, it should be a coherent whole, requiring deep reflection on the part of the student. No university degree at any university should be awarded to a student without certification that the student has successfully completed a cultivated curriculum at some university.

Our intense pursuit of new knowledge within universities has necessarily required many imaginative minds to specialize. Of course that brings with it technical vocabularies and modes of thinking that are not readily accessible to specialists in other fields. It is impossible for today's scholars to avoid this problem, which is perhaps most vividly demonstrated in the poignant estrangement over the past two hundred years of the humanities from the sciences. We cannot turn our backs on specialization and technical vocabularies. We also need, however, to develop the capacity to see big pictures in ways that temper criticism with compassion and strengthen the integrating power of our comprehension.

No matter how we organize our own universities we need to keep in mind that all academic disciplines of the arts and sciences share a common heritage derived originally from the liberal arts. We are not speaking here of one tradition versus some other tradition, but of the basic unity of human knowledge as exemplified by Humboldt's conception of *die philosophische Fakultät*, which made no distinctions among scholars by academic field. In other words, the academic compartmentalization of today's university must be balanced by a focused university-wide commitment to the liberal arts.

The content and structure of the cultivated curriculum should be the responsibility of the faculty at any given university, developed and approved through its normal academic government. The faculty that commits to it must be the faculty that designs it and maintains it. One possibility could be a program that focuses on synthesis, perspective, and coherence in a way that demonstrates the motivating power of what I have described here as the liberal arts. A cultivated curriculum could bring students together under the explicit assumption that they have acquired a basic repertoire of general knowledge and skills. The students' common purpose would be to seek patterns within their course of study, to apply values to these ideas, to point their learning toward their postgraduate lives as citizens, and thus to find the definitive meaning of their university education. This kind of cultivated curriculum would not only benefit students but would surely also enrich the faculty, anchoring them in a noble tradition that sustains the university.

SUMMARY AND CONCLUSION

The liberal arts are the seeds from which the luxuriant garden that we call today the university has grown. They also supply the nutrients that keep the garden in flower. In today's world, impressed by the scope and richness of this garden, and dazzled by the beauty of particular blossoms, we stand at risk of forgetting how important are the seeds and the nutrients. We need to stand back, perceive and protect the essence of the university, that spirit on which it depends, and which holds it together. What the university needs today, above all, is a renewed commitment to *Bildung* and to *Wissenschaft*, in the sense that Wilhelm von Humboldt thought about those concepts. As Humboldt reminded us in his essay on the university this will be both difficult and easy. Here is his advice to us:

Difficult:

"In organizing the institutions of higher learning, everything depends upon holding to the principle of considering *Wissenschaft* as something not yet found, never completely to be discovered, and searching relentlessly for it as such" (Humboldt, 1996, *Antrag*, p. 257).

Easy:

"If ultimately in institutions of higher learning the principle of seeking *Wissenschaft* as such is dominant, then it is not necessary to worry individually about anything else" (Humboldt, 1996, *Antrag*, p. 259).

REFERENCES

AAU (2017). Association of American Universities. Retrieved from: http://www.aau.edu on January 20, 2017.

Bédier, J. (1921). Les Légendes Épiques, second edition. Paris: Édouard Champion.

Fallon, D. (1980). The German University: A Heroic Ideal in Conflict with the Modern World. Boulder, CO: Colorado Associated University Press.

Humboldt, W. (1996). *Werke in fünf Bänden. Band 4. Schriften zur Politik und zum Bildungswesen* (fünfte Auflage). Stuttgart: J. G. Cotta'sche Buchhandlung.

(*Antrag*). Antrag auf Errichtung der Universität Berlin [VII 1809]. S. 113-120.

(*Bericht*). Bericht der Sektion des Kultus und Unterrichts an den König, Dezember 1809. S. 210-238.

(*Anstalten*). Über die innere und äußere Organisation der höheren wissenschaftlichen Anstalten in Berlin. S. 255-266.

Leff, M. C. (1976). St. Augustine and Martianus Capella: Continuity and change in fifth-century Latin rhetorical theory. Communication Quarterly, 24 (4), 2-9, September.

Stahl, W. H., Johnson, R, & Burge, E. L. (Eds., Trans.). (1992). Martianus Capella and the Seven Liberal Arts (Rev. Ed.). New York: Columbia University Press.

U.S. Department of Commerce. (1969). Population characteristics (Publication series P-20, No. 182, April 28, 1969). Educational attainment: March 1968. Washington, DC: Government Printing Office. Retrieved from https://www.census.gov/hhes/socdemo/education/data/cps/1968/P20-182.pdf.

SHORT BIOGRAPHY

DANIEL FALLON's publications include laboratory studies of learning and motivation and essays on higher education, including a prize-winning book on the German university. Currently appointed to the Hochschulrat of the Ruhr-Universität Bochum, he served with the first Strategiekommission for the Exzellenzinitiative in Germany. He is Professor Emeritus of Psychology and of Public Policy at the University of Maryland, College Park, where he was also Academic Vice President. Earlier he was Dean of Liberal Arts at Texas A &M University, and at the University of Colorado. He retired from Carnegie Corporation of New York, where he directed all foundation grants in education.

5.

THE DEVELOPMENT OF TERTIARY ATTAINMENT – STATISTICAL SCENARIOS FOR THE COMING DECADES

Bilal BARAKAT & Wolfgang LUTZ

ABSTRACT

In this study we examine long-term trends in post-secondary and tertiary educational attainment in Austria and the rest of the world, as well as projections over the next fifty years, in order to inform current higher education policy debates. These projections are derived in a demographically consistent way within a cohort-component model, with attainment-specific mortality and fertility rates. Scenarios at such a time scale necessarily abstract away from political contingencies, and instead represent the implications of long-term, macro-level social trends. From this perspective, anything other than continued expansion, even if only moderate, would represent a significant break with past trends in Austria itself and with international experience and precedent. In the long run, it appears unlikely that a lack of demand at the macro-level would constrain further expansion. Even under significant further expansion, Austria's share of tertiary-educated labour force will continue to lag well behind other European countries for several decades into the future.

INTRODUCTION

Ever since the passing of the Austrian *Universitätsgesetz* in 2002, which equipped universities with a substantial degree of autonomy, has the appropriate link between enrolments and funding been subject to heated debates. After a short-lived tuition fee experiment during the 2000s, enrolment growth outpaced increases in overall funding, and the notion of a capacity-oriented funding formula was floated repeatedly. At the time of writing, this approach appears to have been embraced as official government policy, but not yet enacted or implemented. It is not clear at the time of writing how exactly the specific number of university places to be offered will be determined. Crucially, even less clear is the *dynamic* planned for this number, in other words, how it will be decided when and to what extent it will be adapted to increased demand in the future, whether on the part of secondary school leavers or of employers.

This brings to the fore a key pair of questions in any kind of scenario exercise: should it focus on long-term trends, including those in other countries, or rather on national plans and policies? And are the scenarios, especially the central one, to be understood merely as projections, or more ambitiously as forecasts? A scenario based mostly on current government plans would be both overdefined in the short term and underdefined in the long run: the assumption that the plan is implemented means the plan *is* the projection, at the same time plans do not extend decades into the future and therefore provide no guidance for future expectations. And *whether* the plan can be implemented successfully (on its own terms) is not a matter of statistical analysis.

It appears more fruitful, therefore, to examine the underlying trends as a backdrop against which the implications of a policy of constrained supply may be assessed. Does it merely amount to making official a development that is already set in motion, or does it, on the contrary, appear to be an attempt to "stem the tide"? Does it compensate for a national idiosyncracy and contribute to making national higher education dynamics more similar to those in other countries, or on the contrary, represent a lonely path?

A number of governments at some point announced national 'targets' for higher education participation among the principal age group ranging from 20 to 60 percent (Blair 1999; Bradley et al. 2008; Government of China 2010; Obama 2009), well into territory that Trow (1972) in his seminal study of higher education expansion characterised as mass (16 to 50%) or even universal access (greater than 50%). In any case, government commitment may be less decisive than sheer demand pressures, as suggested by the striking finding that higher education enrolment rates are unrelated, or even negatively associated with the share of the education budget for higher education (Mimoun 2008; Bergh and Fink 2008).

Anticipating some of the discussion to follow, it is worth noting that constraining tertiary *enrolments* does not necessarily preclude medium-term growth in tertiary *attainment*. One of the aims of limiting admissions is to reduce the 'mismatch between traditional and modernized elements' (Pechar and Wroblewski 2012, 39) that contributes to high rates of high drop-out in the Austrian higher education sector. If successful in this regard, *completion*, and therefore attainment, may in principle continue to expand. In addition, in thinking about the capacity of the labour market to offer post-secondary graduates tasks appropriate to their qualifications, it is crucial not to conflate the *flow* of graduates among cohorts of young people entering the workforce with the *stock* among the working-age population. Even if somehow every single young school-leaver from now on obtained a university degree, it would still take decades for the last worker with less schooling who is already in the labour market today to retire. In light of such nuances, it is necessary to lay some conceptual groundwork before turning to the numerical results.

WHAT DO WE MEAN BY 'TERTIARY PARTICIPATION'?

ENROLMENT, ATTAINMENT, FLOWS, AND STOCKS

In the interpretation of education statistics generally, including statistics on post-secondary and tertiary education, care must be taken not only with the definitional boundary between different levels, but also with a number of fundamental distinctions. In particular, different conclusions may be drawn depending on whether levels and trends in the number of entrants are analysed, in the number of students, or of graduates. Moreover, the implications of the latter as a flow must be distinguished from the stock of graduates in the population that reflects cumulative past flows.

For policy and planning purposes, the absolute number of entrants and students is of key interest. For the purpose of understanding long term societal change, however, it is the *proportions* of different cohorts at different levels of attainment that matters more. The former can easily change even if the latter does not. More young people may start a tertiary programme, but drop out without completing it. The same number of entrants may take longer to complete on average, increasing the stock of students due to inefficiency rather than high attainment. In more complex ways, and analogously to how the standard summary measure of childbearing intensity, the *Total Fertility Rate*, is affected by the timing of births as well as their number, a trend of increasingly earlier or later tertiary entry, at constant duration of study, would cause the number of students to increase respectively decrease. Again, the actual distribution of attainment ultimately achieved would remain the same nevertheless. The potential for distortion becomes even greater when consideration is limited to a narrow age bracket, as the Tertiary Gross Enrolment Ratio, which references the age range up to five years after the theoretical age of completing upper secondary school, typically 19–23. All this without even considering the question of how to handle parallel enrolments, individuals enrolled, but not actively pursuing their studies, and other problematic cases. Indeed, among the publications by the Austrian national statistical office, namely the *Hochschulstatistik* and the *Hochschulprognose,* there are discrepancies with respect to the exact definitions.

For these reasons, actual, completed attainment is arguably the most relevant measure for international comparisons, as a stock in the population as a whole, and interpreted as a flow into this stock when examined for young cohorts. Indeed, this is how the EU's 'Europe 2020' strategy defined its tertiary education target, namely as 40 percent or more of 30–34-year-olds achieving tertiary attainment. However, the notion of 'tertiary attainment' presents significant measurement issues of its own.

Delineating 'tertiary' attainment

However, the debate concerning the delineation of 'tertiary education' did not end when the more inclusive definition prevailed in the struggle for recognition of non-university higher education institutions. In some systems, such as the United Kingdom, the very category of 'polytechnic' was abolished, and these institutions simply became universities with the *Further and Higher Education Act 1992*. Elsewhere, such as in Germany, the *Fachhochschulen* remained such, but saw their status enhanced to being equivalent to that of university for most practical purposes, with the notable exception of the power to award doctoral degrees. Either way, there is no longer any debate about both types of institutions being part of the 'higher education' sector.

The boundary debates have moved. Certainly since the 2011 revision of the *International Standard Classification of Education* (ISCED), with the introduction of the level of 'Short Cycle Tertiary' (ISCED 5) that is explicitly recognised as often being provided at different educational institutions than academic degrees, 'tertiary education' is no longer congruent with 'higher education'.

An additional complexity is recognised in the distinction between the classification of *programmes* on the one hand (ISCED-P) and *attainment* on the other (ISCED-A) in the ISCED 2011 standard. This recognises the existence of education programmes that are situated at a certain level, but that are 'insufficient for level completion' and do not, by themselves, confer the corresponding level of attainment.

Based on this distinction, a pursuasive case can be made (Aff 2013) that even though the Austrian *Berufsbildenden Höheren Schulen* (BHS) are part of ISCED-P 5, they should be considered 'insufficient for level completion' and that its graduates have therefore not yet attained ISCED-A 5, i.e., tertiary attainment. However, the more generous interpretation has established itself, and the Austrian BHS are presented in the ISCED 2011 Operational Manual as an explicit example of a vocational school-based programme that, after the full five-year cycle, does lead to a first *completed* attainment at ISCED-A 5. One consequence is a definitional break in the time series of tertiary participation and attainment that Eurostat or the OECD publish for Austria.

Such problems of classification are the main reason why the educational attainment projections presented in (Lutz, Butz, and KC 2014) combine the categories of post-secondary and tertiary attainment all together.

TERTIARY PARTICIPATION IN AUSTRIA: STATUS QUO AND SCENARIOS FOR THE FUTURE

A STATISTICAL SNAPSHOT

The present aim is not to replicate the volume-filling presentations of detailed statistics of all the indicators mentioned above for Austria and comparison countries, statistics that are readily accessibly in the current publications by Statistik Austria, Eurostat, or the OECD, and that go into great detail in terms of providing disaggregated figures by gender, subnational region, subject area and so on. Instead, only a small number of key figures is presented to set the scene for the projections, not least by providing a sense of how the starting point in terms of completed attainment relates to other indicators that receive more coverage.

Statistik Austria's flagship publication on education, *Bildung in Zahlen 2014/15* reports some 375 thousand students in higher education in the strict sense including only the 22 public and 12 private universities, the *Fachhochschulen* (universities of applied sciences), teacher training and theological institutions. Around three quarters of these enrolments are at the universities. The size of the higher education sector in terms of the absolute number of students has followed a strongly increasing trend, both in the long term (enrolments only exceed 100 thousand in the late 1970s), and in the medium term since the early 2000s, when the introduction of tuition fees resulted in a temporary drop in enrolment, partly because it resulted in the purge of inactive students from the register. The number of degrees completed ('ordentliche Studienabschlüsse') at public higher education institutions has risen even more markedly, from fewer than 10,000 per year in the mid-1980s to over 50,000 for the academic year 2013/14.

In terms of transition rates, around two-thirds of upper secondary graduates eligible for entry into higher education do so within three years of graduating. However, note that the graduates of BHS higher vocational schools have already reached tertiary attainment, regardless of whether they subsequently enter higher education or not, and the entry rate among graduates of general academic upper secondary education into higher education is 85 percent. In other words, the transition from upper secondary into tertiary does not constitute a bottleneck that in itself would serve to limit the expansion of tertiary attainment. More limiting is the completion rate. Among higher education entrants in the academic year 2004/05, just over half had actually graduated with a degree within ten years.

Projections of tertiary attainment in Austria and the world

Approaches to (tertiary) educational projections

As a general rule, projection models become more stylised, the greater their coverage in space and/or time. This pattern is reflected in the differences between education projections whose primary purpose is to aid national planning and those serving international comparisons.

The national projections contained in Statistik Austria's *Hochschulprognose* focus on absolute numbers of entrants, students, and graduates in the Austrian higher education sector over the medium term to 2033. Accordingly, they build on statistical extrapolations of trends in entry, progression, drop-out, and completion rates at each stage. As discussed above, this approach is invaluable for national policy analysis, but is limited in its applicability to truly long-term projections and international comparisons. The underlying model accounts for the effect of a number of covariates, and is contextually specific, as is evident in, for example, the separate treatment of student migration from Germany specifically, disaggregation of types of upper-secondary schooling and their different tertiary transition rates, or th consideration of the number of *months* since graduating upper secondary to determine tertiary transition rates. At the same time, a fundamental assumption is that the conditional rates remain constant in the future. In other words, the *Hochschulprognose* focuses on the effect of the changing composition of cohorts of potential entrants on student numbers. As such, its use is limited to the medium-term, as is reflected in the projection horizon up to 2032/33.

The focus of the Organization for Economic Cooperation and Development (OECD) naturally rests on international comparisons rather than accounting for national idiosyncrasies. Accordingly, its own principal higher education projection exercise, documented in the *Higher Education to 2030* report (OECD 2005), follows a more abstract approach. For enrolment outcomes, these projections make use of 'age functions' of entry, drop-out, and completion, that specify the incidency of enrolment events at different ages, rather than occurrence-exposure rates. Among these functions, only entry is allowed to vary by country, while the other two represent average behavioural patterns across OECD countries. The dynamics are limited to the extrapolation of linear trends estimated on the most recent past. Notably, the projections of population attainment presented in that report are based on a *different* model, namely an extrapolation of age-specific attainment shares.

Our own projections differ crucially in this regard, in that once achieved, attainment is carried to higher levels in a demographically consistent way within a cohort-component model, with attainment-specific mortality and fertility rates. The projections presented here are derived from the latest iteration of the model described by Lutz, Butz, and KC (2014). The methodology of this update is fully documented in Barakat (2017). In brief, we model highest attainment directly, in other words, without deriving it from entry, progression, and graduation rates. The specification takes into account country-specific trends, and because these are estimated on relatively long time-series, and projected out to a distant horizon, they can take the non-linearity into account that is inevitably induced by the upper bound of universal attainment at a given level. The country-specific trends are jointly estimated within a Bayesian framework, and are exposed to additional assumed convergence in the future.

SCENARIOS

Given the probabilistic nature of these projections arising naturally from the Bayesian setting, different scenarios can straightforwardly be defined in terms of the quantiles of the distribution of simulated trajectories. In particular, the median is a natural choice for a 'business as usual' scenario. The scenario corresponding to the 10th percentile of the distribution clearly qualifies as a 'low' stagnation scenario, yet it is still perfectly compatible with a general continuity of the underlying structural dynamic. In other words, an associated narrative would not require the occurrence of political or socioeconomic disaster, merely an extended period of anaemic lack of dynamicism. In terms of specification, the 'high' scenario shown is the mirror image of the 'low' scenario, namely the 90th percentile of the distribution of simulated trajectories. Narrative support for such a scenario might stem from the recently-adopted Sustainable Development Goals (SDGs). These goals were adopted by the United Nations in September 2015 as the framework to guide global development initiatives during the period 2015 to 2030. In contrast to the preceding framework, the Millennium Development Goals (MDGs), the SDGs are explicitly understood to apply not only to so-called 'developing countries', but also to industrialised, high-income countries. Indeed, some of the targets are likely to prove challenging even for the most advanced countries. This includes the target of achieving universal completion by 2030 of upper secondary schooling. While the SDGs do not include a quantitative target for post-secondary or tertiary education directly, universal completion of upper secondary education can be expected to create an upward pressure on higher education by inflating the pool of potential entrants.

For interpretation, note that while the medium scenario corresponds to an absence of dramatic shocks in either direction, it is not compatible with complacency. Even the 'expected' outcome must still be actively achieved. In other words, this scenario does not imply an absence of individual and policy effort, but an amount of effort to be expected at this level of educational development that is consistent with the precedent set by other societies, which may be considerable.

RESULTS

In all of the following, recall that 'upper secondary' is *not* limited to *Matura* and qualifications considered to be Matura-equivalent, but corresponds to ISCED-A 3, which also includes most Austrian vocational school qualifications.

Overall level

The development of the share of 30–34-year-olds with more than upper secondary attainment according to the above scenarios is shown in Figure 1. In Austria, it is evident that in terms of ultimate attainment, the expansionary trend over the past few decades is clear-cut.

For the international comparison, we treat countries as the unit of analysis and accordingly examine *unweighted* averages that do not account for population size. It is evident that with respect to the more inclusive category of post-secondary and tertiary attainment investigated here, Austria is actually much less of a laggard in terms of either level or dynamicism that is frequently assumed. This is obviously and expectedly true in a global comparison, but also relative to other countries in Europe or North America. Note, however, that this group is defined *geographically* and is not limited to other high-income countries. The fact that the scenarios for country aggregates already begin with a gap is due to two factors: firstly, the model allows for a small amount of uncertainty and/or measurement error in the past observations, and secondly the reference year for the baseline data differs between countries, so that in some cases, 2015 is already several years into the projection.

According to Statistik Austria, the national statistical office, the size of the relevant age group of young adults aged 20–24 is projected to remain highly stable during the time period in question. Following an initial decline from current levels by some 5 percent, their number is expected to be practically the same in 2065 as in 2022, and on average in between, with a marginal variation of less than 4 percent either way. Accordingly, an additional display of absolute numbers of attainers is expendable, as their general dynamic is clear from the shares shown in Figure 1 to which they are essentially proportional.

The number of attainers in the age group 30–34 may serve as a proxy for the number of students ten years prior. While far from exact, it is a serviceable first-order approximation, especially for the long-term future where deriving enrolments from projections of internal flows within the higher education system become increasingly tenuous. This means that keeping pace with the expansion dynamics evident at the

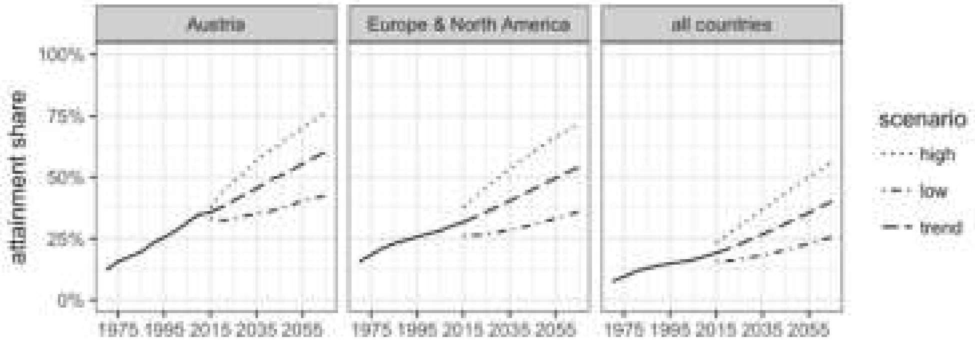


Figure 1: Projected share of 30–34-year-olds with more than upper secondary attainment. Aggregates are unweighted averages across countries.

international level in terms of participation *rates* – even just to maintain Austria's position as a relative laggard among countries with comparably high levels of income – will require a commitment to continue increasing *absolute capacity* at the post-secondary and tertiary level at a similar pace as in the past. The shrinking cohort size in the next few years offers a strictly temporary breather.

At the same time, a prolonged period of stagnation is not implausible, as the 'low' scenario demonstrates. This would involve a combination of two factors: a) falling behind the historic long-term trend, and b) this fundamental trend actually being slower than the recent past suggests, during which Austria would have 'overperformed' (with hindsight in this scenario) with respect to the expansion of post-secondary and tertiary participation.

At the other extreme, it would still be broadly consistent with past trends and international experience for a majority of 30–34-year-olds around 2025 to attain higher than upper secondary attainment. Since these cohorts are of typical higher education age now, current entry and enrolment patterns may provide a sense of whether this scenario can already be dismissed. However, this is examined in a more disaggregated fashion in the next section.

Gender differences

Narrowing the focus to Austria itself allows for a more nuanced examination of the quite different post-secondary dynamics among women and men, and for an inclusion of the upper secondary level that provides the pool of potential entrants (Figure 2).

With respect to the upper secondary level, it is clear that women have caught up rapidly with men during the latter twentieth century. Indeed, upper secondary attainment among men has been stagnant during the most recent decades. Nevertheless, a continued expansion at this level towards universal participation is projected. While the immediate determinant of continued projected expansion are the underlying model assumptions, substantive evidence validates both the general specification and the resulting projection in the Austrian case. With respect to the former claim, the experience across other countries shows that, while it unavoidably slows down as

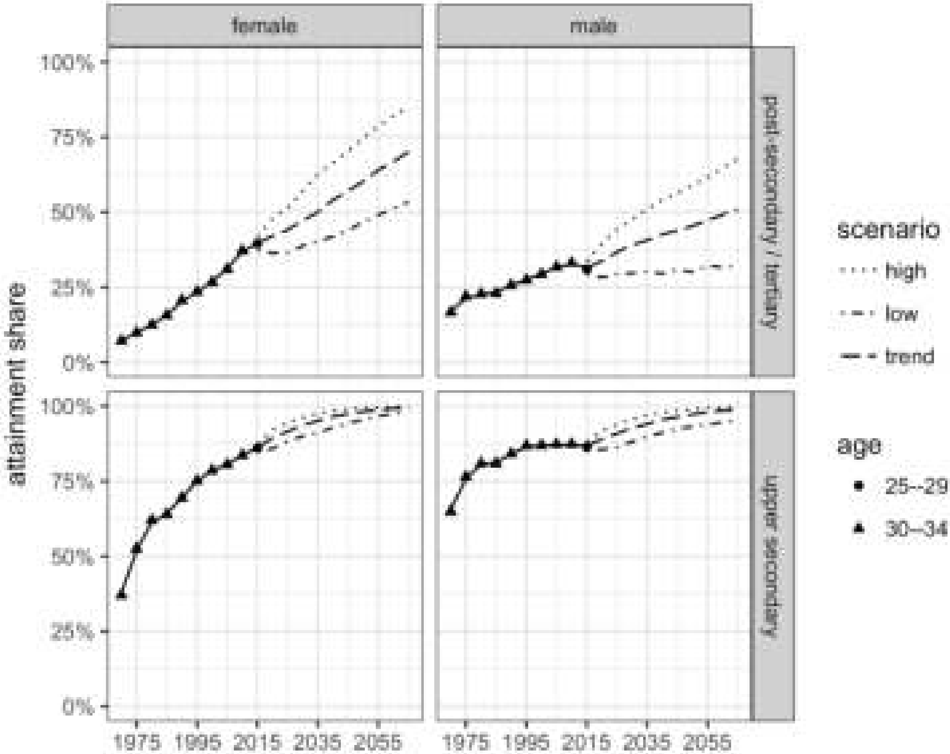


Figure 2: Projected attainment among Austrians aged 30-34, by gender.

it approaches the limit, there is no evidence of a general pattern of upper secondary expansion actually ceasing below close-to-universal levels. Universal attainment at this level is in fact a policy goal, since it is the minimal threshold for not being considered to have left education prematurely. Moreover, the SDGs likewise call for universal completion of this level.

For the Austrian case specifically, we note that the most recent statistics for *Early Leavers from Education and Training* (ELET), defined as 18-23-year-olds with at most lower secondary education and not enrolled in further education or training, stands at 7.3 percent in 2015. Since this group represents the bulk of those who will remain with at most lower secondary education, and is 30–34 years old in 2027, this figure is highly consistent with the trend scenario that does project upper secondary attainment to reach around 92 percent by then, rather than women joining the males at a permanently stalled level of 90 percent. While some 18–23-year-olds with at most lower secondary who *are* enrolled in further education and are therefore not included in the ELET figure might yet fail to reach higher attainment, this is at least partly offset by the fact that some ELETs, especially at the younger end of the age range, may still seek further education or training at a later point.

A careful consideration of age also unveils evidence of late attainment. While the results are presented with respect to the age-group 30–34, the estimation of the underlying trend assumes post-secondary and tertiary attainment is essentially completed by age 25–29. Setting this threshold (uniformly for all countries) is a balancing act between higher cut-offs to more completely capture qualifications gained at higher ages on the one hand, and being able to use more recent data points on the other. One implication is that the most recent 5-year cohort's attainment is observed at a younger age than the previous ones, as indicated in Figure 2. What we can see is that the apparent attainment of this cohort is somewhat lower. Some of this difference is likely due to post-secondary and especially tertiary attainment that is only acquired after age 25 rather than an actual trend-reversal. One implication is that the projections may actually represent an underestimate, especially for men, who appear to be more likely to acquire tertiary attainment late.

Implications for population attainment

The results shown so far referred to the age group 30–34, in other words, those cohorts who (for the most part) completed their education in the recent past. At the population level, these attainments represent a flow into the general stock across all adult age groups. Figure 3 displays how the projected share of the population aged 25 to 64 at different levels of attainment changes over time under the central scenario.

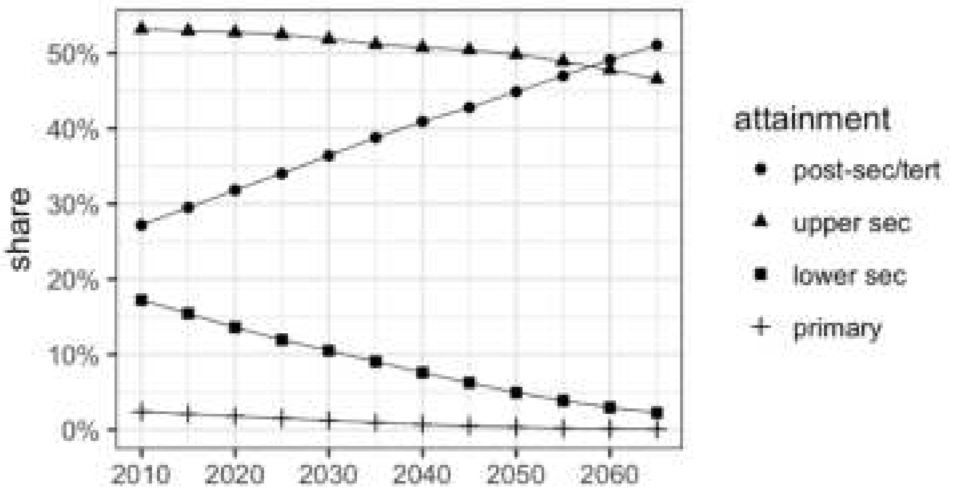


Figure 3: Attainment share among Austrians aged 25–64, trend scenario.

These projections take differences in mortality rates between education groups into account. If they did not, and absent migration, these shares would essentially be 40-year rolling averages of those for the narrower age group 30–34 shown above. It is unsurprising, therefore, that they share the same trends, but at a slower pace. Specifically, upper secondary attainers remain a majority until mid-century. Attainment exceeding upper secondary does not exceed 50 percent until the 2060s.

These figures are for the population aged 25–64, not the labour force as such. They may nevertheless serve as a useful proxy, especially given that the main biasing effects partly offset each other. On the one hand, among both women and men, the more educated exhibit higher rates of labour force, in Austria as in Europe generally (Loichinger 2015). This positive selection effect within each gender operates in the direction of increasing the attainment profile of the labour force in relation to that of the working age population. On the other hand, labour force participation is generally higher among Austrian men than women even while the latter are more educated. This selection effect between genders operates in the direction of decreasing the attainment profile of the labour force in relation to that of the working age population.

Discussion and conclusions

Almost by definition, projected trajectories are *extrapolations* when considered from the perspective of a single country. However, they can be recognised as *interpolations* from a global perspective: a substantial number of other countries have already traced out their paths of expansion from a level similar to Austria's current situation, after all. This argument is stronger with respect to upper secondary education, which is already practically universal in a considerable number of countries. It is more tenuous in general with respect to post-secondary and tertiary attainment, because towards the end of the projection horizon, many countries reach projected levels of attainment that genuinely represent 'uncharted territory'.

The key questions are, therefore, to what extent we accept a) the historical patterns of expansion of lower education levels as precedent for guiding our expectations with respect to post-secondary and tertiary expansion, and b) the international experience as precedent for Austria.

Regarding the first question, the historical expansion patterns at the highest attainment level are actually statistically very similar to those observed at lower levels in the past, merely on a longer time scale (Barakat and Shields 2016). In other words, post-secondary and tertiary attainment does not appear to be intrinsically sui generis *in terms of its patterns of quantitative expansion*. This perhaps surprising conclusion does not deny that higher education is quite distinct from lower levels of schooling in its characteristics concerning, among others, institutional governance, educational organisation, economic costs and returns. As a result, the *drivers* behind expansion at different attainment levels are likely to be different. In any case, there is, perhaps surprisingly, no statistical evidence in past expansion trajectories of post-secondary and tertiary attainment globally that suggests a saturation effect (Barakat and Shields 2016), even at the levels reached by the current front-runners.

Regarding the second question, whether international precedent should determine our expectations for future developments in Austria, it is worth noting that with respect to 'Austria's Place in Europe and the World', 'there are not too many arguments left to claim an "Austrian exceptionalism"' (Pelinka 2011, p. 21; Bischof 2011). This is true not only in the political domain, but also with respect to the economy and labour market. The exceptionally low rates of tertiary attainment in the German-speaking countries, which could evidently not be attributed to a lack of resources, have indeed been explained in terms of their specific institutional models of capitalist labour markets (Hall and Soskice 2001; Andres and Pechar 2013). However, 'it is not clear whether the strong emphasis on upper secondary vocational training that unquestionably contributed to their economic success during the Fordist era of capitalist development is still a comparative advantage in an increasingly knowledge-based economy' (ibid, p. 12).

Indeed, a labour force projection by Loichinger (2015) based on an older version of our population projections by education shows that, even under an expansion trend close to the one projected here, Austria is projected to have the *lowest* share among all EU countries of tertiary attainment in its overall labour force by 2053. Similarly, but without the benefit of modelling labour participation directly, the results above demonstrate that in the Austrian context, the argument that residual labour market demand for low-skilled labour supposedly makes 'indefinite' expansion of post-secondary and tertiary participation unsustainable is an invalid attempt at *reductio ad absurdum*. The attainment profile of the working age population changes much more slowly at the scale of a human life-span; even if participation *among young cohorts* were to continue its expansionary trend unabated, the share among the prime working-age population aged 25–64 with post-secondary or tertiary attainment in Austria would only cross the 40 percent threshold some time in the late 2030s. This level is already exceeded by around one in three OECD members today, even excluding non-tertiary post-secondary. In Canada, the figure even exceeds 50 percent today, a level not projected for Austria under current trends until the 2060s. It is clear that a claim that the Austrian labour market fifty years from now could not sustain a majority with more than upper secondary schooling cannot be made with anything close to the confidence required for this factor to constrain current moderate expansion trends in the foreseeable future. Indeed, Autor (2014) documents an *increasing* skills premium in advanced economies, as do Piketty and Saez (2014), who suggest this fact is one important factor explaining a secular increase in economic inequality. Similarly, the empirical studies underlying claims of 'over-education' that base the 'appropriate' qualification for a given job on the average qualification of those currently executing it frequently cannot account for the fact that higher degrees may be required of new recruits even if a majority of existing job holders lack them (Oliveira, Santos, and Kiker 2000). For all these reasons it seems unlikely that a lack of demand at the macro-level would constrain the projected further expansion of post-secondary and tertiary education in Austria.

Here, the massive expansion of tertiary education witnessed in recent decades around the globe is merely documented, without prejudice to the important questions this development raises. What does this expansion mean for tertiary institutions, their relationship to other sectors of society, or to students? Some of the salient questions of *how* (if at all) potential massification of post-secondary and tertiary education can be achieved in practice, and whether this is socially and individually worthwhile, are addressed in other chapters in this volume. Our more modest aim is to demonstrate the extent to which anything other than continued expansion, even if only moderate, would represent a significant break with past trends in Austria itself and with international experience and precedent. Such a break is entirely possible, of course, but carries the burden-of-proof of explicating at what point and why the underlying dynamics currently in place would be expected to change.

REFERENCES

Aff, Josef. 2013. “Strategische Weiterentwicklung der Handelsakademien (Bhs) durch eine ergänzende Akademische ‘Short Cycle Ausbildung’, Plädoyer für eine Strategie der optionalen Tertiärisierung sowie realistischen Einordnung in die Bologna- und Isced-Architektur.” *Wissenplus – Sonderausgabe Wissenschaft* 5 (12/13): 12–20.

Andres, L, and H Pechar. 2013. “Participation patterns in higher education: A comparative welfare and production régime perspective.” *European Journal of Education* 48 (2): 247–61.

Autor, D H. 2014. “Skills, Education, and the Rise of Earnings Inequality Among the’other 99 Percent’.” *Science* 344: 843–51.

Barakat, B., and R. Shields. 2016. “Just Another Level? Comparing Quantitative Patterns of Global School and Higher Education Expansion.” Working Paper 5/16. Vienna Institute of Demography (VID).

Bergh, A, and G Fink. 2008. “Higher education policy, enrollment, and income inequality.” *Social Science Quarterly* 89 (1): 217–35.

Bischof, Fritz, Günter and Plasser, ed. 2011. *Global Austria: Austria’s Place in Europe and the World*. Innsbruck University Press.

Blair, Tony. 1999. “Leader’s Speech.” Labour Party Conference, Bournemouth.

Bradley, D, P Noonan, H Nugent, and B Scales. 2008. “Review of Australian Higher Education. Final Report. Canberra, Australia: Commonwealth of Australia.”

Government of China. 2010. *Outline of China’s National Plan for Medium and Long-Term Education Reform and Development 2010-2020*. Beijing: Author.

Hall, Peter A, and David Soskice. 2001. *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford: Oxford University Press.

Loichinger, Elke. 2015. “Labor Force Projections up to 2053 for 26 Eu Countries, by Age, Sex, and Highest Level of Educational Attainment.” *Demographic Research* 32: 443–86.

Lutz, W., W. Butz, and S. KC, eds. 2014. *World Population and Human Capital in the 21st Century*. Oxford University Press.

Mimoun, M B. 2008. “Credit constraints in education: Evidence from international data.” *Journal of Applied Economics*.

Obama, B. 2009. “State of the Union Address.” In. Presented as the 219th Annual State of the Union Address, Washington, DC.

Oliveira, M M de, M C Santos, and B F Kiker. 2000. “The role of human capital and technological change in overeducation.” *Economics of Education Review* 19 (2): 199–206.

Pechar, Hans, and Angela Wroblewski. 2012. “Austria. Non-Traditional Students in the 2000s.” In *Global Perspectives on Higher Education and Lifelong Learners*, edited by H G Slowey M AND Schuetze, 25–42. New York: Routledge.

Piketty, T, and E Saez. 2014. “Inequality in the long run.” *Science* 344 (6186): 838–43.

Trow, M. 1972. “The expansion and transformation of higher education.” *International Review of Education*.

SHORT BIOGRAPHIES

WOLFGANG LUTZ is Founding Director of the Wittgenstein Centre for Demography and Global Human Capital (IIASA, VID/ÖAW, WU). He has widely published on international population trends with a special focus on population forecasting, population-development-environment interactions and introducing education as a standard demographic dimension in addition to age and sex. He has won prestigious awards including the Wittgenstein Prize, an ERC Advanced Grant, the Mattei Dogan Award, and Mindel Sheps Award. He is member of the Austrian Academy of Sciences, the Leopoldina, the World Academy of Sciences, the Finnish Society for Sciences and Letters, and the US National Academy of Sciences.

BILAL BARAKAT is a researcher affiliated with the Vienna Institute of Demography (VID) and the International Institute for Applied Systems Analysis (IIASA). Having originally trained as a mathematician at the University of Cambridge, he subsequently obtained his doctorate at the University of Oxford's Department of Education. His main research interests include substantive and methodological issues in educational statistics and policy modelling, especially from a demographic perspective. His research has been published in leading international journals and informed major international reports. He is also a regular consultant for UNESCO and other international organisations.

6.

Value-able Universities: An Answer to Globalization and Digitalization

Günther R. Burkert & Barbara Weitgruber

Abstract

The role of the universities has always been a topic of discussion. Above all, their struggle for freedom from political and economic demands has increased in recent decades. Should their struggle for freedom from society not become a dialog with society? Should not exactly the values that universities communicate be put at the center stage again? On the one hand, these are the purely scientific values of the critical development of knowledge to generate reliable, reproducible knowledge. On the other hand, it is also a matter of more general values of society such as equality, the transmission of which should be part of the "education of mature persons."

> The universities should not
> be carrying the bridal trains
> of the powerful, but rather
> showing the way with a torch.
> – Ernst Bloch

The role of the universities: Freedom from politics and the economy?

For many centuries, the European universities – at least the traditional ones – have played a role in determining the speed of scientific and societal progress. Their history is also one of continuous transformation of a successful form of organization to increase scholarly insight in the tradition of social self-organization. Their contribution to societal discussion over these centuries was only possible because of a struggle for freedom from political and economic demands. Even if the universities were not always the avant-garde for the change of philosophical outlooks and political systems (unfortunately, there were also phases of support for political systems that were not democratically legitimated), universities at least have the potential to belong to the most active parts of civil society (Brix, 2005). As communities in the area of tension between the state and the market, also with regard to their educational goals in liberal democracies, they are a classic component of civil society. They are self-organized and committed to the idea of progress; they pass on their insights, create knowledge, live democratic political virtues, and practice critical thinking.

As soon as knowledge is increased and passed on, it is always tied to changes in society. Above all in highly technologized modern societies, it is expected that the future will be driven by the development of knowledge. In this context, universities' ability to survive is not discussed; instead, their task is seen as being an organization that has the ability to educate the talents that knowledge-based societies need. In the future, will universities continue to be places for teaching and learning that play a role in students' education and character development? Will universities continue to exist as communities and represent certain values? Ultimately, their self-understanding is based on the societal agreement that it is in the general interest to promote scientific education and research. Has the adjective "scientific" as attached to "education" gotten lost in the discussion about the role of universities?

Universities' values? The values of science?

If one values the adjective "scientific" as attached to education, then the question immediately arises of the values of science, not least because science has been entrusted with a function that is crucial for the whole of society: the production of substantiated knowledge (Weingart, 2003). The foundations of this production of knowledge have always been the university's values, which were simultaneously the values of science. Just a few years ago, Frans Zwarts, rector of the University of Groningen, characterized the university as follows: "Like no other institution, the university embodies the principles of doubt, of irony, of distance, of the rebellious discontent with the existing understanding of nature, people, and society" (Ed Noort, 2014). Critical scrutiny, falsification wherever possible and thus developing further, along with daring to think synergistically are the foundations of science. The endless curiosity that is necessary finds a much better expression in the English phrase "curiosity-driven research" than the German word "*Grundlagenforschung*" (basic research) could ever describe. If one takes the meaning of researching the basics, then the universities would have covered that already in their "normal" spectrum of tasks. "Curiosity-driven," by contrast, belongs to the ever-present rebellious and critical spirit that has also characterized universities. Or is this spirit out of date, even nostalgic in a world of "mammoth" faculties, giant labs, ties to industry, challenging framework conditions for studying at a university, and (chronic) financial problems? On the other hand, are not precisely these characteristics, on which science is based and which are threatened with loss as "values" of the university, indispensable for the development of a society, also and exactly in a time of globalization and digitalization?

The universities' special responsibility is the transmission of skills that enable a person's constructive engagement with social, economic and political change. In the current image of progress through education, the university still represents, both symbolically and in reality, the driving force of modern society. In the present as in the past, the largest share of societal and economic leaders has been educated at universities. Is the university on a path from being the driving force, to being a companion in change that it no longer drives?

GLOBALIZATION, DIGITALIZATION

Are not universities, which have always, though to varying degrees, been internationally oriented, ideally suited "coaches" to globalization? Globalization means extending and intensifying relations of communication across national borders. The politics of the nation-state, which are tied to a location, have difficulty in keeping up with economies that cross borders, and must witness how the pursuit of economic interests frees people from the grip of the nation-state's control, which seems to put the common welfare and the internal coherence of society at risk. Can politics at a supranational level, as with the European Union, manage to initiate the development of a European society, something that currently appears to be happening with pro-EU demonstrations? What is the role of the universities in this process, especially given the years they have contributed to developing the European Higher Education Area? (Gantner/Koch, 2007).

Intellectual elites ("experts") from academia and the public (still) define the discourse about the world's most important problems, but they barely contribute to their solutions. Science and academia are years ahead of possible solutions when defining problems, and thus they also contribute to the uncertainty about change. The faster networking and dependence expand, the more important an active respectively interactive dialogue with civil society will be.

In an age of globalization, the old pair of opposites of community and society has returned as the difference between the local and the global, with the global standing for threats to what is local and worthy of protection. Are regional universities thus necessary as "intermediaries" for the local, and the "old" values that are part of this context? The more internationally oriented universities are active as drivers and companions of change. Both have a role in making the global developments of the transformation brought about by globalization and digitalization more understandable. But that also requires an openness that takes important academic ideas – wherever they may come from – impartially and open-mindedly into academic discourse (carried out both nationally and internationally), regardless of their underlying values.

Simultaneously, globalization also increasingly calls the canon of Western universities into question: without knowledge of Arab poetics, Asian philosophy and American programming languages, it is impossible to understand today's world. Above all the humanities and social sciences would have a chance to move away from the intrinsic value of the aesthetic that many disciplines use for justification, with professors as well as students who would engage again in political debates, explaining and disputing. They would rightly find a receptive audience in society, and represent reality. The future of the university is, at any rate, in offering a comprehensive education, one that no other form of knowledge organization can offer.

Still, digitalization does also not stop at the classroom door. Many universities already have their lectures on the net under the name of "MOOC" (massive open online course). EdX (www.edx.org) is a non-profit open-source platform that numerous universities use to make their lectures available online. Another well-known and well-liked platform is Coursera (www.coursera.org). There is hardly a topic for which there is not a presentation or information available on YouTube or Wikipedia. In addition to global and usually free access, an online lecture can be taken in at a personal speed and at an individually chosen time. Personalization is also possible, because someone who is learning about a subject can choose the most suitable among various offerings. An online remix tool would make it possible to combine parts of different lectures, so that different instructors could explain a topic, thus leading to better understanding or to the juxtaposition of different views. Current digital developments are thus also fundamentally changing universities.

UNIVERSITY AND SOCIETY IN AN AGE OF GLOBALIZATION AND DIGITALIZATION

Does globalization mean that the global normativity of the system of higher education – and the system of science as well – is hurrying ahead of business? Does globalization mean strong standardization and removing differentiation among the contents of studies and qualifications, regardless of an institution's location and how it is embedded in the given surrounding society? The digital world is a multiple world of parallel realities that also undermine traditional political terms. Thanks to global social media, single individuals can create a global public at any time from anywhere, at practically no cost. That raises the question of the provider of information, but also the differentiation from the provider of knowledge. In the future, will the university still be needed as a place that guarantees the scientific standard of knowledge?

The university will probably increasingly operate as a platform that uses a common exchange to create meaning. A digital world, a networked world is fast, barely tangible, changes constantly. It retreats from every attempt to nail it down, to squeeze it into a fixed frame. That appears as a problem to the people who had previously determined the framework – but it can also be seen as an advantage. If the "liquid modernity" (Zygmunt Baumann) dominates the universities, then it is best faced by a liquid "service public": a permanent discussion about the role of the universities (Dohrmann, 2015). Digital media would offer the opportunity to conduct a discussion across the country about the role of the universities. Tools such as "liquid democracy" enable every person to participate individually.

In this area, universities are competing with the providers of new values: Google, Apple, Facebook – all of Silicon Valley is waiting to be able to implement its concepts of society. Google, for example, has been known for some time for its efforts to buy up every possible competitor, not least because Europe failed to counter the fantastic empire of search with something of its own. That leads to a monopoly that is not solely concerned with economic power. It is a question of the future models of society. Thus the philosopher Francesca Ferrando created cyborgs – beings that are part human and part machine. A post-human society teeming with mixed forms of humans and machines would bring about a more just and tolerant world (Buchter/Straßmann, 2013). It is also a matter of how knowledge is created. Are universities additionally under pressure from information producers such as Google? Or is it possible to distinguish the "information industry" so clearly from the knowledge production of the universities that the (supposed) increase of knowledge is not increasingly outsourced to the internet, thus calling the tasks of the universities in this area into question?

Scientific view of the world

Do universities today still even have an understanding that they see themselves as an expression of a scientifically based view of the world, which an international community of teachers and students intends to assert as a matter of conviction? Or is a modern scientific view of the world no longer even possible, due to the splintering of the disciplines and their specialization? Research today employs methods and tools that were unimaginable a few decades ago. How can the latest insights in quantum physics, neurobiology, genetic engineering or bionics even be understood on the basis of what is taught in schools? Who today can really present a complete scientific view of the world? Does not a return to the pre-Darwin view of the world seen in many US states, that one can base on "belief," fit this situation?

The term "scientific view of the world" is most used by those who want to express the dangers of new scientific insights. If the university canon of values has truly become so diffuse that it can no longer be expressed unequivocally and convincingly, then universities do not have a promising future as institutions with a claim to comprehensive humanistic education (Brix, 2005).

Misuse of scientific values

Universities have increasingly slipped into a credibility deficit among the general public, which is tied to the fact that to a very great extent they no longer see themselves as important civil actors. Does that not also run the danger of calling into question the societal consensus that it is in the general interest of promoting scientific training and research?

The out-of-hand pressure for ever-higher publication numbers and the ever-expanding necessity of publishing in constantly higher-ranking journals for any type of scientific career, tied with the strongly increased expectations from university leadership for constant increases of third-party funding, have lately led to an increasing number of attempts to circumvent or ignore values of scientific integrity previously considered non debatable. Cases of academic fraud, with the three main sins of fabricating data, manipulating data, and plagiarism are becoming conspicuously more common. Even more common, however, is methodologically sloppy science, which cannot be called fraud but which probably contributes more to the reputation for unreliability than the actually fraudulent cases, which are still relatively rare.

Is (and was) the creation of an Austrian Agency for Scientific Integrity (OeAWI) not a sign of the pressure in academic careers to achieve scientific quantity and quality at the cost of setting aside scientific integrity? Should the universities that are represented in the agency not reflect about the reasons which make such a body necessary? The European network of agencies – the European Network of Research Integrity Offices – should also undertake an analysis of its cases: which countries are commonly affected, which scientific branches and disciplines show a particular "vulnerability" for scientifically questionable practices. Looking back over these analyses could contribute to a new definition of scientific values. The integrity of research refers to "undertaking research according to the highest standards of professionalism and precision, and on the correctness, objectivity and authenticity of the research results and publications. Good research practice includes research ethics in the proposal and experimental phases, as well as publication ethics in analysis and distribution" (The European Code of Conduct for Research Integrity 2017).

The term "science"

In this context, are we perhaps having the wrong public discussion? In the discussion about measuring in all of its various forms – numbers of publications, citations, peer reviews, even of days spent in other countries – which dominates the public discussion, not least as a result of the ranking industry in all of its private-business forms, a fundamental part of the universities' practice has almost been forgotten: the term "science." Science as a method-driven, initially subjective process of insight that has the goal of forming inter-subjectively testable and transmissible, i.e., objective, explanations, hypotheses and theories. It is always a matter of contexts of creation, substantiation and validity that can be submitted to a strict rational test to gain knowledge that goes beyond supposing and believing to what is reliable and reproducible. At the end of scientific work, the insights are preserved, documented, and incorporated into teaching.

The conditions of human life and experience today are determined by science down to the smallest detail. This stands in contrast to the specific disappearance of the belief in progress and the improvement of life by science that had held sway since the Renaissance and the Enlightenment. There is even fear of or skepticism about science (Mantl, 2005). Defensive attitudes that often go beyond what is reasonable (nuclear research, genetic engineering) specifically affect digitalization in its technological development as a threat to individuals' jobs.

The EU as a community of values

In this case, hopes rest on the EU. Is that not a very positive development that hopes are leaving the old nation-state aside and turning to the larger realm as the shaper of the future? Not least because of the European Charter of Fundamental Rights, issued in 2000, the Union was able to become something of a role model. The Charter not only codified the rights of the Union's citizens, it also defined general fundamental and human rights: general principles such as respecting the dignity of each person, rights to freedom and security, and prohibition against slavery, torture, and forced labor nourish claims to global validity (Metzeltin, 2014).

Despite all of the resistance and difficulties, the European Court of Human Rights constitutes "the most remarkable mechanism for the international protection of human rights that has ever existed" (Simpson, 2010). Are enlightenment, understanding and education unifying events that are strong enough and lasting enough to serve as the pride on which Europe can be built? Why is there not yet a Europe Day for all EU member states on which scientists and academics as well as artists – with a view to both past and future – could present ideas about everyday Europe? There was a European Renaissance and a European Enlightenment, with widely varying characteristics. Courage for the new and persistence in the proven should make visions of justifying creative and fruitful cooperation in the new Europe possible (Rosenmayr, 2014).

The European Higher Education Area – a community of values?

The European Union won the Nobel Peace Prize in 2012 for its "successful struggle for peace, reconciliation, democracy and human rights." Who still remembers that today? At the awards ceremony, the Norwegian Nobel Committee justified its decision with the EU's stabilizing role in the transformation of Europe from a continent of wars to a continent of peace. They also praised the common canon of values that was set down in Article 2 of the Treaty of Lisbon, which entered into force on 1 December 2009. "The Union is founded on the values of respect for human dignity, freedom, democracy, equality, the rule of law and respect for human rights, including the rights of persons belonging to minorities. These values are common to the Member States in a society in which pluralism, non-discrimination, tolerance, justice, solidarity and equality between women and men prevail." Europe sees itself not only as an area of peace, but also as a community of values. This dilemma cannot be solved *a priori*. The process of European integration is a process without "finality." Europa's ability to constantly transform and renew itself was and is the most important source of its success and its uniqueness.

In this context, the universities play an important role. In 1988, to mark the 900th anniversary of the founding of the University of Bologna, 388 rectors committed themselves in the *Magna Charta Universitatum* to deepening their cooperation; they defined the particular role of universities in and for Europe:

- "The university is an autonomous institution at the heart of societies differently organised because of geography and historical heritage; it produces, examines, appraises and hands down culture by research and teaching. To meet the needs of the world around it, its research and teaching must be morally and intellectually independent of all political authority and economic power."
- "Freedom in research and training is the fundamental principle of university life, and governments and universities, each as far as in them lies, must ensure respect for this fundamental requirement. Rejecting intolerance and always open to dialogue, a university is an ideal meeting ground for teachers capable of imparting

their knowledge and well equipped to develop it by research and innovation and for students entitled, able and willing to enrich their minds with that knowledge."

– "A university is the trustee of the European humanist tradition; its constant care is to attain universal knowledge; to fulfil its vocation it transcends geographical and political frontiers, and affirms the vital need for different cultures to know and influence each other." (http://www.magna-charta.org/resources/files/the-magna-charta/)

Ten years later, the political cornerstone was laid for creating a European Higher Education Area with the Sorbonne Declaration, issued at the celebration of the 800th anniversary of the Sorbonne on 25 May 1998. This common declaration on "harmonization of the architecture of European higher education system" (www.ehea.info) by the ministers of higher education from France, Germany, Italy and the United Kingdom was written against the background of the falling attractiveness of European higher education and academia, which expressed itself, among other ways, as a noticeable decline in the number of international students.

The declaration also represented a plea for a Europe of knowledge and for strong universities. "Relevant as they are, they should not make one forget that Europe is not only that of the Euro, of the banks and the economy: it must be a Europe of knowledge as well. We must strengthen and build upon the intellectual, cultural, social and technical dimensions of our continent. These have to a large extent been shaped by its universities, which continue to play a pivotal role for their development" (https://media.ehea.info/file/1998_Sorbonne/61/2/1998_Sorbonne_declaration_English_552612.pdf).

The "Joint declaration of European Ministers of Education on the establishment of a European Higher Education Area" was signed in Bologna in 1999 by the ministers of education from 29 European states and constitutes a declaration of political intent to use a number of instruments to voluntarily make their national systems of higher education comparable and convergent. The overarching goals were to strengthen Europe's international competitiveness and to improve the attractiveness of the European system of higher education. The declaration also emphasized – not least because of the influence of the military conflict in Kosovo – the "importance of education and educational co-operation in the development and strengthening of stable, peaceful and democratic societies." Further, the declaration stated that "a Europe of Knowledge is now widely recognised as an irreplaceable factor for social and human growth and as an indispensable component to consolidate and enrich the European citizenship." The emerging European Higher Education Area was also intended as a community of values. A Europe of Knowledge is "capable of giving its citizens the necessary competences to face the challenges of the new millennium, together with an awareness of shared values and belonging a common social and cultural space." What concrete deeds followed these important documents? Which of the universities that signed the *Magna Charta* took its implementation as the basis of their actions? (https://media.ehea.info/file/Ministerial_conferences/02/8/1999_Bologna_Declaration_English_553028.pdf).

When the ministers who were responsible for higher education in the 48 countries that had by then signed on to the Bologna Process met in Budapest and Vienna in March 2010, the year in which a European Higher Education Area was planned to be established, they issued a “Budapest-Vienna Declaration on the European Higher Education Area” in which they affirmed the vision “of an internationally competitive and attractive European Higher Education Area where higher education institutions, supported by strongly committed staff, can fulfil their diverse missions in the knowledge society; and where students benefiting from mobility with smooth and fair recognition of their qualifications, can find the best suited educational pathways.” The first criticisms of the Bologna Process were also taken into consideration. “Recent protests in some countries, partly directed against developments and measures not related to the Bologna Process, have reminded us that some of the Bologna aims and reforms have not been properly implemented and explained. We acknowledge and will listen to the critical voices raised among staff and students. We note that adjustments and further work, involving staff and students, are necessary at European, national, and especially institutional levels to achieve the European Higher Education Area as we envisage it.” At the same time, they highlighted their commitment to “academic freedom as well as autonomy and accountability of higher education institutions as principles of the European Higher Education Area” and “the role the higher education institutions play in fostering peaceful democratic societies and strengthening social cohesion.”

Although no provisions for sanctions were made in the framework of the Bologna Process, current events – most recently because of developments in Turkey – periodically drive discussions about violations of the agreed-upon basic values. These take place in the Bologna Follow-up Group, which is charged with accompanying the implementation of the European Higher Education Area. In this group, all of the member states emphasize their commitment to upholding “academic freedom as well as autonomy and accountability of higher education institutions as principles of the European Higher Education Area” and to respect “the role the higher education institutions play in fostering peaceful democratic societies and strengthening social cohesion” (https://media.ehea.info/file/2010_Budapest_Vienna/64/0/Budapest-Vienna_Declaration_598640.pdf).

Although universities are not explicitly mentioned in the “Declaration of the leaders of 27 member states and of the European Council, the European Parliament, and the European Commission” made on 25 March 2017 in Rome, the values discussed above are highlighted: “a community of peace, freedom, democracy, human rights and the rule of law, a major economic power with unparalleled levels of social protection and welfare” (http://www.consilium.europa.eu/de/press/press-releases/2017/03/25-rome-declaration/).

THE ROLES OF SCIENTISTS

If one attempts to apply the correct and important goals of the EU at the level of an individual scientist, limitations quickly become clear. Instead of big plans, which necessarily mean moving over uncertain terrain, there is going along safe paths, simply to avoid endangering one's own academic career. People who write policy papers, who blog as scientists, who publish opinion pieces in newspapers, who seek out discussions with politicians, who dare to appear on television, can still put their academic career path partly in danger. People who speak up make themselves vulnerable. That is even truer in the time of digital communication spaces. It is no coincidence that these are characterized as echo chambers. Instead of clear words, they contain veiled language that often leaves a viewer or listener perplexed. Recruitment of professors that only takes into account the Social Science Citation Index or Google Scholar will only promote the marginalization of every discipline. The continuous advance of specialization (the spaces for discussion are getting smaller) and the "objectionable" presence of the public – a million viewers on television count less than the five readers of a specialized essay – show that the environment is not particularly favorable to supporting efforts in the direction of a discussion of values.

As a reaction to the American president's tendency to cast aside scientific results that do not support his political ambitions, and out of concern that in a "post-factual" reality scientific findings will no longer be able to get a hearing, a "March for Science" was organized on 22 April 2017, Earth Day, in Washington D.C. to demonstrate in favor of a rational view of the world and verifiable scientific truth. Similar events took place in European cities. Will a US president with no interest in science be the one who motivates its representatives to begin to engage in their new role and to advocate publicly, even demonstrate, for the values of science?

In a time of "alternative facts," the question increasingly arises of to what extent researchers can be true to their role. They can best fulfill their role if the conditions are guaranteed that enable them to take up all of the roles Roger Pielke describes in his book *The Honest Broker*. Those include the "pure scientist," whose role is to transmit basic information, the "science arbiter," who delivers factual answers and analyses when consulted, the "issue advocate," who represents particular points of view and interests, and the "honest broker," who offers all possible alternatives (Pielke 2007).

VALUE-BASED COMMUNICATION

How should this public communication that was started by President Donald Trump take place? It is a central element of modern societies: surely the most prominent version of an "ideal public" is the "discursive" or "participatory" model, as decisively shaped by Jürgen Habermas. The model's conception of an ideal public is that of a free, accessible and pluralistic communication within society that includes all willing actors and all of their appropriate arguments. If one examines the actors from science whose voices are present in the internet and in print media, then one realizes that the spectrum of participants on the internet is not broader than that in print media.

In both forms of media, primarily biological and natural scientists, i.e., experts, have their say – in the internet actually to a greater extent than in the newspapers.

Researchers must thus be ready to enter into dialogue with and between society, politics and economy in a much broader form than has been usual until now. In June 2015, Austrian universities and research organisations signed a memorandum of understanding with the country's Ministry of Science, Research and Economy on the initiative "In Dialogue with Society – Responsible Science," and thus founded an alliance for responsible science. In the memorandum, all of the partner institutions agreed to "start a common communication and development process that serves strengthening, critical reflection on, and further development of responsible science in research, teaching, and social engagement."

They should let deeds also follow these signatures. The difference from the daily excitements of public discussion must, however, be noticeable. Science should begin this dialogue with composure, tranquility, and factual dispassion. The tranquility that makes sustainable thinking and research possible must be maintained. Societal foundations do not lend themselves to being represented in knowledge surveys, and they are also not communicated by knowledge transfer centers. They do, however, stabilize democracy and its values, which guarantee the further existence of democratic societies. In addition to all the other demands placed on it, the value-able university has an important responsibility which is likely to become a key future challenge and should contribute to a cultural change.

Responsible research and innovation

With its RRI concept listing six dimensions, the EU provides a framework that should be taken into account in the design of and reflection on research practices: governance, open access, ethics, gender, public engagement and science communication. The Rome Declaration, which was put together by the scientific community itself, formulates the value of RRI as follows: "It ensures that research and innovation deliver on the promise of smart, inclusive and sustainable solutions to our societal challenges; it engages new perspectives, new innovators and new talent from across our diverse European society, allowing to identify solutions which would otherwise go unnoticed; it builds trust between citizens, and public and private institutions in supporting research and innovation; and it reassures society about embracing innovative products and services; it assesses the risks and the way that these risks should be managed" (https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf).

Here, too, it would be desirable that implementation follows the declaration. And this should happen as soon as possible, so that the universities are seen as value-able. It is that much more regrettable to see what is in the white paper with five scenarios about the future of Europe that Jean Claude Juncker, president of the European Commission, published to mark the 60th anniversary of the signing of the Treaties of Rome. Because this white paper is meant to serve the heads of state and government in their discussions as well as spurring public debate on the future of Europe, the absence of the universities is particularly regrettable.

Although the white paper pursues the question of how Europe will change in the next 10 years, and addresses not only the effects of new technologies on society and employment but also the topics of globalization and security, as well as growing populism, it makes no mention of an explicit role for Europe's universities They are absent although the European Commission's concept of "Responsible Research and Innovation" has experienced a strong upsurge in recent years and plays a strategic role not only in the orientation of the EU's framework program for research Horizon 2020 but also in the organization of the European Research Area (https://ec.europa.eu/commission/sites/beta-political/files/weissbuch_zur_zukunft_europas_de.pdf).

Hope thus once again rests at the level of the nation-state. In the 2015 memorandum of understanding discussed above, the signing institutions define their roles not only as promoters of gaining scientific knowledge, advancing and appreciating the arts, teaching, and knowledge transfer, but also as the institutions that bring forth young scientists, researchers and young artists. They want to educate graduates, stimulate social and technological innovation, and contribute significantly to Austria's scientific, technological and economic capacities, competitiveness, and ability to cooperate. They are working on sustainable solutions for the great challenges of our time, and are drivers of socio-cultural development in Austria and far beyond its borders. Scientific and artistic excellence along with relevance to practice form the two poles around which these institutions from science, research, education and practice develop their manifold impacts. With the highest scientific aspirations, openness to society, and responsibility – in that they operate as Responsible Universities and as Responsible Research Performing & Research Funding Organizations – they aim to prove themselves as valuable innovators for a society that is ready for the future (www.responsiblescience.at). The future of "value-able universities" in Austria is thus defined; monitoring of this declaration of fundamentals will show whether these ambitions can be attained.

THE ROLE OF THE UNIVERSITIES: IN DISCOURSE WITH POLITICS AND THE ECONOMY

The future of Austrian universities seems to be clearly sketched as value-oriented by the joint initiative and the requirements on the European and national levels. This is all the more surprising because the current discussion in Germany is happening between the extreme poles – "Freedom from political and social interference" (Kempen, 2016/17) and "Research topic frameworks derived from a clearly defined goal" (Vahrson, 2016/17) – whose distance from reality seems to have been long since shown by numerous studies. Thus, for example, a study of the mission statements of German universities (Müller, 2015) showed in an overview that what appeared most commonly among identified values were basic academic values such as disciplinarity and interdisciplinarity, sustainability, academic integrity, humanity, freedom, autonomy, and responsibility. One of the most commonly codified values was exchange with the environment (in the widest understanding of the word), which primarily manifested as dialogue with the public, or informing the public. The value of equality was also codified at almost every university. Similarly, the transmission of particular values, and the associated "education of responsible persons" was highlighted. Appreciation of diversity was also mentioned many times and shown, for example, in the general appreciation of varying cultural backgrounds, educational backgrounds, and the heterogeneity of talents. It would thus be desirable that this intra-German discourse took greater note of the existing studies and thus contributed to discussion about values with society and the economy. What is undeniable, however, is that given "the processes of digitalization and globalization whose effects are expanding … the scientific systems that have until now been more shaped at the national and partially even at the regional level" face "completely new challenges." Precisely in this context, "the basis of information and knowledge, above all the values and norms that underlie them" must also "continuously be put to the test" (Krull, 2017).

The prerequisites are thus on hand; the attention of all those responsible in the universities and in civil society must be put a bit more on this set of questions. With that, we would also come a long way closer to the "critical university," as sketched by Antonio Loprieno (Loprieno, 2016).

References

Brix, E. (2004). Die Universitäten im Wettbewerb um die besten Köpfe. *politicum 97*

Buchter, H./Straßmann, B. (2013). Die Unsterblichen. *Die Zeit*

Dohrmann, H.-J. (2015). Start-up in big Business. Wie Start-up-Nischen am Rand der Konzernstruktur auch großen Unternehmen Experimente ermöglichen. *GDI-Impuls*

Gantner, M./Koch C. S. (2007). Europäischer Hochschul- und Forschungsraum: Eckpunkte und Anregungen und Umsetzung am Beispiel der Universität Innsbruck. *Europäisch Denken und Lehren. Festschrift für Heinrich Neisser*

Kempen, B. (2016/17). Sollten Universitäten thematische Vorgaben haben? *Helmholtz Perspektiven*

Krull, W. (2017). Die vermessene Universität. Ziel, Wunsch und Wirklichkeit. Passagen Verlag

Loprieno, A. (2016). Die entzauberte Universität. Europäische Hochschulen zwischen lokaler Trägerschaft und globaler Wissenschaft. Passagen Verlag

Mantl, W. (2005). Welche Forschung/Kunst brauchen wir? *politicum 97*

Metzeltin, M. (2014). Europäische Identität und europäische Integration. *ÖAW: Forschung und Gesellschaft 8*

Müller, R. (2015). Wertepräferenzen an deutschen Universitäten – eine Leitbilderanalyse zur Organisationskultur. *Beiträge zur Hochschulforschung*

Noort, E. (2014). Die Universität und ihre Aufgaben im Wandel der Zeiten. *Wohin geht die Universität. Tagungsband des Österreichischen Wissenschaftsrates*

Pielke, R. A. (2007). *The Honest Broker: Making Sense of Science in Policy and Politics*. Boulder

Rosenmayr, L. (2014). Ein großes und mein kleines Europa. *ÖAW: Forschung und Gesellschaft 8*

Simpson, B. A. W. (2010). Foreword to Ed Bates, *The Evaluation of the European Convention of Human Rights: From Its Inception to the Creation of a Permanent Court of Human Rights*. Oxford University Press

Vahrson, W.-G. (2016/17). Sollten Universitäten thematische Vorgaben haben? *Helmholtz Perspektiven Winter*

Weingart, P. (2003): Wissenschaftssoziologie. Verlag: Transcript

Coursera: www.coursera.org
Erklärung von Budapest und Wien zum Europäischen Hochschulraum: https://media.ehea.info/file/2010_Budapest_Vienna/64/0/Budapest-Vienna_Declaration_598640.pdf
Erklärung von Rom (25. März 2017)- Erklärung der führenden Vertreter von 27 Mitgliedstaaten und des Europäischen Rates, des Europäischen Parlaments and der Europäischen Kommission: http://www.consilium.europa.eu/de/press/press-releases/2017/03/25-rome-declaration/
Europäische Hochschulraum, Der: https://media.ehea.info/file/Ministerial_conferences/02/8/1999_Bologna_Declaration_English_553028.pdf
European Code of Conduct for Research Integrity: http://www.allea.org/allea-publishes-revised-edition-european-code-conduct-research-integrity/
Magna Charta der Universitäten, Die: http://www.magna-charta.org/resources/files/the-magna-charta/german
MOOC (Massive Open Online Courses): www.edx.org
Responsible Research and Innovation (RRI): https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf
Responsible Science: www.responsiblescience.at
Sorbonne Erklärung: http://media.ehea.info/file/1998_Sorbonne/61/2/1998_Sorbonne_Declaration_English_552612.pdf
Weißbuch zur Zukunft Europas: https://ec.europa.eu/commission/sites/beta-political/files/weissbuch_zur_zukunft_europas_de.pdf

SHORT BIOGRAPHIES

GÜNTHER R. BURKERT, earned his PhD at the University of Graz in 1977, completed his *Habilitation* in 1985, and in 1990 was a visiting professor at the University of Passau. From 1990 to 1996 he was head of the Department of Humanities and Social Sciences in Austria's Federal Ministry of Science and Research. From 1996 to 2006 he was the Academic Director of the Political Academy, and since 1992 he has taught at the University of Vienna and the Danube University Krems. Since 2008 he has been Director of the Department of University Research Policy in Austria's Federal Ministry of Science, Research and Economy, and since 2012 Deputy Head of Section II in the Research Department.

BARBARA WEITGRUBER, academically certified translator, "Master" degree in English/American and Interdisciplinary Studies, Certificate in Mass Media, University of Graz; M.A. in Communications, University of Illinois at Chicago; in 1987 founding staff member and in 1990 Director of the Office for International Relations (University of Graz); Director of the Office for European Educational Co-operation/OeAD, Vienna (1993/1994). Since 1994 leadership functions in the Austrian Ministry in charge of higher education and research; since 2010 Director General for "Scientific Research and International Relations", Federal Ministry of Science, Research and Economy, Vienna.

This report is originally published in German and has been translated into English.

II.

ORGANIZATION, MANAGEMENT AND GOVERNANCE

7.

AUTONOMY IN CONTEMPORARY HIGHER EDUCATION: EXTENT – INTERNATIONAL COMPARISON – CONCEPT – HISTORY – FUTURE

Dieter LENZEN

ABSTRACT

The essay takes an international comparative and historic approach. Proceeding from the situation of political discourse concerning the topic of autonomy for institutions of higher education in core Europe, the characteristics of autonomy in the three great higher-education traditions (continental European, Anglo-American, East Asian) are compared. The term "autonomy" is defined precisely, and a historical reconstruction is added. This is undertaken via the stations of the German Enlightenment (autonomy as a right of a rational individual) with a view toward authoritarian conditions in the modern period, particularly during the time of National Socialism, with a view toward the erosion of the idea of autonomy in the Federal Republic of Germany, as well as projection into the future with possible scenarios of development for the autonomy of institutions of higher education in Europe. The key concept of the essay is to defend and expand autonomy for institutions of higher education in light of an enlightened understanding of a university.

In Germany the discussion about autonomy in higher education is (again) in high gear. After the German Rectors' Conference had, on 3 May 2011, formulated their demands regarding autonomy in higher education, at least two states – namely, North Rhine-Westphalia (NRW) and Hamburg – passed laws that significantly rolled back autonomy. In Hamburg, this went so far that the Constitutional Court was compelled to intervene. The Rectors' Conference called for:

"1. The states should concentrate on the inalienable area of legal oversight of institutions of higher education.

"2. The minimal subsidy should be provided to the institutions of higher education as a global budget. In this context, the fungibility of funds and creation of reserves should be allowable.

"3. The right to call and appoint professors must lie with the institutions of higher education. If they wish, they should be able to retain the characteristics of an employer. This may not be tied to the transfer of the costs of employment.

"4. The responsibility for research and teaching and guaranteeing performance quality must be anchored in the institutions of higher learning. This includes determining the appropriate increase or reduction of organizations as well as establishing efficient leadership and decision-making processes.

"5. Legitimate state interests should be secured with multi-year performance agreements and contracts for higher education.

"6. To meet the demands that state and society place on institutions of higher learning, both the grant of autonomy and sufficient basic financing are indispensable. Only with these are institutions of higher learning in a position to do justice to their wide range of tasks in an environment of growing national and international competition." [1]

An analysis that appeared at the same time, "Higher Education Autonomy in Law and Practice,"[2] published by the Donors' Association for the Promotion of Humanities and Sciences in Germany and the Heinz Nixdorf Foundation, added to this largely agreed-upon catalog of dimensions of autonomy for institutions of higher education the acquisition of external financial sources and tuition fees, as well as the right of the institutions of higher education to decide for themselves about real estate and construction.[3]

The Konrad Adenauer Foundation presented an additional analysis with its study "Higher Education Autonomy in International Comparison,"[4] which came to the conclusion that there were a number of states, particularly states such as NRW, that belonged to an *avant-garde* of higher-education autonomy, but in which a reversal of the trend was taking place, in the direction of reduced autonomy.[5] It then points to developments such as setting legal minimums for the duration of contracts for academics that could be seen as *de facto* limitations on autonomy in higher education. Given these and other observations, it can be established that, not least because of federalism in the German system, the situation remains unclear, and that to date no single model of far-reaching autonomy in higher education has established itself. Discounting certain exceptions, such as the pilot project at the Technical University of Darmstadt, which has received complete autonomy, or foundation models with quite extensive autonomy and private universities in certain sectors that have lately proliferated, it is not currently possible to speak of attaining the maximal, and thus sufficient, degree of autonomy in higher education.

With this background, the question arises of the reasons for making autonomy a central topic at all. Why did the call for greater autonomy in the academic aspects of higher education arise about 10 to 15 years ago in continental Europe? The question can most readily be answered with a comparative look at non-European systems of higher education because continental Europe, and particularly Europe's core nations, has not remained untouched by the process of globalization. Furthermore, the present situation and projections into the future can only be understood if, in addition to

1 HOCHSCHULREKTORENKONFERENZ (2011): *Zur Hochschulautonomie: Entschließung der 10. Mitgliederversammlung am 03.05.2011.* Bonn, p. 1.

2 HÜTHER, Otto et al. (2011): *Hochschulautonomie in Gesetz und Praxis: Eine Umsetzungsanalyse vor dem Hintergrund der Förderprogramme des Stifterverbandes und der Heinz Nixdorf Stiftung.* Essen.

3 Cf. ibid., p. 23-25.

4 DOHMEN, Dieter and René KREMPKOW (2015): *Hochschulautonomie im Ländervergleich: Bestandsaufnahme und Ausblick auf künftige Entwicklungen.* Berlin.

5 Cf. DOHMEN/KREMPKOW (2015): p. 64.

the international comparative perspective for a particular point in time, a historical one encompassing a wider span of time is undertaken. Without an understanding of the history, an understanding of the present and assessment of the future is hardly possible.

An international comparison of autonomy in higher education

Around the world, there are generally speaking three university systems for post-secondary education: the continental European, the Atlantic (Anglo-American), and the East Asian.[6] When comparing the systems, an examination of the Atlantic (Anglo-American) system, which has recently significantly expanded and not only by way of the Bologna Process, particularly important because its expansion has brought with it an understanding of the university that is very different from that of the continental European understanding. In the Atlantic system the question of autonomy does not arise because the universities are managed by forms of organization that are like businesses, and because in the USA only a very small share (roughly 10 percent) of an institution's overall costs are provided in any way by public sources. Universities are educational enterprises that must make headway in the market and that primarily finance themselves from three sources: donations, tuition and research contracts.

Leading such an enterprise would be unthinkable if the state were to intervene as a regulator and, as in continental Europe, determine the crucial dimensions of the enterprise's activities. The dimensions of intervention include the reports of subject oversight or legal oversight bodies, regulations about how funding is used (state budget laws), and with regard to selection of personnel, quality control, employee representation, or property management. An enterprise could not be run successfully under those conditions. As a result, universities in the Atlantic realm enjoy total autonomy as organizations, but that is not equivalent to individual academic freedom for faculty members. This freedom must rather be viewed as limited because the instructors in higher education are not, as in continental Europe, bearers of the basic right of academic freedom in greater or lesser degrees, but rather are regular employees who cannot assert their interests through academic self-government but rather, in the best case, through unions, and even then only in matters of regulating pay and working conditions.

If nevertheless a debate about autonomy in higher education was sparked in Germany, Austria, and the rest of core Europe, then it is because against a background of sinking basic financing for the academic budget based on "better," more efficient (because entrepreneurial) management of the institutions of higher education, it was self-evident that greater autonomy of action must be granted to these institutions. It is however, as shown, always just relative autonomy. On the other hand, at least in

6 Cf. Lenzen, Dieter (2015): *Hochschule in der Globalisierung: Zwischen atlantischer, europäischer und konfuzianischer Tradition*. Berlin and Lenzen, Dieter (2014): *Eine Hochschule der Welt: Plädoyer für ein Welthochschulsystem*. Wiesbaden.

Germany scholars are guaranteed a significant degree of academic freedom as the expression of a fundamental right, which in the Atlantic system is also established in a declaratory way, but must also face limitations in that the "goods," (professional) education have to be "sold" to American universities and colleges. All academic employees must submit to this verdict. They have to provide services that are "salable," independent of the question of whether the contents of their teaching (and researching) interest them or not, or of whether they find these contents justifiable. That holds true in a similar fashion in the realm of research, which is largely oriented toward contracts. The awarder of the contract, not a scholarly bearer of fundamental rights, determines the contents of the research.

In this respect it can be said that autonomy for institutions of higher education and academic freedom are in opposite proportional relationships to each other in the Atlantic and continental European systems. The more autonomy for an institution of higher education exists, the less academic freedom, and the more academic freedom, the greater limits on higher-education autonomy through state regulation in the interest of the "sovereign." Finally, the East Asian system should be mentioned. In its pure form, it derives historically from the idea of the Chinese Empire and its need for a large number of officials who should form, on the one hand, an elite, and on the other an elite with a higher loyalty. For this reason, there was not only a high level of selectivity for access to the system of higher education, but also in terms of the definition of contents and procedures that were intended to be set up make this elite into an actually functioning elite. That was, however, always tied to a limited amount of social selectivity because the purpose was to procure the best talents and not, as originally in Europe, to reproduce (non-existent) systems of nobility.[7] The Asian university system is, despite all the differences in detail, not only authoritarian, even in parliamentary democracies such as Japan, but very strongly guided by the state, particularly in the People's Republic of China. The Party, like the apparatus of the Imperial state, takes care to secure loyalty and an elite. It is however impossible to overlook the fact that under the influence of globalization, as in continental Europe, the concept of post-secondary education as a product is beginning to assert itself. Thus tuition fees at many Asian institutions of higher education, even in the People's Republic of China, are significant, and there is a noticeable "trade" in the educational product, via both staff and student exchanges, for example with Australia or among Asian countries, but also in the direction of the USA and continental Europe. This commodification of education is leading to demands for autonomy in Asia, but they are only slowly becoming established and would in the resulting process replace one lack of freedom (state control of goals and contents) with another (market orientation).

To address the question in Europe's core countries today about the future development of autonomy for institutions of higher education, it is necessary to pose the question, naturally also with a view toward academic freedom, of how the idea of autonomy for the realm of higher education actually arose, and how it came to be embedded in the understanding of the state that prevailed in each place. That is because

7 Cf. LENZEN (2015): pp. 8-9.

the question of higher-education autonomy can and must of course be discussed as a question regarding the legitimation of state intervention, not only in terms of asserting the will of the sovereign but also in regard to safeguarding scholarly quality through academic freedom.

The term "autonomy"

"Autonomia," translated literally, means "the power to issue one's own laws." The *Kleine Pauly* writes that in classical times this power to issue laws "rested on the cooperative fundament of the polis."[8] In an autonomous polis, there is no legislative power beyond the executive and the judicial. The political theory of classical Greece presumes that the citizens of the polis are united in the question of what should be; that is, in the question of the law because they are tied to one another by common actualities: origin, rites, religious beliefs, social hierarchy (stratification), etc. We thus note that the term autonomy *first* of all is absolute (there is absolutely no legislative power, not only relatively none) and that *second* it can claim its place in a society whose unifying ties are so strong that an internal regulation of power is not necessary. This basic concept was developed further over the course of history. For example, it was developed in relation to noble castes, churches and universities, insofar as these were granted autonomous statutes that took precedence above imperial law. For the university, this meant that it was in practical terms a state within the state; results of this context included, for example, a rector's right to hold courts that could even sentence students to prison, etc.[9] Over the course of the 19th century, many autonomous rights remained for the nobility and the principalities. In Germany, these were only abolished after the collapse of the Empire. Remaining untouched were the rights to self-rule enjoyed by municipalities and associations of local governments, by publicly chartered corporations, which included universities, and by recognized religious communities and others. For this reason, we note *third* that the legal reality of autonomy in Germany, up through the cut made by the losses in the Napoleonic wars and then the cut by the revolution of 1918, was wide-ranging and, at universities, had established freedom that in part not only included the "right to issue laws" but also adjudication, although in limited areas of the law, as well as enforcement (universities employed prison guards who would literally lock delinquent students in detention).[10]

To be able to evaluate and appreciate this degree of freedom historically, and thus also theoretically, it is necessary to examine more closely the conditions in which it arose. Since roughly the middle of the 5th century, the Greek city states increasingly pursued the policy of determining for themselves, independent of any distant overlords, their internal affairs in all three dimensions: legislative, judicial, and executive.

---

8 ZIEGLER, Konrat and Walther SONTHEIMER (Eds.) (1979): *Der Kleine Pauly: Lexikon der Antike*. Vol. 1, Munich, p. 782.

9 Concerning the rector's judicial rights, see: ALENFELDER, Klaus-Michael (2002): *Akademische Gerichtsbarkeit.* Baden-Baden.

10 Cf. ALENFELDER (2002).

This also held true at times for an institution within the city-state as, for example, the temple of Apollo at Delphi or the temple district in general, which had its own laws, its own taxes, and its own regulations.[11] One may ask why that was. This can be readily seen by the example of Kamiros, a city that was excavated on the island of Rhodes. In classical times, the island was home to three city-states – Kamiros, Lindos, and Rhodes – that co-existed peacefully. However, the island as a whole was consistently an objective for various powers from Asia Minor, from the Roman west, from Egypt, or later from the Knights of Malta or the Knights of St. John. Kamiros covered an area of roughly 700 meters by 200 meters, with a population of less than 1000 people. It is located on a slope. At the upper end of the hill is the temple district, separated from the actual city. This municipality was small enough that it can be presumed there was a common interest in simple survival, an interest that was characterized by internal union against changing external, often violent, claims. In such a world, autonomy is identical with the chance for survival and for "pursuit of happiness." We can thus note *fourth*: The idea of autonomy, which derives from ancient Greece, functioned under external pressure with simultaneous homogeneity of interests and ties to religious practice over which the inhabitants of the temple district kept watch. More simply, if the city Kamiros (metaphorically: a university) wished to survive outside influence and did not wish to be forced into conflicts with neighbors (metaphorically: other universities), it had to insist on *autonomia*, and could not accept its dysfunctional opposite, *heteronomia*. This autonomy was functional because it safeguarded the system of city-states (university) against external attempts at destabilization. It was supported by a common mission (belief) (metaphorically: theory of the university) and a common religious practice, e.g., the cult of Zeus (extended: academic rites).

The explication of an understanding of autonomy and its assertion seems to become necessary particularly at the moment when external powers question the rights of a social unit.

Autonomy as a Right of the Reasonable Individual in the German Enlightenment

Consequently, the term "autonomy" and all that pertains to it played no significant role in the complete history of the Middle Ages. That does not mean that there were no autonomous units. The Church, the cloisters, the Imperial free cities, trading associations such as the Hansa are all examples of how autonomy was not only claimed but was seldom questioned.

The situation changed significantly again when the French Revolution made the nobility's claim to autonomy as a class privilege fragile. This questioning did not primarily take place by means of a non-noble entity, at least not at first, as the bourgeoisie is not an organized, self-contained unit. Instead, the questioning came from an

---

[11] Cf. RITTER, Joachim (Ed.) (1971): *Historisches Wörterbuch der Philosophie*. Vol. 1, Basel, p. 701.

idea, from the fundamental notions of the Enlightenment itself, which now individualized the claim to autonomy. Kant's philosophy now conceptualized the individual and no longer social groups as the autonomous entity. That means that Kant's Enlightenment philosophy sees each person as a result of their capability of reason as the autonomous entity, which, as a result, can claim *potestas vivere propriis legibus*, that is, the power to live by its own laws, which was originally intended for social units. That is the categorical imperative. The autonomous individual in the full development of their reason is the judge of himself or herself, and must, as a result, be able to judge whether to follow reason or nature and (executive!) act accordingly on an individual basis. Kant is of course no naïve idealist who would presume that reason would also in fact prevail each time in its highest development, and thus would require no institutions. However, Kant presumes that these institutions themselves must be autonomous because its supporters are themselves individuals who are capable of reason, ideally at the highest level. That holds true for the state. But for Kant that also explicitly holds true for the university, as he spelled out in "The Conflict of the Faculties." He writes:

It was not a bad insight [. . .] to manage the epitome of erudition (actually, the heads that were devoted to the same), so to speak, like a factory, with a division of labor where as many scholarly disciplines as exist there would be as many instructors, professors employed as depositors of the same, who together form a sort of scholarly common endeavor, called a university (also a higher school) which should have its autonomy (because only scholars can judge scholars as such).[12]

We see and note *fifth* that the principle of autonomy is individualized in the German Enlightenment. But it does not remain still; instead, it is so to speak projected back onto a new term for institutions, at least for the circumscribed parts of society that could as institutions, like universities, not only claim autonomy but actually must possess it because reason could not otherwise come into its own. Conversely, reason is the medium as well as the guarantor that an autonomous institution like the university will not, in a manner of speaking, go off the rails. We further see that the Enlightenment brought to each human individual the rights that had been previously borne by the socially privileged members of a class that had slipped into a crisis, the nobility, with its particular autonomy. These rights were then projected back onto the institutions created by these rational individuals. That means that the term autonomy moves from the state-centered factualness of the small Greek states and their constitution into the field of the philosophical. Philosophy becomes, as Kant also framed it, identical with autonomy. Still further: reason, one could say, is either autonomy, and in fact absolute autonomy, or it is not reason at all. That means that an institution that is not autonomous not only has its ability to reason denied, but also the factuality of its rational constitution. It is easy to comprehend that such a loss would be least conceivable for the place where reason was invented and where it must be the precondition for all research and insight – for the university. An institution called a

12 KANT, Immanuel (1798): Der Streit der Fakultäten. Edited by Horst D. Brandt and Piero Giordanetti. Hamburg 2005, p. 15. See also RITTER (1971), p. 709.

university that is not autonomous, one could say pointedly, is not a university at all, or at least no insights take place there.

In this sense it is also important to note (and not only on the margin, but for the current context on the margin) that the claim to autonomy in later times was extended to other segments of societal activity. For example, Schelling extended it to art, because the artist is a genius and in this sense nothing other than led by reason. It was further extended to religion and, beyond art, to the aesthetic as such. The importance of precisely this last step in neo-Kantian thought cannot be overestimated because in Kantian philosophy the aesthetic accompanies the ability to reach moral judgment as the faculty of judgment and thus forms the (Gothic) keystone in the structure of Kantian philosophy. This, by the way, is the origin of the concept of autonomous aesthetics, which at the beginning of the 20th century simultaneously marked the start of observers not understanding an expressionist painting or readers not understanding a Dada poem. It is no longer understood that art, also in its apparently crazy forms, relies on this autonomy because otherwise it would no longer be art at all but mere mimicry.[13]

THE EROSION OF THE IDEA OF AUTONOMY IN POST-WAR GERMANY

The Basic Law of the Federal Republic of Germany takes up this concept in its precepts of freedom for scholarship, art and religion.[14] (As an aside: The extension in the 1970s, according to which the freedoms that are spelled out in the Basic Law do not relieve anyone of the duty to be true to the constitution, was philosophically foolish because the constitution is either rational, and thus does not need to secure itself because an autonomous individual will follow it, or, as this extension demonstrates, it was no longer secure in its rationality and thus to be changed as necessary.) This erosion of the clear, lucid and enlightened conception of Germany's Basic Law has only recently made it possible that, starting in the 1970s, the degree of freedom in the academic sphere was called into question at all by things such as the Framework Act for Higher Education. A rational institution does need a Framework Act for Higher Education, but instead sets its own *nomos*. From this point of view, this extension of the Basic Law was itself a violation of the Basic Law. How did this erosion come about? Was that the first time, was it new?

The erosion of the Enlightenment ideal of autonomy, for individuals as well as institutions, had at least one prior version, at least in the field of education. In 1854, the Stiehl Regulations brought about what we would today call massive detailed guidance for the education system. Unfortunately, this authoritarian behavior was confirmed in public discourse by the victorious war of 1870–71. This occurred even though the push for autonomy in education, at least in the case of universities, was itself a reaction to losses in the Napoleonic wars of the early 19th century. Following a push

---

13 On the term "autonomy" in the arts see, for example, KARSTEIN, Uta and Nina Tessa ZAHNER (Eds.) (2017): *Autonomie der Kunst? Zur Aktualität eines gesellschaftlichen Leitbildes*. Wiesbaden.

14 Basic Law of the Federal Republic of Germany, Art. 4, Art. 5.

for autonomy under the Weimar Republic, to which we will return in regard to the university system, there was a violent rupture with the events following 1933, and then after the old academic freedoms were restored with the founding of the Federal Republic another significant change came with the student movement. We must ask ourselves the question of whether the governmental system of the Federal Republic, or at least its education and university sectors, has ever recovered from the authoritarian state intervention of the 1970s, which was ironically strengthened by Social Democratic governments. At least through the changes of 1989 it had not, and the transformation of the university system in East Germany was anything but a non-state act. Nevertheless, this process obviously did not lead to a flowering system of higher education; otherwise, books on the topic such as Peter Glotz's *Rotten to the Core?* would be inconceivable.[15] Only the economic crisis and the financial crisis on top of it in the first decade of this century created the crisis conditions in which (for example in North Rhine-Westphalia) at least for a short time there was a return to the type of institutional autonomy that was founded on Kantian philosophy. In that regard, it should naturally not be overlooked that the conception of the university as an "entrepreneurial institution of higher education," at least if the term meant close connections with business, instantiated a specific contemporary interpretation of the concept of rationality, in the sense of instrumental reason according to the Atlantic model. Or to put it more pointedly: It is *sixth* necessary to ask whether the conceptualization of higher education as "entrepreneurial" is not ultimately unreasonable and whether that makes it easier for state interventionists to liquidate this form of autonomy without replacing it with a new (old) one. That is the actual problem.

That was no push toward freedom because of conviction, but rather a release into freedom because of necessity. The state was at its wit's end; state intervention from 1970 to 2000 had ruined the system of higher education, in the sense of making autonomy dysfunctional.

Academia's self-immunizing system dynamics under authoritarian conditions since the beginning of the modern era

What does that mean? To understand it, one must use a sociological differentiation that carries forward the historical differentiation between institutional and individual autonomy: the differentiation among social, personal, and functional autonomy. In this regard, social autonomy is the power to enact one's own laws that is known from antiquity; personal autonomy is close to the individual autonomy that we know from Kantian philosophy. Added to these types is functional autonomy, which arises if we take an observer's perspective on society. In this understanding, the idea of autonomy is no longer propagandized as part of Enlightenment, as it is in Kantian philosophy, but considered from a systems theory point of view. The question is then no longer

15 GLOTZ, Peter (1996): *Im Kern verrottet? Fünf vor zwölf an Deutschlands Universitäten*. Stuttgart.

whether autonomy of the individual or institution should exist for enlightened or idealistic reasons, or because it conforms to the constitution; the question is now either in structural/functional terms, whether autonomy has to exist for functional reasons, or whether, in terms of systems theory, it is unavoidable. To address that, we will for a moment consider the total system of society as one entity, and a societal subsystem like academia as the other entity. In systemic terms, the autonomy of societal subsystems is unavoidable, and not just the subsystems of scholarship, art, and religion, but also, for example, business. That is because a societal subsystem constantly pursues differentiation as a part of its preservation, of its self-programming. These differentiations make its holdings distinct from other systems, and draw a border separating this system from the fundamentally threatening overall system, but also from other partial systems. By this means, a means of communication establishes itself in the communications between the academic system on one side and the overall system of society or the political system on the other that immunizes System A against attempts by System B to intervene. In the relationship between the partial system of academia and the partial system of politics, the following can be demonstrated: By definition, the partial system of academia contains everything that communicates in the medium of truth, whereas the partial system of politics contains everything that communicates in the medium of power. From the moment that communication elements of power from the political system attempt to have an effect on the academic system, the medium of truth is called into question. The academic can only react in two ways: either by collapsing, because the communication medium of power becomes so dominant that truth can no longer assert itself, or with an internal differentiation. Because the participants in the academic system are, compared with all other societal subsystems, presumably among the most intelligent, they will attempt to follow the path of differentiation as long as no sheer physical violence prevents them, as it does in authoritarian and fascist states. That means that the academic system is expending energy to differentiate itself further and by this means to undermine the influence of the political system's power. That is expressed in terms of the relationship between the academic system and the business system in that in third-party funding, one dupes the donors by describing the basic research that comprises half of the goals and steps in the research as either applied research or its necessary prerequisites.

These attempts at differentiation are well known from everyday practice in the academic system. The toolboxes available to academics seeking to undermine state interventionist influences are well stocked. Public relations work plays a role in this contest, a role that cannot be forbidden to an academic. Confounding expectations plays a role, because academics can determine for themselves the objects and methods of their work. Simple obstruction also plays a role, for example by refusing things such as third-party funders, and there are many other tools available. From this perspective, the attempt at a state-interventionist limitation of the autonomy of the academic system is dumb. For one thing, it is futile, and for another it uses the energy of members of the academic system to develop obstruction strategies.

Thus even if one ignores the logic of the ancient polis and the institutional autonomy that is tied to it, and even if one ignores the Enlightenment individual and institutional autonomy that is constitutionally guaranteed, in the sense of refusing this claim to autonomy then *seventh* a limitation of the autonomy of partial societal systems would be futile sooner or later. This mechanism has existed since the dawn of the modern era and the social differentiation that is tied to it; that is, since the closing of the 18th century.

On the ineffectiveness of political interventions in the system of higher education, with National Socialism as an example

Let us therefore examine whether and how the partial societal system of academia, of universities, reacted to state-interventionist attempts at limiting autonomy, and which consequences that had for the systemic goals of each.

If one considers various stages of history under the rubric of whether and how the partial system of academia, of universities, defended itself against encroachment attempts by the state, then in the modern period one can say that, again deployed after the losses in the Napoleonic wars, the question of degradation by the state in the context of Humboldt's university reforms was not posed. Humboldt thought out the complete founding of the University of Berlin from the perspective of the state; moreover from the perspective of a state that he fundamentally conceptualized as one that would not stand in opposition to the university, but rather as a mentor and an advocate.[16] That is because the founding of the University of Berlin was considered as a state activity that could compensate for the catastrophe of the lost war. In Humboldt's conception, the university could trust the state, and the state could trust the university. Schleiermacher went even further in his considerations at that time, because despite all of the trust placed in the state, he feared the university's economic dependence on the state. For that reason he called for economic autarky, with the state transferring land from the royal domain to the university, as a source of income that would be independent of state control.[17] That did not take place, and as a result the University of Berlin in 1810 had by no means unlimited autonomy, but was instead compelled to remain open to state-interventionist encroachments that were attempts to develop a particular profile. Similar attempts were made in the second half of the 19th century, although they were likewise always unsuccessful. Thus the utilitarian principle, in the form of "usable" technical courses of study in the classical universities, was not taken up. Instead, technical universities were founded, and later also a type of practical university of applied sciences, followed in 1911 by the founding of the Kaiser Wilhelm Institutes. Because contract-based research in the state's interests

[16] Cf. Kraus, Hans-Christof (2010): "Die Gründung der Universität Berlin im Kontext der allgemeinen Bildungsentwicklung um 1800," in Holtz, Bärbel (Ed.): *Krise, Reformen und Kultur: Preußen vor und nach der Katastrophe von 1806.* Berlin, pp. 171-190.

[17] Cf. vom Bruch, Rüdiger (2005): "Universitätsreform als Antwort auf die Krise: Wilhelm von Humboldt und die Folgen," in Sieg, Ulrich (Ed.): *Die Idee der Universität heute*. München, pp. 43-55.

could not simply be transferred to these institutes, as the top-drawer researchers who worked there were too stubbornly committed to basic research, a third kind of institution arose, ministry-directed research, which was undertaken during the First World War initially in aeronautics and poison gas. This marked the birth of what the Americans later called "Big Science," which made history with its first great project, the Manhattan Project to build an atomic bomb.[18] Looking at these developments from a systems theory perspective, the university system was not forced to use differentiation to protect itself from attempted intervention by the political system; instead, the political system differentiated itself by founding its own, politicized, scholarship that, as a result, no longer followed the communications medium of truth but rather that of power. It is no coincidence that all of the examples here are war-related research. That means that the university system was strong enough to protect its autonomy, even if that autonomy was not absolute.

That of course changed in 1933. The state institutions that ended universities' autonomy arose between 1934 and 1936. These were the Reich Education Ministry, the NSDAP Commission on Higher Education, the National Socialist German Lecturers League, and the "Academic Office" of the Amt Rosenberg.[19] Although the universities' leaderships were successively replaced according to the Führer Principle, despite the loss of autonomy there was in the end no real organizational transformation. In fact, one of the leading Nazi professors, Ernst Krieck, wrote in 1939 in a confidential letter to the Reich Student Leader that the chance for transformation had "fundamentally slipped through our fingers" and further that "leadership in the fields of scholarship and literature are close to anarchy."[20] In contrast to widespread assumptions, there were also no significant numbers of firings; firings for political reasons were major exceptions. It was no coincidence that Ernst Krieck wrote to the Reich Student Leader, because it was primarily the students and the previously underprivileged parts of the teaching corps that strove to fundamentally change institutions of higher education according to the Führer Principle.[21] Michael Grüttner comes to the conclusion that academia's conformity to the National Socialist regime lagged behind the expectations of National Socialist policy makers for academia, and he quotes a relevant complaint from Reich Student Leader Gustav Adolf Scheel, as well as one from Heinrich Härtle of the Main Office for Scholarship in the Amt Rosenberg that contained the sentence, "To date it has only been possible to cleanse the universities of Jews and enemies of the state, but a truly National Socialist penetration of our universities has not succeeded."[22] If one considers the reasons for this failure

---

18 Cf. VOM BRUCH, Rüdiger (Ed.) (2002): *Wissenschaften und Wissenschaftspolitik: Bestandsaufnahme zu Formation, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts*. Stuttgart.

19 Cf. GRÜTTNER, Michael (2003a): "Die deutschen Universitäten unter dem Hakenkreuz," in CONNELLY, John and Michael GRÜTTNER (Eds.): *Zwischen Autonomie und Anpassung: Universitäten in den Diktaturen des 20. Jahrhunderts*. Paderborn, pp. 67-100.

20 Quoted in GRÜTTNER, Michael (2003b): "Die nationalsozialistische Wissenschaftspolitik und die Geisteswissenschaften," in DAINAT, Holger et al. (Eds.): *Literaturwissenschaft und Nationalsozialismus*. Tübingen, p. 19.

21 Cf. Grüttner (2003b): p. 19.

22 Ibid., p. 21.

individually, then one can see that the internal factionalism within the universities, distrust, and attempted favoritism; that is, everything that Schleiermacher once characterized as professors' wrangling, did not end with the loss of autonomy but rather had downright subversive effects. That is a systemic effect, not the natural product of resistance. Quite the opposite: the Führer Principle in its abstraction ran up against the professorial principle, which led to a strengthening of the self-immunization. An excellent example of how a partial system uses the communication rules of a foreign system, in this case the political system, by effectively absorbing it and integrating it into its own medium of communications. Thus the institutions of higher education retained their right to propose who should be called as a professor, so that these proposals were, with a few exceptions, generally followed.[23] That means that if the members of the academic system cleverly understood that the planning policy of the Nazis could be undermined with a policy of recommendations, which involved including unsuspicious evaluators, even if that did not always succeed, as the example of the failed candidacy of Werner Heisenberg at the University of Munich shows. It is possible that the situation would have changed over the course of time if the "Comprehensive Plan for Individual Subjects" from the Reich Ministry of Science, Education, and Culture had been implemented.[24] Here as well the political system preferred to use directed new foundings to cover its needs in directed research, as in the fields of *Volkskunde*, racial hygiene, and military sciences. It is possible that the effect can be traced back to a specific inability of the political system to differentiate itself purposefully. Thus Vossen comes to the same conclusion as Grüttner, that the chaos among bureaus within the political system created mutual blockades, so that one can not speak of a National Socialist transformation of academia and higher education.[25]

In terms of systems theory, we find *eighth* in this short excursion through the history of universities' autonomy since the founding of the University of Berlin, which could be extended at length, for example with the reorganizations undertaken by the communists in the GDR or after the collapse of East Germany, that the academic system either, as Humboldt conceived, did not stand in opposition to the political system but felt well treated by it, or that the stability that one might also characterize as capacity for persistence was so great that the autonomy of the universities was only slightly affected within the corresponding boundaries.

---

23 Cf. HAMMERSTEIN, Notker (2002): "Wissenschaftssystem und Wissenschaftspolitik im Nationalsozialismus," in VOM BRUCH, Rüdiger (Ed.): *Wissenschaften und Wissenschaftspolitik: Bestandsaufnahme zu Formation, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts*. Stuttgart 2002, p. 219-224.

24 Cf. MERTENS, Lothar (2002): "Einige Anmerkungen zur NS-Wissenschafts- und Forschungspolitik," in VOM BRUCH, Rüdiger (Ed.): *Wissenschaften und Wissenschaftspolitik: Bestandsaufnahme zu Formation, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts*. Stuttgart 2002, p. 225-240.

25 VOSSEN, Johannes (2009): "Der politische Systemwechsel von 1933 und seine Auswirkungen auf die Hochschulpolitik," in SCHLEIERMACHER, Sabine and Udo SCHAGEN (Eds.): *Wissenschaft macht Politik: Hochschule in den politischen Systembrüchen 1933 und 1945*. Stuttgart, p. 27.

ON THE FUTURE: AUTONOMY IN HIGHER EDUCATION OR THE DUMP OF DIOGENES?

It can be assumed that a new wave of state interventionism in the coming years would also lead to the same effects because there is no empirical evidence that the situation and the inner stability of the academic system are fundamentally different from what they were during the historical stations described above. Certainly the university system's absorption with fending off attempts at infiltration from the outside would also be significant. It is no coincidence that universities always sank into scholarly irrelevance when they were primarily occupied with securing their autonomy, for example during the Third Reich, during the roughly 15 years following Germany's introduction of the Framework Act for Higher Education, or at other points in time. As a result, one need not fear that state interventionism will actually lead to a loss of autonomy, only to a loss of quality.

The circumstances of intra-university relations, which were characterized as anarchic and which are as such co-guarantors for the protection of their autonomy against the political system, hark back to the fact that participants in the university system must make decisions whose nature requires that they follow the communications medium of power, although from their profession the decision-makers are used to operating on the principle of truth. They are thus forced, in order to perpetuate their institution, to code the four fields of autonomy that Wilhelm Krull identified – organizational autonomy, financial autonomy, personal autonomy, and academic autonomy – in terms of power politics and specific truths. Only the last of those four easily follows the distinction between true and untrue.[26] Subsuming the other three partial autonomies under the principle of truth always requires various intermediate steps. So, for example, each discipline must activate criteria to acquire a larger share of the finances for itself. To do that, it must argue in the medium of truths, roughly along the lines that the truth of discipline A is truer than that of discipline B. Because that does not function, helpful arguments from other partial systems are immediately introduced, naturally from the political partial system but also from the legal partial system, by having certain contents prohibited by law, from the economic, in the senses of utility and demand, and in previous centuries from the religious system, inasmuch as at that time the first faculty of all, the theological, was supposed to have primacy over all others on the basis of the principle of revelation. "Autonomous" universities drew a wise conclusion from this circumstance by declaring all disciplines to be equally valuable, which thus naturally increased the need for financing. Attempts by the state to intervene will not change anything about that, despite plans for the development of higher education, structural and development plans, target and performance agreements because *ninth* even if a discipline is eliminated for utilitarian reasons, the academic system has sufficient semantic means to bring back its contents in a different location under a different name. If, for example, a university

---

[26] Cf. KRULL, Wilhelm (2014): "Die autonome Universität in zeithistorischer Perspektive," in MÜLLER-ESTERL, Werner (Ed.): *Die autonome Universität – ein Erfolgsmodell?* Düsseldorf, pp. 21-36.

eliminates Egyptology then research on hieroglyphs and Egyptian manuscripts can continue at, say, the Institute for Asian and African Studies with a special research field of “manuscript research.” It is precisely this practice that Article 5.3 makes it difficult for the state to hinder. The internal work of self-organization is, however, significant. However, one may also not be overly optimistic. It is certainly probable that eternal scholarship, in the sense of the *philosophia perennis*, will in the end prevail, even if the defense against interventions from foreign systems such as religion, politics, and business is significant. The much greater problem, however, is *tenth* that of the side effects on participants from systems outside of academia. Political attempts to occupy the academic system suggest to them that it could be legitimate to give assignments to scholarship, that is, to give insight a direction. From that moment, however, it is no longer a matter of insights, but of products, whose measure is not absolute truth but relative functionality. Over the long term, such an attitude can naturally lead to the sovereign taking resources from the academic system, as can be observed in Great Britain and in the USA under Trump, and thus taking from society as a whole the prospect of a better life, which is finally a dependent variable of truly new insight.

What may, what must the state, each democratically legitimated government do in relation to the autonomy of institutions of higher learning? That is a question of constitutional law that has to be evaluated according to each of the national constitutions in question. For the Basic Law of the Federal Republic of Germany, Carsten Günther has presented such an analysis.[27] In his analysis, Günther comes to the conclusion that in Germany the topic of autonomy for institutions of higher education as a legal matter does not fall under the Basic Law (protection of individual rights according to the Basic Law’s Article 5, paragraph 3) but rather under state constitutions (the guarantee of self-governance for institutions of higher education). Accordingly, the Constitutional Court has ruled that Article 5, paragraph 3 of the Basic Law “requires that the legislature create an organizational form that is adequate for scholarship, i.e., to provide the organizational, financial and human resources for fostering free scholarship.”[28] But it does not follow from that, Günter states, that institutions of higher education have a right to self-governance. The state is fully free to carry out organizational interventions, as long as it can be shown that they observably improve the rights of the bearers of fundamental rights. In this respect, the state cannot arbitrarily challenge the “historically established collection of tasks of self-governance” such as “the election of the institution’s own organs; the organization of the operations of teaching and research; participation in calling professors; administration of the institution’s own assets; the regulation of matriculation at all levels, including doctoral and post-doctoral studies; the awarding of academic degrees at all levels, including doctoral and post-doctoral; the assessment of tuition fees; as well as the general issuing of

[27] Cf. GÜNTHER, Carsten (2012): “Der verfassungsrechtliche Rahmen der Hochschulautonomie,” in ERICHSEN, Hans-Uwe et al. (Eds.): *Lebensraum Hochschule: Grundfragen einer sozialdefinierten Bildungspolitik*. Siegburg, p. 281-290.

[28] Ibid., p. 282.

rules for the self-regulation of its own affairs."[29] This historically developed guarantee of self-administration should, reasonably, only be interfered with if the freedom of bearers of fundamental rights is being undermined by the self-administration itself. Given this background, the establishment of oversight boards for higher education is criticized in some quarters because these boards, directly below the ministerial level, could allow persons outside of higher education to exercise influence over the institutions of higher education. In this respect, very narrow limits have been set on shifting responsibilities to the oversight boards.

On the other hand, there are also limits to the autonomy of institutions of higher education, at least within the legal sphere of the Federal Republic of Germany. Thus all of the acts that a university executes must "be able to be traced back to the will of the people."[30] The Constitutional Court has, however, decided that fulfilling the tasks of self-governance given the background of the democratic principles in the Basic Law can be seen as an appropriate balance of interests between the bearers of basic rights and the university's state-like actions. That is because untying a university's decisions from democratic principles is only acceptable if it is the only way to secure "a constitutionally less valuable good," the academic freedom that is anchored in the Basic Law. For this reason, certain zones of the university's sphere for decision-making can, on a constitutional basis, be removed from the ministries. On the other hand, the guarantee of this right, as well as students' freedom to choose their profession also limits the freedom of institutions of higher learning to make decisions about their internal organization, for example, if the ordinances about studying or examinations that the university issued would use fees to limit the ability of people to exercise their freedom to choose a profession.

These considerations, which are somewhat complex for judicial laypersons, can perhaps be brought to a point regarding the relationship between the autonomy of institutions of higher learning and academic freedom. The decision-making rights on matters internal to the university, which are tied to the autonomy of institutions of higher learning, can only limit academic freedom as little as students' freedom to choose their profession. That means that "deregulation," i.e., delegating state tasks to, for example, the leadership of an institution of higher learning, can fundamentally be in competition with the commandment of academic freedom. Or put very simply: the more autonomy is granted to institutions of higher learning based on the principle of democracy, the less academic freedom this means. As a result, a system of higher education like that in Germany is in a similar relationship with the communicating vessels of autonomy and freedom as is the Atlantic system, which is "autonomous" for completely different reasons. In both there is a tendency, or at least a risk, that the creation of greater autonomy for institutions of higher education leads to a reduction of academic freedom.

In global comparison, we are, despite completely different constellations, facing a similar dilemma in all systems of higher education, which is that the simultaneous

[29] GÜNTHER (2012): p. 284.
[30] Ibid., p. 286.

granting of the maximal amounts of academic freedom and autonomy for institutions of higher education is obviously very difficult. Humboldt's idea of a university presumed, however, that this would be possible. For Wilhelm von Humboldt it was completely clear that scholars would need the maximal amount of freedom in an autonomous university if they were to achieve results of the highest quality and thus fulfill the interest of the sovereign, an interest in improved life prospects for students and in improvements to the conditions of life, made possible by scholarship. The students at that time were not bearers of fundamental rights in the contemporary sense, so the only relationship that mattered was that between scholars and the state. Wilhelm von Humboldt built successfully on the mechanism of "trust as a mechanism for reducing social complexity"[31] – although this success was in a world of higher education that was intellectually extremely selective. The question for today is whether the mechanism of trust can still be sufficient if more than 50 percent of an age cohort studies at a university, not to seek insight but to attain a profession, and if instructors at institutions of higher education can, as a result of reductions in the available resources of time, money, and research, only pursue insight on, in a manner of speaking, a part-time basis?

References

ALENFELDER, Klaus-Michael (2002): *Akademische Gerichtsbarkei*t. Baden-Baden.

BASIC LAW OF THE FEDERAL REPUBLIC OF GERMANY: Art. 4, Art. 5.

VOM BRUCH, Rüdiger (2005): "Universitätsreform als Antwort auf die Krise: Wilhelm von Humboldt und die Folgen." In: SIEG, Ulrich (Ed.): *Die Idee der Universität heute*. Munich, pp. 43-55.

VOM BRUCH, Rüdiger (Ed.) (2002): *Wissenschaften und Wissenschaftspolitik: Bestandsaufnahme zu Formation, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts*. Stuttgart.

DOHMEN, Dieter and René KREMPKOW (2015): *Hochschulautonomie im Ländervergleich: Bestandsaufnahme und Ausblick auf künftige Entwicklungen.* Berlin.

GLOTZ, Peter (1996): *Im Kern verrottet? Fünf vor zwölf an Deutschlands Universitäten*. Stuttgart.

GRÜTTNER, Michael (2003a): "Die deutschen Universitäten unter dem Hakenkreuz." In: CONNELLY, John and Michael GRÜTTNER (Eds.): *Zwischen Autonomie und Anpassung: Universitäten in den Diktaturen des 20. Jahrhunderts*. Paderborn, pp. 67-100.

GRÜTTNER, Michael (2003b): "Die nationalsozialistische Wissenschaftspolitik und die Geisteswissenschaften." In: DAINAT, Holger et al. (Eds.): *Literaturwissenschaft und Nationalsozialismus.* Tübingen, pp. 13-40.

GÜNTHER, Carsten (2012): "Der verfassungsrechtliche Rahmen der Hochschulautonomie." In ERICHSEN, Hans-Uwe et al. (Eds.): *Lebensraum Hochschule: Grundfragen einer sozialdefinierten Bildungspolitik*. Siegburg, pp. 281-290.

HAMMERSTEIN, Notker (2002): "Wissenschaftssystem und Wissenschaftspolitik im Nationalsozialismus." In: VOM BRUCH, Rüdiger (Ed.): *Wissenschaften und Wissenschaftspolitik: Bestandsaufnahme zu Formation, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts*. Stuttgart 2002, pp. 219-224.

HOCHSCHULREKTORENKONFERENZ (2011): *Zur Hochschulautonomie: Entschließung der 10. Mitgliederversammlung am 03.05.2011.* Bonn.

HÜTHER, Otto et al. (2011): *Hochschulautonomie in Gesetz und Praxis: Eine Umsetzungsanalyse vor dem Hintergrund der Förderprogramme des Stifterverbandes und der Heinz Nixdorf Stiftung*. Essen.

[31] Cf. LUHMANN, Niklas (2000): *Vertrauen: Ein Mechanismus der Reduktion sozialer Komplexität*. Stuttgart.

KANT, Immanuel (1798): Der Streit der Fakultäten. Horst D. Brandt and Piero Giordanetti, eds. Hamburg 2005, p. 15. See also, for example: RITTER (1971): p. 709.

KARSTEIN, Uta and Nina Tessa ZAHNER (Eds.) (2017): *Autonomie der Kunst? Zur Aktualität eines gesellschaftlichen Leitbildes*. Wiesbaden.

KRULL, Wilhelm (2014): "Die autonome Universität in zeithistorischer Perspektive." In: MÜLLER-ESTERL, Werner (Ed.): Die autonome Universität – ein Erfolgsmodell? Düsseldorf, pp. 21-36.

LENZEN, Dieter (2015): *Hochschule in der Globalisierung: Zwischen atlantischer, europäischer und konfuzianischer Tradition*. Berlin.

LENZEN, Dieter (2014): *Eine Hochschule der Welt: Plädoyer für ein Welthochschulsystem*. Wiesbaden.

MERTENS, Lothar (2002): "Einige Anmerkungen zur NS-Wissenschafts- und Forschungspolitik." In: VOM BRUCH, Rüdiger (Ed.): *Wissenschaften und Wissenschaftspolitik: Bestandsaufnahme zu Formation, Brüchen und Kontinuitäten im Deutschland des 20. Jahrhunderts*. Stuttgart 2002, pp. 225-240.

RITTER, Joachim (Ed.) (1971): *Historisches Wörterbuch der Philosophie*. Vol. 1, Basel, p. 701.

VOSSEN, Johannes (2009): "Der politische Systemwechsel von 1933 und seine Auswirkungen auf die Hochschulpolitik." In: SCHLEIERMACHER, Sabine and Udo SCHAGEN (Eds.): *Wissenschaft macht Politik: Hochschule in den politischen Systembrüchen 1933 und 1945*. Stuttgart, pp. 19-28.

ZIEGLER, Konrat and Walther SONTHEIMER (Eds.) (1979): *Der Kleine Pauly: Lexikon der Antike*. Vol. 1, Munich, p. 782.

SHORT BIOGRAPHY

Prof. Dr. DIETER LENZEN, born in 1947 in Münster, studied from 1966 to 1970 at the University of Münster (educational science, philosophy, as well as German, English and Dutch philology). Starting in 1975, he was professor of education, first at the University of Münster and, from 1977 onwards, he held a chair for philosophy of education at Freie Universität Berlin. Between 1986 and 1994, Lenzen took up guest professorships at Stanford, Columbia, Tokyo, Hiroshima, and Nagoya Universities. From 2003 to 2010, he served as president of Freie Universität Berlin. Since 2005 he is chairman of the 'Aktionsrat Bildung' and from 2007 to 2016 he was the vice-president of the German Rectors' Conference. He is president of Universität Hamburg since 2010.
praesident@uni-hamburg.de

This report is originally published in German and has been translated into English.

8.

Can Autonomous Swarm Intelligence Bring About an Overall Profile of the System?

University Development Along the Axes of Law vs. New Public Management and Autonomy vs. Integration

Elmar Pichl

Abstract

How can autonomy (of an individual institution) and integration (within a system) be guaranteed? How can cooperation among the universities be achieved in the interests of systemic goals? Does a "swarming gene" exist at Austrian universities, or not? Autonomy and management are, like yin and yang, unthinkable separately – at least according to the broad consensus. How goal-directed external management can be effected is, however, still under development. How can an "embedded and 'c'ontrolled autonomy" that fits better with by now well-developed maxims of competition – cooperation nationally, competition globally – be established? Although some questions of governance are not yet completely answered, Austrian higher education definitely does not present a governance-free zone.

Introduction

Many of the topics concerning university development that were discussed in recent years circle around questions of individual universities as institutions, and what each one needs to thrive as it develops. One thing is certain: Austria's public universities have an independent legal personality under public law, and are correspondingly anchored in Austria's constitution. Within the framework of laws and regulations, they can act independently and are essentially not subject to orders. In this regard, autonomy is a principle of state governance that is becoming appropriate for the university as an organization of academic experts. Far-reaching autonomy has been achieved in Austria[1] – also as an expression of institutional academic freedom – and it is obligated to the goal of hands-on, unbureaucratic, efficient university leadership.

There has been little discussion of the question of overall management of the system of 21 (or 22, counting Danube University Krems) public universities. The individual autonomous universities can and should decide autonomously about their

1 Only the areas of financial autonomy (key phrase: tuition fees), access to higher education, and laws governing studying in higher education, weaken the otherwise very high degree of autonomy.

affairs, but they cannot decide "for Austria," or for the Austrian system of higher education. Nevertheless, from the societal point of view, from the academic point of view, from the point of view of innovation, we need a functioning "complete whole" (in the sense of a coordinated university collective). How can thereby autonomy (of individual institutions) and integration (within a system) be guaranteed? In short, how can cooperation among the universities be achieved in the interests of systemic goals?

The Federal Budget Law of 2013 extended this systemic challenge with a legal reality. Under this law, Austria's federal administration – according to Austrian constitutional law, in this systemic context, the public universities are also included according to Austrian constitutional law – was required to orient itself toward the principle of "effectiveness orientation." There are goals for effectiveness that are set out in the laws governing the federal budget. But how can the cascade of outputs and outcomes of the individual universities be guided and managed so that their contributions to fulfilling the effectiveness goals contribute to fulfilling the goals at the level of the system as a whole? And what – which capabilities, characteristics and internal conditions – does an Austrian university "of today" need to perform optimally in this context of external management? Does such a "swarming gene" exist at Austrian universities, or not?

FROM "MANAGEMENT BY OBJECTIVES" TO "MANAGEMENT BY SWARM INTELLIGENCE"

Might the writers of the 2002 Law on Universities (UG) have forgotten something? Is there really not anything in this law that addresses the question of how the complete system of 21 universities listed in UG §6 should be managed? Are there no indications regarding which governance instruments for shaping the system should be used to make concrete the overall responsibility[2] for university affairs that is set out by the constitution, and naturally exists politically as well? In the UG, §13 paragraph 7 states that the university (with specific responsibility in the rector's office) shall present the ministry with a draft performance agreement. But what precedes this draft agreement? On the one hand, according to the law the draft should form the basis of the university's development plan. But how do considerations, goals, and programmatic elements that have their origin and legitimation in the external university world – in the system of higher education, the research system, the system of innovation – come into the draft? How should the ministry live up to the general responsibility it has within the structure of politics for the "overall academic profile" of the state, as well as integration with other areas of policy (cf. Müller et al., 2010, p. 15)? An "administrative practice" has developed for this along the lines of a certain

[2] Set in law by the (competency) provisions of the Austrian constitution, as well as the law setting up the federal ministries, this responsibility is a matter of fulfilling the provisions with respect to the well-being of the institutions of higher education and, consequently, with respect to the well-being of the republic and/or the population via the effectiveness of both the system of higher education and the institutions that comprise it.

pragmatism that the world of "new public management" ideas, which was the inspiration for the introduction of the new law on universities, certainly makes provision for.

For managing an individual university, the law more or less sufficiently describes the rules of the game by which university and ministry coexist and cooperate. "Management by objectives," which finds its concrete expression in the instrument of the performance agreement and in the cascade of target agreements that are "broken down" within the university, together with the implementation principle of "university autonomy," and with public financial and intellectual capital accountability all form the key bonds of the "couple relationship" of university and republic. What is missing, however is a statement – at least one that goes beyond the national government's financial responsibility spelled out in UG §12 – about managing the complete system. Was it trust that something of this sort exists that keeps the innermost heart of the autonomous world of the universities together? Was it hope that development plans, performance agreements, intellectual capital reports, all embedded within management by university boards – in short, the management by objectives that was valid for each individual university – would in sum lead to management by "swarm intelligence"[3] for the system? Or was it, among the priorities for the great work, the courage not to know everything that meant that the corresponding statements were consciously left out?

According to accounts by people who were on the scene, there is no doubt that among the framers of the UG there was a very concrete notion of how management of the entire system, in the sense of integrating individual institutions into a complete whole, should come about. The ministry provides a clear and transparent framework for the "performance requirements,"[4] spelling out what the state, i.e., political leaders, expect from the universities. The universities develop proposals in (constructive) competition with each other (among individual universities or, e.g., among regional groups of universities) about how these expectations or performance requirements would be implemented. The ministry, for its part, makes a selection from among the submitted proposals. The results of this process are set out in binding performance agreements and declared. However, the further back into history this genesis recedes, the weaker the effects of the mindset become. Fifteen years after the final parliamentary draft of the UG 2002, it is more often asked whether something was forgotten, than remembered that a clear concept existed. There are two reasons for that. On the one hand, in the first years after the law's passage the concept tended to be barely

3 The concept of "swarm intelligence" used here draws on an analogy from modern research on drones. There are flying drones that operate autonomously. The management of an individual flying robot is one thing. But what is necessary for a swarm of drones as a whole to operate as successfully and efficiently as possible, with a minimum of accidents? What algorithms are required for (autonomous) management of the system?

4 This framework is made concrete, for example, in that the ministry's ideas are based on national and international evidence, developments, and necessities, and that these ideas are discussed publicly (within the discipline), with particular involvement of the independent Austria Science Board's expertise.

brought to life by the ministry, if at all. The reasons for that include the fact that the ministry was not structurally set up for it and had insufficient personnel, that there was uncertainty about the methods that should be applied, and that there were other priorities in higher education policy to take care of – “first things first.” It is also possible that the fiscal framework did not provide the necessary leeway to be able to implement the idea of constructive competition. On the other hand, some currents on the side of the university exaggerated – consciously or unconsciously – university autonomy. For that reason, the “implementation principle” became “absolute autonomy,”[5] whose instrumentalization in past arguments was all too often used to try to deny the legitimacy of systemic objectives, content-related programming, or efforts at coordination. Management by “strategic objectives from the outside” was, however, from the beginning a constitutive principle of the new university management – just like the roll-back of detailed regulations, strengthening competitive pressure, and strengthening university leadership (cf. for example Titscher et al., 2000, p. 71). And with his criticism – “state management by agreements, the unfolding of a state strategy exists only in rudiments” – Sigurd Höllinger, one of the framers of the new university management, also confirms the basic unwritten historic consideration 10 years after it was all poured into the new legal framework (Höllinger, 2014).

System governance: multidimensional

North Rhine-Westphalia’s law on higher education from 2006 clearly addressed, in §6, precisely the question of overall responsibility. “For the management of higher education, the state develops strategic goals and thus fulfills its responsibility for an appropriate supply of higher education programs.” This formulation was amended in 2014 by a law on the future of higher education, but despite criticism[6] the topic of “overall responsibility” was not struck from the law.[7] With the legal introduction of an All-Austria University Development Plan (cf. §14d UG idF BGB1, I Nr. 52/2013) governance of higher education in Austria developed in a similar direction, but the definitive legal anchoring of the new planning instrument was no longer in force just one year later as a result of systemic “combination” with efforts toward a reform

[5] I note as a symbolic example the letter from the chairman of a university board that was written to the Science Minister in the first university period and made a scandal out of the fact that the minister wanted to communicate, or had communicated, directly with the rector.

[6] One example of criticism came from the conservatories, which were required under the new framework to develop a profile with the stipulation that not all conservatories should offer everything as they had in the past, but should in the future cooperate and become more efficient (cf. Irle, 2015, p. 11).

[7] The amended key paragraph 1 of §6 of the Law on Higher Education now reads: “Development planning for higher education is a joint task of the ministry and the institutions of higher education, under the general responsibility of the state. This development planning particularly serves to guarantee a supply of institutions of higher education and of programs, as well as a balanced variety of disciplines, all of which are agreed among the state’s regions. It is composed of the state development plan for higher education and the individual development plans of institutions of higher education.”

of university financing, which were temporarily delayed in 2014. The idea and its effects, however, lived on. The juxtaposition of the dimensions “higher education planning” and “All-Austrian University Plan” points toward a further, parallel challenge. Not just the sector of public universities requires coordinated planning and management, but the system of higher education itself: inter-sectoral, i.e., including public universities, universities of applied sciences and teachers’ colleges, as well as considering both public and “private.” In this respect, the governance of the system of 22 public universities should be distinguished from the governance of the system of higher education. And this understanding of governance of the system should in turn be distinguished from the daily necessary balancing among the elements of the university eco-system and their intrinsic conflicts: societal vs. private values, competition vs. cooperation, change vs. tradition, “blue-sky” research vs. applied research, regulation vs. market (cf. Ruckenstein et al., 2016). That is yet another level.[8]

“Yin and yang”

The development that university governance should have undertaken in the context of new public management was and is characterized by “shutting down” state (detailed) regulation, paired with “starting up” target-oriented external management (cf. Zechlin, 2015, p. 21). After a decade in which target-oriented external management has, for many reasons, hardly taken place, a more active target-oriented external management in the second decade of Austrian university autonomy represents a change. The form in which it is implemented and/or pursued varies, and ranges from new objectives for the whole system (with the necessity of integrating these into each university’s development), through contributions to the effectiveness goals of the whole system (“Contributions to the Fulfillment of Effectiveness Goals”), up to the implementation of strategies for the whole system (e.g., research, technology and innovation; life-long learning; open innovation; digitalization; internationalization; mobility; social dimension). If, however, external management is not accepted or is even thwarted by the “objects” of the management, over the long term this leads to destructive damage to university autonomy. For years there has been wrestling about the proper dosage of university management. The key question in this context is, “How much strategic planning remains in the hands of the state, and how does the state implement it?” (Irle, 2015, p. 7) Economically, the relationship may well remain hierarchical. The state is the stronger economic actor because it sets out the budget framework, and even after their “spin-out” the universities remain dependent (cf. Funk, 2006, p. 38). The systemic level is, however, ultimately dependent on the sum of the individual institutions’ existing competencies in order to generate sustainable developments. For these, however, practically no normative provisions were made. One starting point for a normative anchor could be seen in that the universities

8 A good overview of the theories and concepts of governance of higher education is provided by Ian Austin and Glen A. Jones in their recent work (cf. Austin et al., 2016).

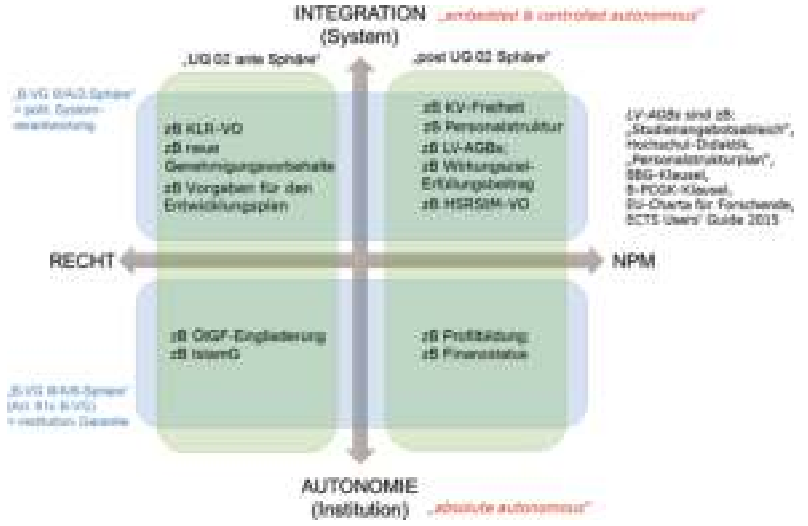
at least are under the general authority of the "compliance principles." They are required to orient themselves toward the norms and goals of the Austrian legal order. In this respect, for example, the decision of whether or not the rectors negotiate a performance agreement with the ministry is not up to the universities (background remark: within the conference of the universities there existed – how seriously is an open question – sentiments in favor of collectively rejecting signing performance agreements). The law on universities clearly presumes in this regard that serious negotiations will be undertaken and that the participants will purposefully pursue finalization of performance agreements. It is in this case a legal requirement that essentially must be fulfilled, regardless of whether everything that the ministry or other authorities of the republic "provide" as a framework or require as expected contents is to the taste of the "political interest" of the university side. Where opposition to particular contents arose based on institutional interests – except against budgets that were too low – can also be derived from the learning and development curves over previous rounds of negotiation about performance agreements. The first round of negotiations in 2006 (for the 2007–09 period) was shaped by the fact that both sides of negotiators were new to the process, that the idea of autonomy was dominant over the idea of management, and that the year of negotiations coincided with a crucial national election year. The round in 2009 (for 2010–12) brought with it the "first outrages," as the ministry, by way of the "Faulhammer letter" (i.e., a letter from the person who was then responsible for the higher education section within the ministry), had the "presumption" to expect certain things from the universities. A good example that opens a more fundamental discussion is the ministry's expectation, which flowed down to the universities, that universities, like all other federal institutions, were expected to do their part in the federal government's "apprentice initiative" and (increasingly) train apprentices. On this subject, the (symbolic) resistance of Christoph Badelt, who was then the rector of the Vienna University of Economics and Business (WU Vienna), has become almost legendary. He justified the resistance by saying that as long as the Republic of Austria offered WU Vienna no improved conditions for the education of students, it was absurd that the WU Vienna should (increasingly) train apprentices but could not make progress in its actual tasks of academic teaching and research. (Note that it was in fact symbolic resistance, as it was a matter of one or two apprentices as the WU Vienna's contribution to the federal government's overall initiative.) The negotiating year 2012 (for 2013–15) had a more relaxed atmosphere because a "higher-education billion" allowed the budget for universities to grow significantly and include room for developments. For that reason, structural changes (e.g., new regulatory guidance for the performance agreement, or the "Higher Education Plan 2011") were adopted more or less without friction. By contrast, the negotiating round in 2015 (for 2016–18) was somewhat more difficult. On the one hand, an additional € 615 million were available, but at the same time universities were required to raise "efficiencies" that showed their value monetarily, and thereby make a contribution to the continuation of the enterprise for the period of the performance agreement. Further programmatic developments in terms of content, which were expressed in the regulatory guidance or in the All-Austria University Development Plan, were not much discussed. Additional anchors for "obligations to the system" could be seen in the freedom of negotiating a collective contract that is legally based on the UG, and in the legally constituted National University Federation. This could also be seen in the self-understanding of Universities Austria, which considers itself not only the representative of the universities' (primarily rectors') interests but also expects that they bear responsibility for the system in equal partnership with the system. Perhaps "cooperation," as a component of the arrangements, which is anchored in the Law on Universities and repeated several times, can also be considered as something like the parliament's position on expectations toward agreement and coordination. Autonomous universities did not, as a result, automatically coordinate in all of their main activities, particularly in the procedurally very complex questions of academic programs. But as was previously noted, other "messages" were probably dominant in the first decade of autonomy, and above all "autonomy and competition" were easier to pair up in thinking than "autonomy and integration."

AUTONOMY – "EMBEDDED AND CONTROLLED"

Because the idea of autonomy that is in the 2002 Law on Universities was not fully legally implemented – the laws governing university studies retain jurisdiction, the legal framework for internal university governance hinders decisions that are truly competition-oriented, etc. – and the budget situations that would be necessary to unleash the full effects of competition have never been attainted, something like an "embedded and controlled autonomy" is needed, which also fits better with the competitive maxims – cooperation nationally, competition globally – that have in the meantime been further developed.

Over the years, university autonomy has in fact established itself, fundamentally and on a non-partisan basis, but phenomena such as "doubts about autonomy" have arisen among many stakeholders. This has primarily happened because phenomena such as forces of spontaneous self-coordination have hardly been seen, centrifugal forces have let the system drift apart in some aspects, and desirable conditions could sometimes only be attained by legal intervention. The hope that new public management would lead to individual institutions developing empathy for the system as a whole remained unfulfilled; the law remains indispensable as a management instrument.

This situation can be described as a field of tension along two axes: one axis of "institutional autonomy – systemic integration," and the other of "new public management – management by law." And within this field, "phenomenological spheres" can be defined according to whether the management intervention serves political responsibility for the system (derived from the corresponding part of constitutional law, that is "B-VG III/A/2 sphere" referring to governmental and/or ministerial responsibility) or institutional academic freedom ("B-VG III/A/6 sphere" referring to Article 81c of B-VG), and whether the background of intent is "mentally" located before or after the caesura brought about by the new philosophy of regulation that accompanied the 2002 Law on Universities ("pre-UG 2002 sphere" and "post-UG 2002 sphere").



"Autonomy and management", author's diagram.

The individual examples can then be read as follows. Is or was a development at an individual university instituted by legal instrument (e.g., direct organizational execution by law, whether that is the UG 2002[9] or the Law on Islam[10]), or by "agreement" (e.g., questions of individual profile or financial status)? Is or was a development related to the system and/or all universities instituted by legal instruments (e.g., regulations or requirements for approval) or by "agreement" (e.g., decisions made by the partners in the collective contract, "general terms and conditions" for the performance agreements in the sense of points that are ideally equally binding on all universities, or also just objectives)?

Lane describes the relationship between state and university in the American context with the amusing words, "The relationship between state governments and public institutions of higher education resembles an intricate and clumsy dance with both partners often trying to play the role of the lead dancer" (Lane, 2007, p. 615). The continuing challenge is how to secure the idealized principle of implementing autonomy as "absolute autonomy," while simultaneously bringing the universities as a whole to behavior that is optimal for the system – that is, how the universities can have "embedded and controlled autonomy."

The fantasy of a self-ordering university landscape, however, apparently contradicts nature. "The tendency toward increasing entropy is a fact of nature, a gradual sinking into disorder. What is cold warms up, what is hot cools down, signal gets lost

9 For example, the integration of the Austrian Institute of Historical Research into the University of Vienna.

10 The 2015 Law on Islam (BGBl. I Nr. 39/2015) legally mandates a curriculum of Islamic theological studies at the University of Vienna.

in noise until gradually chaos reigns. Stopping or reversing this trend toward increasing disorder requires management (Rid, 2016, p. 70)" That is how it appears, at least to the academic approach from cybernetics.

From Higher Education Plan to higher education planning

Empirical findings that can be derived from the Austrian university landscape over the last 15 years reveal a dialectic pendulum movement. At first, it was important to learn "autonomy" as such and autonomous action; then there was a need to shape the entirety of the universities, or all institutions of higher education; there has been a reaction to that for several years, and instruments have been developed that allow for better management of the system as a whole. In political and programmatic terms, that need was first expressed in a government manifesto in 2008. It read, "The Austrian higher education area, with its various sectors – the universities, universities of applied sciences, teachers' colleges and private universities – should be considered as a whole in its needs, stated tasks and points of emphasis. An 'Austrian Higher Education Plan' should work toward a clear division of tasks and points of emphasis" (Regierungsprogramm, 2008, p. 202). It further stated, "As an overall concept for shaping the Austrian higher education area, an 'Austrian Higher Education Plan' should be developed with the following key points: strategic guidelines, optimization of locations, porousness within higher education in Austria, as well as balance between regional education offerings and bundling research infrastructure" (Regierungsprogramm 2008, p. 203). These statements not only resulted in the first adaptations in shaping and negotiating the performance agreements with the universities, but also marked the "starting point" for the development of Austrian higher education planning. These efforts to develop governance in coordinating and setting goals for the Austrian higher education area found their concrete expression primarily in:

- Adoption of the Framework Law on Quality Assurance in Higher Education;
- Publication of the Higher Education Plan document (at the end of 2011);
- Establishment of a higher education conference[11] (from the beginning of 2012);
- Start of building planning in university construction;
- Dedicated governance track for large research infrastructure;
- Start of effectiveness-oriented system management for systemic goals;
- Introduction of structural funds in the higher education area; and
- Specific governance for education of higher-education instructor that is jointly agreed on by both responsible ministries.

The most recent development is represented by an "All-Austria University Development Plan" that is geared toward the public universities. As a strategic planning framework for the public universities over the course of two performance agreement

[11] Information about and materials concerning the Higher Education Plan as well as the higher education conference can be found at http//www.hochshulplan.at

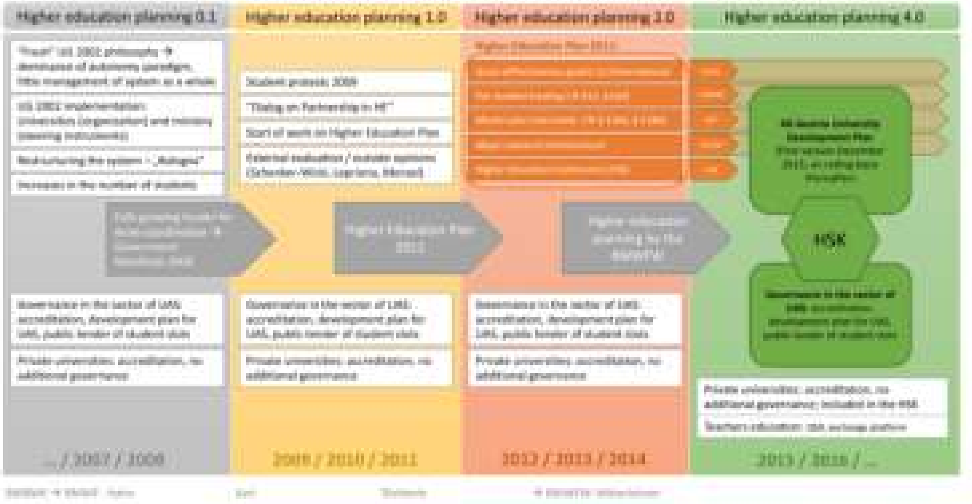
periods, the All-Austria University Development Plan has the goals of making a contribution to ordering and, particularly, optimizing the university system in Austria, and deriving actionable options for higher education at the universities. The plan refers to the universities' research task, which simultaneously identifies the tie between research and teaching (research-driven teaching) as a unique facet of higher education at the universities. This also takes place against the background of increasing university competition at the international level. The All-Austria University Development Plan marks the first concrete step to match the intention of the Law on Universities (guaranteeing the autonomous development and integration of an individual university with an overall system) with the demands of various stakeholders (Austria Science Board, Austrian Council for Research and Technology Development, Austrian Court of Audit, etc.) in overall development of the public university system. In its 2015 version the Plan describes the desired future according to eight systemic goals[12] as well as a model of the desired financial framework.

The interim result of this multi-year development from Higher Education Plan to higher education planning, development that was also shaped by numerous ministerial changes, paints a picture of the Austrian higher education area that cannot be characterized as a governance-free zone. The structures were established, and current higher education planning, in continuing the goals of the Higher Education Plan of 2011, still focuses on strengthened cooperation and coordination, better use of available resources, coordinated setting of profiles and emphases, and coordinated further development of the spectrum of subjects.

With the motto "higher education planning n.0," it will be important in the future not only to work more on the emotional ties between an individual institution and the system (along the lines of empathy for the system and an individual institution's responsibility that also applies for the "entire whole"), but it will also be worth considering whether something like a "swarm gene" should be "inserted" into the law, something that legally defines development of the system as a common task. That could, for example, be accomplished with something like this formulation of a paragraph on "higher education planning n.0" in the UG: *"Development planning of the public university system is a joint task of the ministry and the universities under the general responsibility of the state. This development planning particularly serves to guarantee an inter-regionally coordinated array of institutional arrangements and services. This planning consists of the All-Austria University Development Plan that is concluded by the ministry and the individual university development plans.*

---

[12] The eight systemic goals: 1. Strengthening and further development of the higher-education system, 2. Strengthening basic research, 3. Improving the quality of university teaching, 4. Improving the relevant performance indicators for teaching as a whole, 5. Supporting young scholars, 6. Extending knowledge and innovation transfers, as well as with local advantages, 7. Sustainably raising mobility and the internationalization of Austrian higher education, 8. Promoting cultural change in favor of social inclusion, gender justice and diversity in the university. Both long and short versions of the All-Austria University Development Plan can be found on the internet at http://wissenschaft.bmwfw.gv.at/bmwfw/wissenschaft-hochschulen/universitaeten/der-gesamtoesterreichische-universitaetsentwicklungsplan-2016-2021/



Higher education planning, author's diagram

The components of the All-Austria University Development Plan are in particular plans regarding a supply of services that are regionally balanced and coordinated on an inter-regional basis, a variety of disciplines that is balanced and adequate for the Austrian academic system, management of student supply and demand, the utilization of capacities, as well as questions of research.

Universities' own development plans shall orient themselves toward the All-Austria University Development Plan. At all stages of developing the All-Austria University Development Plan the concerns of the universities, particularly the universities' own development plans, shall be appropriately taken into consideration (counter-flow principle[13]*).*"

For a forecast that reaches a bit further into the future, it could be interesting to check, given the quite robust data quality and availability in Austria's academic system, to what extent the opportunities and chances of Big Data, artificial intelligence and complexity research could also be made usable in higher education governance. But even this "technical foundation" will never be able to replace political narration about goals in general, and about the necessity of a "swarm intelligence" of autonomous universities in particular.

---

13 The "counter-flow principle" (*Gegenstromprinzip*) is an element of land-use planning in German-speaking countries that requires decision-making processes to contain both top-down and bottom-up elements.

REFERENCES

Austin, I. & Jones, G. A. (2016). *Governance of Higher Education. Global Perspectives, Theories and Practices*. Routledge.

Funk, B. C. (2006). "Verfassungsrechtliche Dimensionen des Hochschulrechts." In: Berka, W. & Brünner, C. & Hauser, W. et al. (Eds.): *Handbuch des österreichischen Hochschulrechts*. Neuer Wissenschaftlicher Verlag.

Höllinger, S. (2014). "Verbesserte Strukturen und mehr Geld." In: *Der Standard*, 21 June 2014.

Irle, K. (2015). Einführung: "Die aktuelle Debatte in den Bundesländern." In: Bungarten, P. & John-Ohnesorf, M. (Eds.): *Hochschulgovernance in Deutschland*. Friedrich Ebert Stiftung.

Lane, J. E. (2007). "The spider web of oversight: an analysis of external oversight of higher education," In: *The Journal of Higher Education*, Vol. 78 No. 6.

Müller, U. & Michalke, J. P. & Behm, B. & Ziegele, F. (2010). Was macht eigentlich … das Ministerium? Überlegungen zu Wissenschaftsministerien von morgen. Centrum für Hochschulentwicklung, www.che.de/downloads/CHE_AP132_Wissenschaftsministerien.pdf

Rid, T. (2016). *Maschinendämmerung. Eine kurze Geschichte der Kybernetik*. Propylän.

Ruckenstein, A. & Smith, M. & Owen, N. (2016). "How can we make UK higher education sustainable?" *The Times Higher Education*, https://www.timeshighereducation.com/features/how-can-we-make-uk-higher-education-sustainable

Titscher, S. & Winckler, G. et al. (Eds.) (2000). *Universitäten im Wettbewerb. Zur Neustrukturierung österreichischer Universitäten*. Rainer Hampp Verlag.

Zechlin, L. (2015). "Was ist "gute" Hochschulgovernance?" In: Bungarten, P. & John-Ohnesorf, M. (Eds.): *Hochschulgovernance in Deutschland*. Friedrich Ebert Stiftung.

DOCUMENTS

Gesamtösterreichischer Universitätsentwicklungsplan (2015), http://wissenschaft.bmwfw.gv.at/bmwfw/wissenschaft-hochschulen/universitaeten/der-gesamtoesterreichische-universitaetsentwicklungsplan-2016-2021/

Österreichischer Hochschulplan (2011), http://www.hochschulplan.at

Regierungsprogramm für die XXIV. Gesetzgebungsperiode (2008), https://www.bka.gv.at/DocView.axd?CobId=32966), 202.

SHORT BIOGRAPHY

ELMAR PICHL, born in 1973 in Styria, studied law at the University of Graz. After occupations as assistant at the University of Graz and as Head of Office for World University Service Austria in Tetovo (FYROM) / Prishtina (Kosova), in 2000 he began to work in Vienna in the headquarter of the Austrian People's Party (last: Political Director). In 2007 he became Chief of Cabinet and served for the Federal Ministers for Science and Research Johannes Hahn, Beatrix Karl and – interimistically – Karlheinz Töchterle. Between 2010 and 2013 he held the position of a Deputy Director General. In August 2013 has been appointed Director General for Higher Education (Universities, Universities of Applied Sciences, Private Universities) [since 2014 in the Federal Ministry of Science, Research and Economy].

His additional engagements and memberships include Head of the Board of OeAD-GmbH (since 2011). He has published on topics including legal and political science issues in South-eastern Europe; integration and migration; communication, campaign leadership, and election campaigns; as well as Austrian university policy and higher education development.

This report is originally published in German and has been translated into English.

9.

EXCELLENCE, RELEVANCE AND CRITIQUE

Antonio LOPRIENO

Austrian Science Board

ABSTRACT

Everyone now talks about the future of the university. After centuries in which the aura of the ivory tower stuck to this institution, there is now hardly an actor in society that is not in some way occupied with the tasks and potential of higher education. Whether rectors or politicians, academic panels or parliamentary commissions, employers' associations or student representatives, everyone seems to hold an opinion (often well-founded) on the challenges of tertiary education. How could it happen within just one generation that a once impermeable institution turned into the protagonist of a social debate?

FROM *universitas* TO UNIVERSITY

Through the 18th century, European universities were eminence-based institutions for the transmission of professorial knowledge, mostly financed by the local rulers or elites. They were politically funded, academically independent institutions. Their main emphasis was on teaching, although utilitarian ties to professional status were often in the foreground. "High" faculties such as theology, law and medicine enjoyed a higher status than the faculty of the "Artists," who were assigned a pedagogical, introductory function. In the 19th century, three functionally comparable, but culturally very different models established themselves. These models shaped our understanding of the university until the end of the 20th century. They were the German "Humboldtian" model, the Anglo-Saxon "liberal arts education", and the French *grande école*. Humboldtian teaching understood itself as handing down a disciplinary perspective (the canon of a particular academic discipline) to students as future academics. University training was simultaneously seen as the ideal approach to both general education and specialized training. The Anglo-Saxon model proceeded from a wider canon of cultural contents that, when imparted, would produce good citizenship among society's elites. Finally, the French *grande école* aimed at preparing elites for state service with a curriculum primarily focused on engineering.

THE "SOCIETAL TURN" IN THE HIGHER-EDUCATION SECTOR

Over the last 15 years, the differences among these three models have been newly negotiated in all European systems of higher education. First, as a result of the Sorbonne (1998) and Bologna (1999) declaration, a formal architecture of university studies has established itself, even if it is not always accompanied by a change of the educational contents. This architecture prescribes that the bachelor's level provides a general education, to be followed by a more specific training at the master's level. In the first years following the reform, therefore, qualitative attention was devoted to the needs of quality assurance in the area of internationalization and of academic teaching. In the last ten years, however, the logic of institutional competition among players in higher education has pulled research ever closer to the center of university attention. Based on the increasing power of the rankings, and despite regular questioning of their actual information content, academic institutions have oriented themselves around "excellence" in a process that has provided identity-driving primacy to the Anglo-American model of a globalized world-class university (Loprieno 2016).

At the same time, a gradual differentiation of the higher-education sector has taken place in Europe. This has given rise to new institutional models of higher education in addition to the classical universities. These new institutions frequently differ from the usual model of a university in their legal affiliation (as in the case of private universities in a traditionally public higher-education sector) or in their academic offer (as in the case of the universities of applied sciences in German-speaking countries or the newly founded university colleges in England). Instead of aiming at a broad disciplinary spectrum, they often concentrate on specific educational goals, generally dovetailing with the expectations of the labor market. The result of these developments is an increasing "societal turn" of higher education in Europe, which now engages with the participation, influence and expectations of various stakeholders, and which also leads to the constant visibility of higher education in the media and society. This visibility can be understood as society's answer to the organizational autonomy that European institutions of higher education have been given, however without reducing their financial dependence on state support. The organizational and academic autonomy is compensated by a loss of strategic self-direction, because the groups who have a claim on the university have different notions of what the newly granted "autonomy" entails.

FROM "MISSION STATEMENT" TO "STRATEGY"

Together with this organizational transformation we now experience the transition from a university culture that used to be fundamentally aristocratic, with the *disciplinary* identity of professors and students at its center, to an increasing prioritization of the university as a whole, which privileges a new *institutional* identity. This evolution is also reflected in the various text genres that the university of the "societal turn" uses to present its perspective on the future. The former *mission statement* tends to be replaced by the *strategy*. Encompassing "mission statements" became typical for European universities in the wake of the 1968 revolution, when it became crucial for the higher education to legitimize itself politically as a result of the democratization processes that were underway (von Wissel 2007: 67–69). The academic community was fostered by *common values*. The strategy, by contrast, is a product of the post-modern "societal turn" and is oriented toward the real or putative *unique selling propositions* of each academic institution. Until fifteen years ago, the need for a "strategy" in the academic context was anything but uncontroversial (Duderstadt 2000: 262), as the term was reserved for the military or the entrepreneurial context.

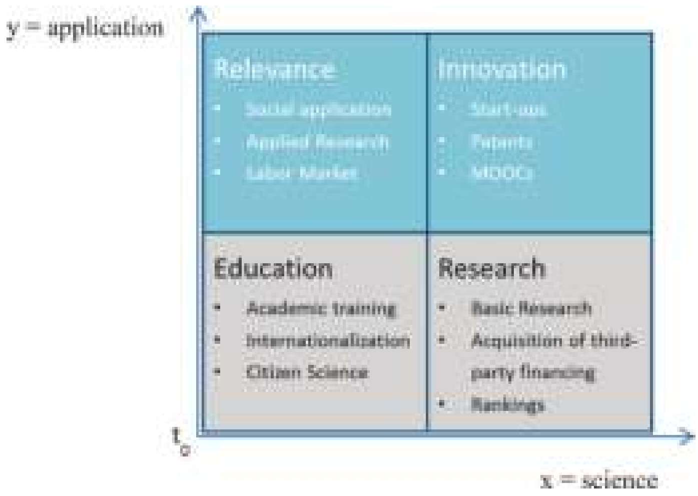
In the case of a university, the relationship between a "mission statement" and a "strategy" is all but clear. In a company, a strategy (*action plan*) is derived from its main market features (*mission statement*). The strategy is an attempt to give concreteness to the mission statement by lending it explicit goals. This is very different from what happens in the academic context. The often similar university strategy papers and development plans that have established themselves as features of our university landscape are only very rarely derived from pre-existing mission statements. The two text genres coexist, often without any direct reference to one another, but mobilize very different academic actors. An academic mission statement generally rests on the idea of enlightened education and adopts an emancipatory style; a strategy, by contrast, focuses on the areas in which the institution expects to have a competitive advantage. The work on a strategy provides the socialized university with specific institutional goals that are missing in the mission statement, which usually reflects a traditional model of the university (Marcinowski et al. 2013).

"Excellence" and "relevance" as strategic axes

To understand why present-day universities need a strategy, I would like to describe the fields of action and effects of a socialized university along the two axes of pure *science* (x) and of its scholarly, economic, cultural or societal *application* (y). The combination of these two axes produces four quadrants along the lines of Donald E. Stokes' taxonomy of research activities (Stokes 1997). The core of this classification is represented by two axes of *fundamental* vs. *applied* research. They result in phenomenological research (lower left), pure fundamental research (lower right), applied research (upper left) and application-oriented fundamental research (upper right). The paradigmatic example for this last quadrant is pharmacology with its representative Louis Pasteur, who also currently receives the sympathy of many university strategies because he combined pure research and relevant application in a most successful way.

If we transfer this model to the university's fields of activity, four ideal (and countless mixed) possibilities arise for the strategic positioning of an institution of higher education.

The role that in the Pasteur quadrant is claimed by phenomenological research is played here by *education* as the most basic intersection of research and teaching;



that is the prototypical task of a classical university. Consequently, most expressions of the traditional model of a European university are oriented toward the humanistic transmission of education with the ultimate goal of forming a critical personality (Bugandwa and Lowe 2010). Among the current accomplishments of a university, in the sense of basic provisions for a knowledge society, are education to a bachelor's or master's level, as well as striving for social effectiveness and international visibility.

STRATEGIC ONE-SIDEDNESS?

The history of the last fifteen years has, however, led to a strong movement toward the other three strategically guidable quadrants: first, scientific excellence (according to the hegemonic model of a world-class university that is propagated by the rankings); second, orientation toward social or economic application (as in the case of most universities of applied sciences); third, the combination of these characteristics via orientation toward innovation, which particularly applies to the research-intensive technical universities. Signs of this development are, for example, a strong recognition for attracting third-party funding or an orientation toward quantitative measurability in research accomplishments (Hazelhorn 2011). With these, the socialized university takes leave of educating students as its primary task, because in continental Europe there seems to be no direct connection between excellence in research and quality of teaching. This is different from the traditional liberal arts colleges in America, or the French *grandes écoles*, both of which enjoy a high level of social acceptance precisely because of the quality education they provide, even though their research output is proportionally low.

The attention that an institution of higher education pays to the axis of relevance is displayed, for example, by the attention it pays to the economic needs of the area where it is located. This can be shown in gaining regional industrial partners in the French *Investissements d'avenir* (Cremonini et al. 2013), or in engagement in the socio-cultural and societal fields, as some German universities have done with their own "future concept" as the basis for support from the third line of the excellence initiative. But privileging research as is traditionally done in our academic tradition, and made even more powerful by the increasing competition among institutions of higher education, makes it difficult for concerns located on the y-axis to receive the same degree of recognition as research excellence on the x-axis. As a result, the two axes are often consciously or unconsciously confused with one another in public discourse. A university strategy – following the rubric "do one thing and don't leave out the other" – must of course provide for both dimensions. The question is the dosage between the two poles that can give the institution its unique position on the quadrant.

Has excellence based on competition thus risen to the new university narrative (Müller and Bischof 2015)? Despite what could be claimed *prima facie*, the focus on excellence is a relatively new phenomenon in our academic culture (Peter 2015). In the logic of the Humboldtian university, the constitutive characteristic of scientific identity was the academic profession as such, not the research performance (Zimmerli 1998). In such an encyclopedia, "excellence" represented the immeasurable, qualitative status of the holder of the professorship, not the measurable, quantitative achievement of the best of them (Bröckling 2009). Over the last 20 years, we have shifted from an understanding of excellence based on *eminence* to one based on *evidence*, that is, to an understanding of research quality founded upon its measurability. This is shown in the global university landscape by examples such as Germany's excellence initiative, France's *investissements d'excellence*, Japan's Center of Excellence Program, and many more (Gläser and Weingart 2010; Kehm 2013; Bennetot Pruvot and Estermann 2015). Thus the programmatic accentuation of the axis of quantifiable research results has led to privileging the quadrant of excellence over the classical ideal of education (Banscherus et al. 2012: 18–23). This has happened so thoroughly that "excellence" is now generally applied as the most prominent indicator of institutional or individual quality (Jarausch 2008). "Excellence" has come to mean nothing more than "qualitatively outstanding achievement," which amounts to a semantic drift, a phenomenon known from linguistic history. In this context, it should be considered that in the competition for excellence a certain status-conscious "elite equality" is getting lost, one that also supported the traditional solidarity among disciplines. It is clear that in our "age of excellence," competition among peers is increasing, yielding consequences that are not unambiguously positive for the quality of academic culture (see, for contrast, Sporn 1992, who refers to the culture of a university of professorships, versus Roche 2014, who regards generalized competition as the characteristic feature of the American academic model). Since in a disciplinary culture, the primary loyalty belongs to one's own discipline and not to the university as a whole, professorial bodies are now falling into conflicting loyalties between the organization and the profession (Kohmann 2012: 53). Students also see themselves to an extent as victims of the "circle of excellence," i.e., a new organizing principle that is oriented toward entrepreneurship and rejected in favor of a new intra-discipline cohesion (Masschelein and Simon 2010).

INNOVATION

The current double pressure – from scholarship in the sense of focusing on excellence and from civil society in the sense of contributing to local economy in the general sense of the term – draws the university away from its sole task as provider of higher education and calls up a new idealized model based on the concept of "innovation," which, along with "excellence," comprises a significant component of university discourse (Reichert 2009: 111–118). The concept of innovation is also applied in connection with the active role of philanthropy in supporting scholarship, with institutional help offered for spin-offs and other application-oriented secondary employment, as well as in recruiting and developing young scholars (von Schnurbein and Egger 2013; Pattnaik and Pandey 2014). In the particular case of the MOOCs, one can see the increasing importance of technological innovation, which guides the digital transition from *individual* to *social* knowledge, and thus also sets in motion the breakup of the hegemony of a book-based type of knowledge. In this transition, the visibility of the university brand plays a significant role, thus emphasizing the importance of marketing in contemporary academic discourse (Walsh 2011).

It could appear at first sight that the universities' utilitarian turn toward innovation is only prompted by economic interests (Heuermann 2000: 92–109; Wodak 2010), something that even economists sometimes complain about (Mazzucato 2013: 52). Indeed, the universities' tendency to increasingly take economic interests into account corresponds to the efforts to tie the institutions of higher education more tightly to their ultimate owners. This is the trend which I subsume under the heading "relevance" and which is practiced with particular success in the Northern European countries (Ritzen et al. 2014). But it can also be legitimately argued that the reasons for the attractiveness of the term "innovation" in academic discourse may very well be related to an altered understanding not only of *knowledge* (with the transition from an individual to a social production of knowledge) but also of *science*, with a changed perception of the role of research in the scholarly and scientific communities themselves. I understand this development as a transition from an understanding of science or scholarship as "research," that is, as a *program*, as a timeless advancement, to an understanding of science or scholarship as "exploration," that is, as a *project*, as a future-oriented plan. In the latter model, the prototypical characteristic of university work is not seen as a continuous *process*, as an activity such as "to research" or "to study," which was the case in the classical (also Anglo-Saxon) university, but rather as the *result* of a process, as an achievement such as "to discover" or "to invent" (Vendler 1967). The current extreme focus on producing immediate research results runs the risk of privileging short-term and shortchanging long-term research projects, whose threatened marginalization is complained about in numerous academic cultures (Swiss Academies 2014). This shortcoming can most clearly be seen in the extension of an economic and technical understanding of innovation and carrying that understanding over into all forms of socially usable creativity, as partly happens in the Anglo-Saxon world (Lüthje 2008; von Oetlinger 1999). In this regard, the digital humanities offer an ideal channel for an active presence of the humanities in the university strategy (Lauer 2013).

Two university cultures

Despite their success, the two terms "excellence" and "innovation" fail to mobilize the emotions that are necessary to present themselves as a connecting narrative for the socialized university. Why? Because "excellence" and "innovation" evoke the hot logic of competition (Bogumil et al. 2013). Competition may award the university an image, but not a spirit (Habicht 2009). The logic of competition is not cohesive, but rather divisive; it introduces a "multi-level system" (Fraenkel-Haeberle 2014): dispositive for differentiation in attracting students, in the success of graduates, in scholarly publications, in human capital, in sources of financing, in visibility. The whole energy of an institution of higher education now tends to be shaped by this logic. Innovation as the new model leads to concentration on achievement, and to dismantling collegial cohesion, and possibly also institutional coherence – precisely the characteristics that the modern European university seeks to acquire from the globally hegemonic model (Cole 2010: 11–190).

This systemic paradox shows the core problem for the European university of overly identifying itself with the local context in which it is placed. In a university that is primarily optimized for competition, it is difficult to understand oneself as part of a community if one's own university fails to be ranked near the top (Shin 2013). While the traditional university is being replaced by the "innovative" university (Christensen and Eyring 2011), the new paradigm is set up as an institutional project that is not emotionally supported by the broad university community. Great differences remain in the societal self-understanding as well as in the relations between students and the institution, which speaks for the sustainability of the separation between the two models of universities that historically arose. In the American model, the institutional leadership plays a major role that is also entrusted to it in Europe *de jure* (Amaral et al. 2012) but seldom *de facto* (Wilkesmann and Schmid 2012). In the American tradition, the university presents itself as a campus community, i.e. *as a city*, as a location of institutional identity and community aggregation point. In Europe, on the other hand, the traditional model is that of the university *in the city*. Anglo-American institutions, whether private or public, maintain an attitude of independence from political decision-making, something which is only formally possible in Europe because of the one-sidedness of state financing. Regardless of their performance in research, American institutions profess their task of educating society with fewer inhibitions than comparable European universities (cf. Cortese 2003). They entertain a less problematic relationship with private financing, while simultaneously highlighting the importance of common interests for instructors and researchers (Washburn 2011).

The differences in the relationship between students and institution are even more considerable. In contrast to continental Europe, in the Anglo-American world it is uncontroversial on the one hand that *selectivity* is applied in admitting students on the basis of competitive *applications*, and on the other hand that the quality of a university is also measurable by the quality of its students. By contrast, in a continental European university there is a consensus which goes back to the emancipation movements of the 1960s that there is a *right* to higher education and that, ideally, the admission process should avoid early selection. While in the latter case the relationship between a student and the university is viewed as regulated by a *law* that stands above both of them, which lends a certain anonymity to the relationship, in the former case a student is tied to the institution by an individual *contract*.

That makes it a matter of a decisive socio-cultural difference, which also has consequences for the question of tuition fees because in an academic context dominated by the public sector, fees are at best tolerated as an *administrative tax*, whereas in an understanding of the relationship between students and university covered by private contracts, fees ideally represent the *main source of funding* for the university. Accordingly, the question of the appropriate amount of tuition fees, which is on the agenda in both models, can be read against the background of historic and cultural lines (Thelin 2013; Krause 2008).

Such an asymmetry in the relationship between the students and the institutions bears two important consequences. First, universities that can select their students, like Anglo-American universities, operate in a global "education market," one based on the dialectic between supply and demand, and which is guided far more by the Invisible Hand than classical European universities without selective admissions (Roth 2016: 210–213). Second, in the Anglo-American approach more value is attached to the quality of teaching (best teaching awards, etc.), whereas in the continental European approach the term "excellence" is almost exclusively attached to research achievements. Although the Bologna reform took aim at teaching, the recent unilateral shift to the focus on research in European university discourse means that teaching plays an ever-shrinking role.

Our global university landscape, therefore, consists of two academic cultures with an asymmetric interest in one another. Not only at the level of institutional leadership but also among professors as well as students, the *outgoing* movement toward the Anglo-Saxon world is much more significant than the *incoming* movement toward continental Europe (Habicht 2008: 138; Standifird 2005: 240). As a scholarly community, we seem to be much more interested in the Anglo-American system than they are interested in us (cf. Wildavsky 2012, which does not even mention the effects of the Bologna reform, if any). Universities in the UK and in the US do not have the impression that they can learn much from us, while we still entertain the mythical notion that the Anglo-American system is made up only of Yale and Cambridge, and not also of the community colleges or the hundreds of British institutions of higher education where little research takes place. This asymmetry is easily explained: in Anglo-American academic culture an institutional turn never took place, because with their upkeep of the campus model of a university among other reasons, they have remained true to their self-understanding as an endowed " academic city" with its own branding.

The critical university

Thus, over the last 15 to 20 years a renegotiation of the higher-education landscape has taken place that has put the European university at the center of society's attention, but has sowed uncertainty in the scholarly community. In this section, I would like to present the "critical university" as an answer to the challenges encountered by our slightly disenchanted European university (Loprieno 2016).

The university's release into autonomy and the "societal turn" have blurred the rigid distinction between academic and political responsibility. If this separation was traditionally not only clear but also a source of identity, the professionalization of the leadership structures of a globalizing university has brought about a form of neo-politicization, a new dialectic between state and university that, in contrast to the rise of *politics in the university* that followed the 1968 movement, is characterized by the rise of *the university in politics*. How else can one assess the omnipresent declarations in the media from rectors' conferences, science boards or national promotional agencies about the most important topics on the academic agenda? Although university charters generally provide for a clear separation between strategic (a board of trustees or a similar oversight body) and operational (president or rector's office) leadership, it would be difficult to claim that the office of a university's rector, as it is newly defined, does not require any political presence. The strategic clarity that the university expects, along with the administrative accountability, lead directly to debates in civil society, in economic life, and in the political arena (Dörre and Neis 2010).

The university as an engine

The university structure that thus results is no longer set up solely by the law, but much more by the congregation of academic peers, public responsibility and private stakeholders. Together they develop the university project, in which the process, if not the goal of scholarly action, can be steered. As a result, the university acts more as an engine than as a company. In an engine, it is the driving process itself (as in the turning of a motor, or the production of knowledge in a university) that provides identity, whereas in a company (in the sense of a firm) processes are primarily justified by the intended results, which demand a certain organizational skill from the leadership and management. Because the university culture functions like an engine, and the motivation of its members is anchored in the mesh of the organization itself (Pellert 2016), the culture has an allergic reaction to disturbances from the outside, just like a motor that suddenly receives a different kind of fuel (cf. Kleimann 2016).

One model for examining the contemporary university's societal turn and the self-understanding of the new university both in competition and in civil society is the idea of a "critical university," in which the adjective "critical" is understood to refer not to *criticism* but to *critique*. The critical university lives with the contradictions of its position at the junction of local responsibility and global scholarship, and does not commit itself to a single priority, but rather to flexible priorities that are constantly being renegotiated. It does not define academic excellence as its sole goal (at least not in all cases), but instead combines, according to the context, academic and societal concerns. For that reason it needs leadership that does not artificially simplify the institutional differences by professing its commitment solely to the paradigm of the world-class university, but rather regards precisely the variety of its strategic emphases and commitments as institutionally constitutive. Naturally, leading an open mechanism whose complexity also constitutes part of its beauty presents a fairly challenging task because its decision-making process takes place *ad hoc* (Mintzberg 1989; Waterman 1993). Regardless of its size, the critical university remains a transparent engine, whose wheels turn, not to process products, but to develop knowledge (Shun and Kehm 2013).

A university that is critical (and self-critical) in this sense contributes to overcoming the dichotomy between excellence and relevance because the question of its reputation is constantly posed anew, with regard to the contextual conditions in which it operates. Does a quantitatively sub-critical university earn the status of excellence because it has submitted an outstanding project? Or does excellence only exist above a certain critical mass? This question cannot be answered according to absolute criteria, but rather only in dialectic. However, it also requires a commitment to upholding unique local characteristics (linguistic, economic or cultural) that is not sacrificed to a one-sided adoption of the model of the world-class university.

Therefore: research excellence, yes; illusion of excellence, no (Kaube 2009). The positioning of the European university at the junction of scholarship and society has far-reaching consequences for its administration as well, for which the academic and administrative responsibilities are not separated (academy $\neq$ administration as two separate spaces) but instead take the stage interlaced in a productive third space (Whitchurch 2013).

TOWARDS A EUROPEAN CRITICAL UNIVERSITY

A model of the "critical university" shaped by the Anglo-Saxon approach comes from the pens of Geoffrey Boulton and Colin Lucas, and was published several years ago by the League of European Research Universities (Boulton and Lucas 2008). The authors argue for a university that understands how to take up a globalized inheritance of Newman and Humboldt, while increasingly engaging with the utilitarian thinking of its societal and political governance. They challenge universities to position themselves in terms of their values, not just in terms of their needs, and argue for focusing university training on transferable skills that can be applied to a broad spectrum of circumstances and phenomena. They question the highlighting of innovation, whereby they understand the term not only in its economic dimension but also in society's use of reflexive creativity that is especially offered by the humanities and the social sciences, particularly in their current process of transformation. Finally, they hold the position that precisely because of their common values, the universities could take up a mediating role in supporting intercultural understanding in the process of globalization.

This argument is Anglo-Saxon in that it strongly presumes the model of a self-governing institution, which actually never existed in continental Europe, and in England (except for classical institutions such as Oxford and Cambridge) has not existed since the 1980s (Finlayson and Hayward 2012). With financing from third parties – whether the source is public or private – the role and the desires of groups with claims to shape the institution are relevant and must therefore be taken into account in the critical university. The institutional turn cannot overlook the fact that the European university remains a public institution that actively seeks out the private sector. Boulton and Lucas are correct when they emphasize the holistic character of the university and its inherent contradictions, but they fall short of the mark when they make an appeal – understandable in purely academic terms – for autonomy without addressing the burdensome accountability. However, accountability only appears burdensome to us because the university has to account for itself among the tension between the two overlapping logics of global economic competition on the one hand and local social relevance on the other, while also receiving mixed signals from its oversight bodies. The more successful the efforts to secure private financing, the less oppressive the public accountability.

As a result, unconditional adaptation to the model of a world-class university privileged by the rankings hardly presents a realistic solution for the European university. Although there can be no doubt that the Great American University holds the hegemonic commanding heights at the global level (for the cultural aspects cf. Cole 2010; for the organizational theory cf. Manning 2013), the context is different for autonomous but publicly supported European universities. Universities such as the American and English academic institutions that can select their students, can and/or must get ahead in a more direct way in the education market than universities that are guided by the idea of open admissions (Roth 2016: 210–213). As a result, the first model of a university is more sustainable than we think. In contrast to continental Europe, the current problems of American universities rather affect the economic aspects, such as financing studies, than the internal make-up of the institutions (Zusman 2005). But unconditional adaptation of all European institutions of higher education to the linguistic or the educational theory characteristics of the global academic market is thus neither possible nor desirable (cf. Ritzen 2011).

For academia, but also for the national economies of European countries, it is extremely important that in every national system of higher education some research universities operate as global players and attain top positions in the global competition. In the sense of economies of scale, such institutions should demonstrate a critical mass, which can be attained by mergers if necessary. France's higher-education landscape has already provided successful examples (Bennetot Pruvot et al. 2015). But it is equally important to support institutional variety with high-quality education outside the model of the world-class university; universities that use the global horizon of their academics to make a contribution in their local context without having to be ashamed of their research achievements that would be sub-critical in global competition (Warden 2014). After the loss of the old narrative of homogeneity, the European university should also be viewed as a school of interconnectedness (van Schalkwyk

2015). Since the socialization of the university and the resulting orientation toward sometimes incompatible expectations means that it is no longer led by a unifying theory, it must view precisely the limitations of its instable situation as a newly cohesive characteristic. Independent of their positioning in the rankings, European universities should therefore use their own qualitative unique characteristics to find an appropriate positioning in the quadrants of Table 1, a positioning that manages to productively unite their scholarly potential with their social context.

REFERENCES

Amaral, A., Tavares, O., Santos, C. (2012). "Higher Education Reforms in Europe: A Comparative Perspective of New Legal Frameworks in Europe," in Curaj, A., Scott, P., Vlasceanu L., Wilson, L. (Eds.), *European Higher Education at the Crossroads. Between the Bologna Process and National Reforms*. Heidelberg: Springer, pp. 655–673.

Banscherus, U, Himpele, K., Keller, A. (2012). *Gut – besser – exzellent? Qualität von Forschung, Lehre und Studium entwickeln. Materialien aus Hochschule und Forschung*. Bielefeld: Bertelsmann.

Bennetot Pruvot, E. & T. Estermann, T. (2015). Define thematic report: funding for excellence. Brussels: EUA.

Bennetot Pruvot, E., Estermann, T., Mason, P. (2015). Define Thematic Report: University Mergers in Europe. Brussels: EUA.

Bogumil, J., Burg, M., Heinze, R. G., Gerber, S., Gräf, I.-D., Jochheim, L., Schickentanz, M., Wannöffel, M. (2013). *Modernisierung der Universitäten. Umsetzungsstand und Wirkungen neuer Steuerungsinstrumente.* Berlin: edition sigma.

Boulton, G. & Lucas, C. (2008). What are universities for? LERU.

Bröckling, U. (2009). Von den Exzellenzen zur Exzellenz. Genealogie eines Schlüsselbegriffs. *Forschung und Lehre* 5, pp. 250–251

Bugandwa, D. & Lowe, R. L. (2010). A content analysis of European Universities' mission statements, in 13th Toulon-Verona Conference "Organizational Excellence in Services". Coimbra: University of Coimbra, pp. 91–107.

Christensen, C. M. & Eyring, H. J. (2011). *The Innovative University: Changing the DNA of Higher Education*. San Francisco: Jossey-Bass.

Cole, J. R. (2010). *The Great American University: Its Rise to Preeminence, Its Indispensable National Role, Why It Must Be Protected*. New York: Public Affairs.

Cortese, A. D. (2003). "The Critical Role of Higher Education in Creating a Sustainable Future." *Planning for Higher Education* 15, 15–22.

Cremonini, L., Benneworth, P., Dauncey, H., Westerheijden, D. F. (2013). "Reconciling Republican 'Égalité' and Global Excellence Values in French Higher Education," in Shin & Kehm (Eds.). *Institutionalization of World-Class University in Global Competition*, pp. 99–124.

Dörre, K. & Neis, M. (2010). *Das Dilemma der unternehmerischen Universität. Hochschulen zwischen Wissensproduktion und Marktzwang*. Berlin: edition sigma.

Duderstadt, J. J. (2000). *A University for the 21st Century*. Ann Arbor.

Finlayson, J. G. & Hayward, D. (2012). Education toward heteronomy: a critical analysis of the reform of UK universities since 1978, https://libcom.org/history/education-towards-heteronomy-critical-analysis-reform-uk-universities-1978.

Fraenkel-Haeberle, C. (2014). *Die Universität im Mehrebenensystem. Modernisierungsansätze in Deutschland, Italien und Österreich*. Jus Publicum 226. Tübingen: Mohn Siebeck.

Gläser, J. & Weingart, P. (2010). "Die Exzellenzinitiative im internationalen Kontext," in Leibfried, S. (Ed.), Die Exzellenzinitiative. Zwischenbilanz und Perspektiven, Forschungsberichte BBAW, Band 24. Frankfurt am Main, pp. 233–258.

Habicht, H. (2009). *Universität und Image. Entwicklung und Erprobung eines stakeholderorientierten Erhebungsinstrumentariums*. Heidelberg: Springer.

Hazelhorn, E. (2011). *Rankings and the Reshaping of Higher Education: The Battle for World-Class Excellence*. London: Palgrave Macmillan.

Heuermann, H. (2000). *Wissenschaftskritik. Konzepte – Positionen – Probleme*, Tübingen–Basel.

Jarausch, K. H. (2008). “Demokratische Exzellenz? Ein transatlantisches Plädoyer für ein neues Leitbild deutscher Hochschulen.” *Denkströme. Journal der Sächsischen Akademie der Wissenschaften*, 1, pp. 35-52.

Kaube, J. (2009). *Die Illusion der Exzellenz. Lebenslügen der Wissenschaftspolitik*. Berlin: Klaus Wagenbach.

Kehm, B. M. (2013). “To Be or Not To Be? The Impacts of the Excellence Initiative on the German System of Higher Education,” in Shin & Kehm (Eds.), *Institutionalization of World-Class University in Global Competition*, pp. 81–98.

Kleimann, B. (2016). *Universitätsorganisation und präsidiale Leitung. Führungspraktiken in einer multiplen Hybridorganisation*. Wiesbaden: Springer.

Kohmann, O. (2012). *Strategisches Management von Universitäten und Fakultäten. Schriften zur Unternehmensentwicklung*. Wiesbaden: Gabler.

Krause, N. (2008). *Die Debatte um Studiengebühren. Systematische Rekonstruktion eines rapiden Meinungswandels*. Wiesbaden: VS Verlag für Sozialwissenschaften.

Lauer, G. (2013). “Die digitale Vermessung der Kultur. Geisteswissenschaften als Digital Humanities,” in Geiselberger, H. & Moorstedt T. (Eds.). *Big Data. Das neue Versprechen der Allwissenheit*. Berlin: Suhrkamp, pp. 99–116.

Loprieno, A. (2016). *Die entzauberte Universität. Europäische Hochschulen zwischen lokaler Trägerschaft und globaler Wissenschaft*. Wien: Passagen Verlag.

Lüthje, C. (2008). Der Prozess der Innovation. Die Einheit der Gesellschaftswissenschaften 141. Tübingen: Mohr Siebeck.

Manning, K. (2013). *Organizational Theory in Higher Education. Core Concepts in Higher Education*. New York: Routledge.

Marcinowski, F., Kohring, M., Friedrichsmeier, A., Fürst, S. (2013). Neue Governance und die Öffentlichkeit der Hochschulen, in Grande, Jansen, Rip, Schimank, Weingart (Hg.). Neue Governance der Wissenschaft. Bielefeld: transcript Verlag, 257–287.

Masschelein, J. & Simon, M. (2010). *Jenseits der Exzellenz. Eine kleine Morphologie der Welt-Universität*. Zürich: diaphanes.

Mazzucato, M. (2013). *The Entrepreneurial State. Debunking public vs. private sectors myths*. London: Anthem.

Mintzberg, H. (1989). *Mintzberg on Management: Inside Our Strange World of Organizations*. New York: Free Press.

Müller, U. & Bischof, L. (2015). Über die Grenzen des traditionellen Hochschulverständnisses. Plädoyer für einen “erweiterten Hochschulbegriff”, *die hochschule* 1, pp. 132–143.

Pattnaik, P. N. & Pandey, S. C. (2014). “University Spinoffs: What, Why, and How?” *Technology Innovation Management Review* 12, 4, pp. 44–50.

Pellert, A. (2016). “Management in Wissenschaftsorganisationen. Chancen und Grenzen der Führung in Expertenorganisationen,” in Lemmens, M., Horváth, P., Seiter, M. (Ed.), *Wissenschaftsmanagement. Handbuch & Kommentar*. Bonn/Berlin/New York: Lemmens.

Peter, T. (2015). “Exzellenz. Zur genealogischen Rekonstruktion einer Rationalität,” in Banscherus, Engel, Mindt, Spexard, Wolter (Eds.), Differenzierung im Hochschulsystem. Münster: Waxmann, 129–144.

Reichert, S. (2009). *Institutional Diversity in European Higher Education. Tensions and challenges for policy makers and institutional leaders*. Brussels: EUA.

Ritzen, J. (2011). *Eine Chance für europäische Universitäten*, Würzburg: Königshausen & Neumann.

Ritzen, J., Marconi, G., Sasso, S. (2014), University Policy Needs to Beef Up For Europe To Be More Innovative. Brussels: EEU Report November 2014.

Roche, M. (2014). *Was die deutschen Universitäten von den amerikanischen lernen können und was sie vermeiden sollten*. Hamburg: Felix Meiner.

Roth, A. E. (2016). *Wer kriegt was und warum? Bildung, Jobs und Partnerwahl: Wie Märkte funktionieren*. München: Siedler Verlag.

Shin, J. C. (2013). "The World-Class University: Concept and Policy Initiatives," in Shin & Kehm (Eds.), *Institutionalization of World-Class University in Global Competition*, pp. 17–32.

Shin, J. C. & Kehm, B. M. (2013), *Institutionalization of World-Class University in Global Competition*. Dordrecht: Springer.

Sporn, B. (1992). Universitätskultur. Ausgangspunkt für eine strategische Marketing-Planung an Universitäten. Wirtschaftswissenschaftliche Beiträge 56. Heidelberg: Physica-Verlag.

Standifird, S. S. (2005). "Reputation among peer academic institutions: An investigation of the US news and World Report's rankings." *Corporate Reputation Review* 8, 3, pp. 233–244.

Stokes, D. E. (1997). *Pasteur's Quadrant. Basic Science and Technological Innovation*. Washington DC: Brookings Institution Press.

Swiss Academies (2014). Förderung der Geisteswissenschaften in der Schweiz im Zeitraum 2002–2012. Reports 9, 3, 2014.

Thelin, J. R. (2013). *The Rising Costs of Higher Education. A Reference Handbook. Contemporary World Issues*. Santa Barbara: ABC CLIO.

van Schalkwyk, F. (2015). "University Engagement as Interconnectedness: Indicators and Insights," in Cloete, Maassen, Bailey (Eds.), *Knowledge Production and Contradictory Functions in African Higher Education*. Cape Town: African Minds, pp. 203–229.

Vendler, Z. (1967). *Linguistics in philosophy*, Ithaca: Cornell University Press.

von Oetlinger, B. (1999). "Wie kommt das Neue in die Welt? Beitrag der Geisteswissenschaften zu Innovationen," in Meyer-Krahmer, F. & Lange, S. (Eds.), *Geisteswissenschaften und Innovationen. Technik, Wirtschaft und Politik 35*. Berlin-Heidelberg: Springer Verlag, pp. 66–74.

von Schnurbein, G. & Egger, P. (2013), Innovation statt Stagnation. Foundation Governance 10. Basel: Verlag Helbing Lichtenhahn.

von Wissel, C. (2007). *Hochschule als Organisationsproblem. Neue Modi universitärer Selbstbeschreibung in Deutschland*. Bielefeld: transcript Verlag.

Walsh, T. (2011). *Unlocking the Gates: How and Why Leading Universities Are Opening Access to Their Courses*. Princeton University Press.

Warden, R. (2014). "Engaged universities contribute to economic development." *Universities World News* 344.

Washburn, J. (2011). *Academic Freedom and the Corporate University*. American Association of University Presidents.

Waterman, R. H. (1993). *Adhocracy: The Power to Change*. New York: W. W. Norton & Company.

Whitchurch, C. (2013). *Reconstructing Identities in Higher Education: the Rise of "Third Space" Professionals. Research into Higher Education*. London: Routledge.

Wildavsky, B. (2012). *The Great Brain Race. How Global Universities Are Reshaping the World*, Princeton 'University Press.

Wilkesmann, U. & Schmid, C. (2012). *Hochschule als Organisation*. Wiesbaden: Verlag für Sozialwissenschaften.

Wodak, R. (2010). "'Von Wissensbilanzen und Benchmarking'. Die fortschreitende Ökonomisierung der Universitäten. Eine Diskursanalyse," in Diaz-Bone, R. & Krell, G. (Eds.), *Diskurs und Ökonomie. Diskursanalytische Perspektiven auf Märkte und Organisationen*. Wiesbaden: Verlag für Sozialwissenschaften, pp. 317–335.

Zimmerli, W. C. (1998). "'Nicht nur für die Wissenschaft, sondern auch für das Leben ... ' Alte Aufgaben der Universität im Licht eines neuen Europas," in Rusterholz, P & Liechti, A. (Eds.), *Universität am Scheideweg: Herausforderungen, Probleme, Strategien*. Zürich: Hochschulverlag, pp. 113–137.

Zusman, A. (2005) "Challenges Facing Higher Education in the Twenty-First Century," in Altbach, P. G., R. O. Berdahl, P. J. Gumport (Eds.), *American Higher Education in the Twenty-First Century. Social, Political, and Economic Challenges*. Baltimore: Johns Hopkins University Press, 2nd ed., pp. 115–160.

Short Biography

The Egyptologist Antonio Loprieno (born 1955) is Professor of the History of Institutions at the University of Basel and Chairman of the Austrian Science Board. Important stops in his academic career include the University of Göttingen, the University of Perugia, and the University of California Los Angeles (UCLA), followed by his appointment in Basel in 2000. From 2006 to 2015 he was Rector of the University of Basel and President of the Swiss Rectors' Conference. His research interests include ancient Egyptian languages and culture, the history of writing, and academic management.

This report is originally published in German and has been translated into English.

10.

THE HAPPY SISYPHUS: WISHES AND REALITY AT AUSTRIA'S UNIVERSITIES[1]

Oliver VITOUCH

ABSTRACT

The demands that are placed on Austrian universities and their provisioning – according to the number of students – should be brought into alignment. The historical demand of the mythical "free and open access to higher education," combined with the real and chronic underfinancing of higher education, has led to highly suspect conditions not only in terms of the quality of education, graduation rates, and social permeability but also with regard to the ability to meet international standards and face international competition. Capable universities are a key factor for innovation, economic and societal dynamism, and prosperity. The courageous political will for systemic change is needed, with the goal of bringing Austria's universities to the front ranks of the best public universities in Europe. In this task, equality of opportunity and orientation around achievement are core aspects. The suitable steps are an urgently needed means to secure Austria's future.

Honored Vice-Chancellor, honored General Director, dear and honorable guests!

Allow me to get straight to the point: *This year there are good political resolutions about a fundamental reform in university financing.* This should, step by step, bring the demands placed on Austrian universities into alignment with how they are provisioned. The key phrases are capacity orientation, financing for university places, and excellence program.

As a cognitive psychologist, I can tell you numerous reasons why New Year's resolutions fail so often. They include unclear goals, giving up after setbacks (that is, a lack of resilience) and a lack of focus on the positive elements of a successful undertaking. Health psychology differentiates its diagnostics among unmotivated, motivated and acting, each of which needs a specific kind of support; and I am convinced that Austrian government policy is at the very least highly motivated.

We are in competition for the future. A key factor in this competition, with regard to innovation and economic performance, as well as with regard to social cohesion, are internationally leading, creative, pulsing universities. One did not always get the impression that this was clearly recognized in Austria. But now, to quote Reinhold Mitterlehner from a year ago today, it has been intellectually grasped, and we

---

[1] Speech of the President at the New Year's reception of Universities Austria (uniko), Vienna, January 12th, 2017 (Headquarters of Raiffeisen Zentralbank Österreich, RZB).

must succeed in the implementation. "When wishing still helped … ," yes, that was nice; but just wishing will not move Austria forward. And we cannot allow ourselves to treat urgent questions about the future like pious and patient New Year's resolutions. We must take action together, with clear goals, without allowing ourselves to be led astray by defeats, and with clear focus on the improvements that will thus be achieved – improvements not for their own sake, but for the young people of this country and for their future.

The goal is clear. In Austria, we do not just want to win medals in skiing, but we want to win Nobel Prizes, Fields Medals, Turing Awards and the equivalent of Pulitzer Prizes again. We want to be allowed to be as good as the University of Utah or Arizona State University, or as the universities of Copenhagen, Uppsala, Oslo, Aarhus or Groningen. If the key to real estate is "location, location, location," then for universities it is "quality, quality, quality." We need the best minds to give our students the best opportunities and, *plus est en vous*, to support and challenge them to do their best. *I have a dream:* I want our universities to be able to measure themselves against the best public universities in the world.

As the president of Universities Austria one feels occasionally reminded of the myth of Sisyphus. Yes, I know, *Il faut imaginer Sisyphe heureux:* "We must imagine Sisyphus as a happy person," as Camus said in existential absurdity, and the task is thus guaranteed to be exhausting and time-consuming, an enviably secure job. But occasionally one has a strong desire that just once a pebble would stay at top. The task in Austria is so Sisyphean because there are holy cows and dogmatic concepts that few people are willing to disturb. One of these is the promised "free and open access to higher education," a true Austrian particularity. While this open access was absolutely right in 1972, and has superbly fulfilled its purpose of opening the universities, wish and reality have in the meantime drifted further and further apart because the gap between provisions for the universities and the enormous increase in the number of people earning the university-entrance diploma (Matura) and matriculating has constantly widened, which continues uninterrupted up to today. Today, 45 years later, one must actually speak of "allegedly open access," because access in many areas is no longer open, or about "actually existing open access" ("real existierender offener Zugang"), because in the places where it does still exist, it produces inconceivable conditions for studying and working, along with horrendous drop-out rates. To top it all off, it works in a socially selective fashion. Bad conditions for studies can be tolerated relatively better by the self-confident, well-positioned children of university graduates. Free and open access to higher education has, *frustremus igitur*, degenerated into wild, desiccated access to higher education. One pretends that we still have it, like a child who puts his hands in front of his face while playing hide and seek and thinks he cannot be seen. One reason for this is that even today, the phrase is an example of brilliant political framing. "Open access" sounds inimitably welfare and good; every alternative can only turn into "hurdles" and "limitations." *There is no alternative.*

The New Year is not only a time for good resolutions, but also for a New Year's Presidential Address. For want of a Federal President – but that is another story –

I will quote instead from Heinz Fischer's farewell address from July 8th, 2016. "Change is often uncomfortable, painful, and stressful. Change can initially evoke fear and discomfort. But foregoing change can be far more painful."

In a quiet Sisyphean hour, when the boulder starts to roll back down toward the valley, I sometimes tend toward satire. I will give you two recent examples. The first says that there is no cause for unease:

Fortunately, we are so much cleverer than the other countries. They think that it takes solid budgets, targeted investments and structured conditions to make universities successful. But in Austria we know that it can also be done much more cheaply, much more arbitrarily and much more chaotically, because we are so clever. I'd like to see anyone else do that!

The other is something in the way of an allegory:

January 2017: The Austrian federal government has declared that "free access to the train system" is one of its top priorities. From the presentation to the cabinet: "In the future, every Austrian should be able to reach every destination in the country securely, comfortably, reliably, in an exemplary ecological fashion, but above all, free of charge." No more tickets will be sold; however, capacities will not be extended – that would break the budget.

I hope you have a great time with this fictional new Austrian train system: Enjoy life to the fullest! If you have to get reliably from point A to point B, just don't take a train anymore. You will reach your destination someday – although to be precise, that only applies to less than 50 percent of the passengers. For the sake of simplicity, those numbers do not include the passengers who already leave the train at the first few stations. (This begs the question: what is everyone's business in Amstetten?)

Looking back, almost 50 years after its introduction, by no means will anyone be pleased with the results. However, there is supposedly no alternative to the system, based on fundamental considerations. From 2019 to 2021, capacities are planned to be increased by 1 percent per year; but perhaps it will only be possible to keep up with inflation.

Holy cows live longer, and change is not easy – truly Sisyphean tasks. Politics, however, is a matter of dauntlessly doing what one has recognized as right. The facts can be readily stated:

- It is not enough to look at the input – the number of people beginning university studies. What matters is the output – the number and composition of the graduates, and their qualifications.
- The three variables of financing, the number of students, and quality – the quality of the entire spectrum of what a university provides – have a simple causal relation, which cannot be set aside even in Austria; unless of course we have in fact discovered the *perpetuum mobile*, in which case we are saved. It is a matter of adjusting the first two parameters – financing and the number of students – in such a way that quality and international competitiveness improve. Otherwise, the way to becoming innovation leaders will remain something for Alpbach and Maria Zell: nice speeches and pious beliefs.
- The financing gap in comparison with relevant states and countries, such as Bavaria or Switzerland, is only too well known. The Technical University of Vienna compared with the Technical University of Munich and ETH Zurich, or the University

of Vienna compared with the LMU Munich and the University of Zurich have lower funding per graduate by a factor of 1.3 to 5, and lower funding per student by a factor of 2 to 9. Just the annual budget of ETH Zurich, not counting third-party finance, equals 44 percent of the total annual budget of all 21 Austrian universities. Switzerland spends almost twice as much for its universities as Austria – with half as many students.

- We live in an age of global rankings. The new president of the Austrian Science Fund (FWF), Klement Tockner, put it succinctly: It is not just a matter of rankings as a benchmark, but rather quite clearly of the contents. What are the countries and universities doing that are high up in the rankings? What are they doing in terms of admissions and support for students, of financing, of support for research, of the academic climate, and so forth? What are the causes, the decisive factors of success? Instead of staring at rankings like a rabbit hypnotized by a snake, and chronically relapsing into complaining about our national woes, we should devote ourselves to those cardinal factors that make universities strong and successful innovators. Some of those are already realized in Austria (autonomy, for example), but for others we are stuck taking baby steps.

The goals and measures can also be readily listed. A concrete budgetary path, in the sense of a plan of steps, is required to actually attain the oft-mentioned goal of 2 percent of GDP for the tertiary education sector. Demand and provisioning must find a balance – as has been the case at universities of applied sciences since forever. The mutual commitments between a university and its students must increase. On the side of the university, that extends to a duty of care for all of the students who are admitted, so that they have a high probability of completing their studies. The university management needs the authority to limit the number of entrants in areas of studies where, as a result of lack of capacity, it is an urgent necessity. And yes, they are capable of doing this responsibly, and the state is capable of exercising oversight influence, if it offers tuition-free studies. Anything else is economically outrageous.

In these measures, it is also necessary to counteract social selectivity – for example by rewarding universities for doing that effectively. The list of first-generation students (or first academics) with fantastic careers is long: from William G. Bowen, who died in October 2016 at the age of 83, who opened up and modernized Princeton University, and who wrote a work of reference on affirmative action, to Minister of Education Sonja Hammerschmid. There is no reason not to let this list grow even longer, with encouragement and creating opportunity through support.

Our universities should be exciting, internationally attractive places. Nobody gains anything from stale universities that are paralyzed by their conditions – financing and number of students. They are not intellectually absorbing, they attract nobody, they improve no competitiveness, they strike no innovative sparks, they do not make us better people. Ladies and gentlemen, *I want ours to be the rooms where it happens* – not just in Berkeley, Berlin, Basel, Mumbai, and Beijing. We have to be hungry for knowledge, curious, and visionary, not slack, overrun, and condemned to eternal mediocrity. Beyond the many idealistic and socially effective tasks that universities have by definition, it is also a matter of qualification, skill, and creativity. In the long run, it is true that "If the universities are doing well, the economy is doing well." And in an age of globalization, digitalization and automation, that is the truth squared.

Finally, I would like to add a word about the ups and downs of private universities in the Austrian style, which are at present under public discussion. The announced medical program in Mürzzuschlag, a fig-leaf branch of the Ukrainian *Bukovinian State Medical University* in Czernowitz, with tuition of € 18,000 per year, is a clear warning sign. Let me say it bluntly: Such projects damage the term university just as much as the reputation of universities in Austria. The Austrian Science Board (Österreichischer Wissenschaftsrat) has made that clear with its latest recommendations. The Law on Private Universities[2] needs a fundamental revision in terms of the questions of financing and quality control. If it says "private" on the outside, it should also be private on the inside (and not public funds from states and localities); and if it says "university" on the outside, it must also be a university on the inside – with research at the international level, and I can think of more suitable regions for comparison than the Bukovina.

I have reached the end, and instead of a synopsis, I offer a New Year's riddle: who wrote the following lines?

The greatest treasure of a country is the knowledge and capabilities of its people. For that reason, one of the most important tasks of politics is to support the talents of young people with the best possible education and training. That lays at once the foundation for an economy that is dynamic, innovative, and future-oriented, which is indispensable for our economy's competitiveness, for new jobs, and for our welfare system.

[. . .]

Our universities are ailing from chronic underinvestment, from unregulated admissions management, which has led to inadequate conditions for studies, and from excessive bureaucratization.

Moving our universities and our research landscape upward to the top of the international table must become a national core task. For that, we need an efficient way to manage university places, a system of scholarships that is tied to achievement while being socially just, as well as sufficient additional funding.

[. . .]

Increased support for science and research is long since in the interest of everyone's future.[3]

This text is not from my predecessor Sonja Hammerschmid, or her predecessor Heinrich Schmidinger, or perhaps from Christoph Badelt or Hans Sünkel. It is from Hannes Androsch, Chairman of the Austrian Council for Research and Technology Development (Rat für Forschung und Technologieentwicklung), a council established by law to advise the federal government.

I am compelled to be a steadfast optimist. The year 2017 will be an *annus mirabilis* in Austrian academic and research policy, and a formidable year for the

2 In conjunction with the Law on Quality Control for Institutions of Higher Education (HS-QSG).

3 *Vorarlberger Nachrichten,* 6/7 February 2016. The omitted sentence reads "For the fiscal years 2017–2020, at least an additional € 2 billion should thus be made available."

arts and sciences. And Hannes Androsch will still get to experience the serious, well-founded, effective and future-oriented reform of university financing.

The first miracle of the New Year has already taken place. Yesterday, the Chancellor presented a program that has changed me from an optimist by compulsion into a true optimist. If the Vice-Chancellor and Minister of Science, Research and Economy takes the same line, which I do not doubt for a moment, then I will become a glowing optimist and say, "I believe in this country." *Mr. Vice-Chancellor: Please make my year!*

I wish you a good, happy, creative, and forward-looking 2017!

Short Biography

OLIVER VITOUCH, * 1971, became Full Professor of Cognitive Psychology at the University of Klagenfurt in 2003. He served as President of the Austrian Psychological Society and as Chairman of the Senate until he took office as Rector in 2012. From 2015 to 2016, Vitouch was President of the Alps-Adriatic Rectors' Conference, a society with 48 member universities from nine European countries. He was elected President of Universities Austria in June 2016.

This report is originally published in German and has been translated into English.

11.

Austria – A Model Country in Education and Research?

Hans Sünkel

Abstract

Education and research are indisputably important elements of science and the economy, and thus of a country's society. Current developments in Austrian university education and research offer grounds for optimism. The indispensability of regulated admissions to institutions of higher education, tied to financing per admissions slot, was recognized, as was the crucial importance of basic research as a solid foundation for applied research. In the area of research, over the last 15 years Austria has made remarkable progress, including research expenditures that total more than 3 percent of GDP, thus making it one of the strongest countries in Europe. If this trend continues, and if in parallel the universities maintain comprehensive planning certainty (admissions to higher education, financing per admissions slot), then tertiary education and research will finally have arrived in the future. If these developments are accompanied by comprehensive institutionalization, by targeted acquisition of non-public funds, and above all by excellent willingness to lead on the part of the universities, then Austria has the potential to become a model country in education and research – alongside high culture, winter sports, tourism, industry, agriculture and its attractive landscape.

Introduction

Terrible war-like conditions, horrible acts of terror, a depressingly unsolved set of refugee problems, geopolitical uncertainties, turbulence in the financial markets, and more along the same lines – in light of these worrying developments, may and should one think aloud at all about topics such as the future of education and research in our country, topics such as the future of the knowledge society? Or should we instead apply all of our energy to solving the problems of the present? One may, one should – do the one and not neglect the other.

As a native Styrian, one remembers Archduke Johann not only happily and respectfully but also thankfully. He recognized early on – and, I hasten to add, in not exactly easy times – that the best investment in the future of a society is the education of its youth. He likewise recognized that sustainable progress requires research. He gave our country a future and taught us the courage to stand upright. He helped our country in its remarkable upswing and never lost sight of real conditions, thus prefiguring Theodore Roosevelt's recommendation "Keep your eyes on the stars and your feet on the ground."

CCC: COMPETENCE, COOPERATION, COMPETITION

Austria is well known as a high-wage country, and thus to remain internationally competitive we have to be at least as good as we are expensive. And being very good means working up where the air is thin at the very top of the performance pyramid. Austria should never seek its place at the base of the performance pyramid, but must exclusively aim for the position at the pyramid's peak. Products must win recognition in the global market and not just in the domestic market, and as a result products that are made in Austria must measure themselves against the best in the world in terms of quality. Austria is poor in natural resources, but rich in culture and intellect. Austria is thus well advised to compensate for its lack of natural resources with cultural and intellectual riches.

To reach this goal of a top international position, we should consciously focus on our core academic areas in teaching and research, and further strengthen the skills that we already have. And if 99 percent of global knowledge is produced outside of Austria, then that must also be reflected in the strategic orientation of Austria's university system. The former domestic market for education and research with a distinct local-to-regional orientation must be thoroughly extended to encompass the international market that is globally oriented as a matter of course. Instead of national patterns of thought, internationally aligned strategies are increasingly necessary.

Because the problems that we are entrusted to solve are constantly becoming more complex and generally also more global, cooperation across both academic and national borders is absolutely essential. Only interdisciplinarity together with international cooperation offers suitable answers to challenges that are both complex and global. What does that mean for university education and research?

A stable platform for both the common scholarly language and natural language is indispensable for interdisciplinary and international action. As a result, we will increasingly have to become attractive for students from around the world by making our academic programs top-class in their content and thematically sustainable, by working increasingly in English and by positioning them internationally. Consequently, we should understand our central tasks as including increasing the international visibility of our higher education institutions, including using academic programs to this end, and to gain international attractiveness through our curricula.

We should seek out and nourish constructive cooperation – promote complementary, high-quality developments; remove unnecessary duplications; and set aside things that may be beloved but that are no longer up-to-date. The sustainability of knowledge and skills should always have priority over simply being a know-it-all. Focusing on what is important and developing scholarly depth, lending little importance to knowledge that expires quickly, and consciously cultivating the courage not to know everything – those must be our premises, just as Goethe put it: "In limitations he first shows himself the master."

EDUCATION

Lee Iacocca, the former Ford manager and later Chrysler president, once said, "A country's competitiveness starts not on the factory floor or in the engineering lab. It starts in the classroom." That is quite correct, and the best investment that we can undertake is always investment in the education of our youth. But education does not begin in the classroom, and thus at age six with the start of compulsory schooling, and it does not take place exclusively within the walls of the schools or even the universities. The roots of education are to be found much more in early childhood, and thus in the parental home. And the cause of educational shortcoming, particularly in its social aspects, should be sought in the family, rather than just in the school. The latest remarks by our Minister of Education, Sonja Hammerschmid, on the significant educational potential in very early childhood, and consequently on massively supporting our children in pre-school age are on target, extremely positive, and ultimately encourage a justified hope that our entire educational policy will soon take a turn for the better.

At any rate, it is indisputable that the best possible education for the future of our society, and thus for our country, is fundamentally important. Recognizing this is not attributable to the West, and thus to the 4.0 Age that is evoked from all sides (and occasionally misunderstood); instead, it has its origins in the East. China, India, Persia, and above all Mesopotamia, presently so oppressed, were the breeding grounds of knowledge, in addition to Egypt and of course Greece. (On this topic, I can heartily recommend two excellent books: one by John Freely, *Aladdin's Lamp: How Greek Science Came to Europe Through the Islamic World*; and one by Jim Al-Khalili, *The House of Wisdom: How Arabic Science Saved Ancient Knowledge and Gave Us the Renaissance*.) It does not hurt at all to take a look in the rear view mirror of our society and its culture, and to will the academic question *Gaudeamus igitur* with thoughts "*. . . ubi sunt qui ante nos in mundo fuere*."

The increase of education in Europe went hand in hand with economic development and remarkable gains in power. Europe's soaring rise started very late; namely, when the power of the East began to wane. And now we are experiencing a renewed education boost in the East, although not in the Near East but much more in the Far East: a cascading, carefully put-together educational system from pre-school through university, and continuing into lifelong learning. Singapore, Hong Kong and South Korea not only represent the East Asian realm in general, they are also models of best practices that can and should be measured against.

Years ago, one would have commented on the comparison between the Far East and the West with the proverb "*ex oriente lux – ex occidente luxus*." But even this is not completely true today, because people in Southeast Asia have also in the meantime come to appreciate luxury and show it just as self-confidently – as a congenial accompaniment to education.

Can we in the West still do anything at all against the furious rise of the Far East? Yes, we can, because where danger is threatened, it is well known that the rescue also abides (to quote loosely from Friedrich Hölderlin's "Patmos Hymn"). We must cultivate our traditional characteristics, and not, so to speak, our idiosyncrasies. We should make thorough use of the strengths we have acquired: creativity, individuality, flexibility, humanity – that is, education, education and once more education as the unique feature of each of us – tied to purposefulness and diligence, much as the ancient Romans said: *ex nihilo nihil fit* – nothing comes from nothing.

Rediscovering these valuable attributes of our society – to the extent that they have already gone astray – cultivating these attributes carefully, purposefully developing them further and consciously living them in our educational system, that is our opportunity – nothing less, but also not much more. One hastens to add that to do this our educational system must set aside old burdens to gain new freedoms. (Regrettably, the problems do not so much stem from the indolence of the capable as from the ambition of the incapable.)

And let us also please not understand the knowledge of this world as the final product, but rather as valuable raw material, rather like a fired brick that can be used to erect a house of education in which people will gladly dwell. A house of education that raises the quality of our society – on all levels; a house of education that represents a foundation for social welfare and in the end offers fulfillment for each individual.

BOLOGNA – RELOADED

It is well known that the Bologna Process was intended to produce a unified tertiary education sector in Europe: comparable systems that enable, even encourage, thematic and geographic mobility. The declared goal was education and training at the highest level, without obstacles to mobility and independent of a person's social background.

The implementation of the Bologna Process followed swiftly in the 10 years following the Declaration, occasionally overly ambitious, but probably too hastily. This assessment is not from the author of this essay, and is not limited to Austria, but rather has a European dimension.

"Faster, better, cheaper" and naturally the "employability" of bachelor's graduates were the expectations of business and industry, as well as the new graduates who achieved their degrees faster. Reduced supply is, however, seldom better. What is cheaper does not necessarily improve the quality. Whoever wants higher quality must therefore generally do without one of the other two attributes.

Autonomy, reputation building, studies à la Bologna: The universities were required to make changes at almost every level at a hurried speed that hardly allowed time to take a strategic breather. If a truly massive reform such as Bologna has to take place as rapidly as possible for political reasons, and this undertaking also has to happen parallel to a restructuring of the entire university landscape, with the further condition that no additional money may be spent on it, then one should not wonder if the quality of implementation occasionally does not live up to the high expectations of the "client."

The brisk transformation of original *Magister* and *Diplom* academic programs into bachelor's and master's programs shows weaknesses here and there that have rightly been criticized by students, and which should now be cautiously remediated in order to actually reach the Bologna goals: creating a Europe-wide area of higher education with a uniform university ECTS currency to promote the thematic and geographic mobility of our students and instructors.

In many areas today, the new system has become a stiff corset that allows little space for personal development. The occasionally high degree to which curricula have come to resemble schooling, together with the shortage of freedoms, ultimately hinders the mobility that was the original goal. Thematically, as well, there are unintentional hurdles. Here and there it has even become more difficult to change locations inside one country within the same chosen subject. What happened?

It is very simple. It is the logical answer to the forced creation of profiles without agreement among the respective universities; that is, without a plan for higher education. And thus it happens that neither the universities and their students, nor business and industry, and certainly not politics consider what has been achieved as sufficient.

What Bologna therefore needs in the future: It needs a return to an open spirit that also offers a place for contradictions. It needs a return of more of the educational spirit of Humboldt – if with other methods than those of the past – and less of the whiff of the agglomerated factual knowledge of the McKinsey of today. Education, and not just knowledge reduced to facts, should be the declared educational program for the future. And above all it also needs a strategy that is clearly coordinated for all of the areas of the tertiary sector; it needs a higher education plan that should be developed together will all stakeholders and with the common declared goal: namely, that in the future people around the world, including of course Europe, will gladly and smoothly pronounce the term "Bologna."

Competition and higher-education admissions

It is already a commonplace that our future will be increasingly shaped by competition, at least within a common Europe if not further afield. To make it through this competition, arrogance is not beneficial, and meekness is not appropriate, but courage is very much required. Above all, we need a proper framework that is oriented toward international conventions.

And in competition, quality is (almost) the only thing that counts, and this has its price. Consequently, we also need adequate financial provisions for the entire system of education and research, with a judicious mix of public and public funds. The framework conditions will not, however, simply be defined by *pecunia*; instead, they will include and give the same importance to the topics of higher-education planning and admissions. These topics are simmering in the country, but they have not (yet) reached the boiling point. At any rate, the problem seems finally to have arrived in political minds.

Now the time has come not only to collect data but also to take action. And there are in fact deeds waiting to be done: access to higher education and per-student financing are the heavy boulders that have to be moved in the near future, because like any other institution a university only has a limited amount of personnel, space, technological infrastructure and of course funding.

Limited capacities, however, also allow only limited uses. As a result, limited university capacities are not compatible with unlimited access to universities. The consequences are equally simple. If the political mandate is to retain open admission to higher education, and if the quality of teaching and research should simultaneously be maintained, then the costs will increase with increasing access. In the end, however, even the state has limited financial options. Thus this "money follows student" scenario can only take place in a purported paradise and not in our real world. And so it happens that the state's spending on its universities remain largely independent of the increasing access to higher education. The moral of the story: if access increases, quality declines.

This cannot and must not be our goal, above all if we want to succeed in international competition. We must succeed, if we do not want to fall behind. Therefore, two things have to happen at the same time: regulated access to higher education and an equally regulated per-student financing (as has been the case from the very beginning for the universities of applied sciences). Emergency amendments to the laws can at best make provisional repairs to university emergencies. They are, however, completely unsuitable for setting up regulated access to higher education for the entire tertiary sector.

UNIVERSITY FINANCING

The TU Graz (which for good reasons I am glad to refer to as "my TU Graz") is often and happily compared to the ETH Zurich. Do you know the total budget for the ETH Zurich? Approximately 1.6 billion Swiss franks. For how many students? Only about 50 percent more than at the TU Graz. That produces that the sobering adjusted ratio ETH Zurich: TU Graz = 7:1 (not in a football score, but in a comparison of budgets). Need more impressive examples? Stanford, MIT, Princeton, Harvard, Yale . . . ? Policy makers and sometimes also the public think that the comparison is unfair. Why, exactly?

That our universities are strongly to dramatically underfinanced in international comparison has in the meantime become apparent to policy makers as well. Admittedly, money is not everything, but without money everything is nothing. Therefore it really is high time to rethink, even – or precisely – in economically tense and politically unstable times such as these. The USA, Switzerland, Germany, as well as the countries of the Far East offer impressive examples of this. A clear commitment by political leaders to universities is urgently necessary in our country as well.

The goal that was set by the national government years ago of 2 percent of GDP for the tertiary education sector should, therefore, be attained as quickly as possible. A vigorous effort toward the achievement of this goal would in any event be a powerful and far-reaching signal of a policy in which the future of our young people, and thus of our country, is a real concern.

CURIOSITY AND NECESSITY

If we are speaking of scholarship and research, we simply mean the exploration of the unknown. We mean moving our borders, seeking out new territory; we mean better understanding of what, at its core, holds the world together. In this endeavor, curiosity is the most sustainable driver of scholarly research. Curiosity lets us look beyond the borders, lets us discover the undiscovered, enables us to make the unknown known, and lets us understand what had previously not been understood. And this curiosity of ours, and the drive for discovery that arises from it, are in the end the motor for the further development of our entire society. I may quote Albert Einstein who, in his remarkable modesty, said that he was not particularly gifted, just passionately curious.

This curiosity that we all share therefore also lets us develop processes and build instruments that, in turn, deliver data to improve our model of the world in the hope that after every run-through of a given cycle of development the distance between model and reality will be smaller. And at once something truly remarkable happens: we have a growing recognition that the results of this development not only serve to satisfy our curiosity but they also are visibly on the verge of making our lives easier. And thus necessity quickly takes a place next to curiosity. Curiosity and necessity in the same measure become *the* drivers of research. Curiosity and necessity become formative elements of the future. And we carelessly equate curiosity with fundamentals and necessity with application, thus building a sufficient bridge between basic research here and applied research there. Basic research and applied research, hand in hand harmoniously complementing one another, are what discover and shape the future in equal measure.

In the end it is society that promotes and benefits from research, and thus shapes the future with research. Science and research no longer stand apart from society like an occupying army in enemy territory or even like a minaret in the Vatican. Quite the opposite. Try to imagine a world without science and research. We would quickly be where we were thousands of years ago: hunters and gatherers. Science and research have become an enormously important and by now absolutely indispensable element of our society and, consequently, of our entire lives. Knowledge is the number-one factor in competition, and thus the capital with by far the best dividends.

LOCATION FOR SCIENCE

A budget is the program of every institution, expressed in numbers. And the program of "research" in our country has, since the turn of the millennium, followed a remarkable course of development and undertaken a process of catching up that has brought us to the position of an innovation follower. Until the economic crisis of 2008, we were on a good path to reaching the declared goal of the European Commission of investing 3 percent of GDP in research by 2010.

In the phase of stagnation that followed, the Chairman of the Austrian Science Board, Prof. Jürgen Mittelstraß, found true words to speak at the Alpenbach Technology Symposium:

> "When times get worse and as a result resources scarcer, life forms quite naturally react by reducing almost all bodily functions. One function, however, is always preserved, namely supplying the brain with blood, and thus with oxygen. That should also hold true for research and education in a country."

Economic recovery has cautiously returned, and in recent years has been on an upward trend so that in the meantime the EC goal noted above has been attained. And our country has set its own goal of investing 1 percent more relative to the level of 2008 by 2020, which works out to a goal of 3.76 percent. That is definitely a challenging announcement, which now should be pursued forcefully.

Styria can again be taken as an example. Its expenditures have zoomed to now reach 4.9 percent of the gross regional product, a model for all of Austria and in the absolute top ranks of all European regions. One hastens to add that business and industry contributed approximately 70 percent of all research expenditures.

And so our Austrian research rejoices in solid financial budgeting, as it concerns the field of applied research. Basic research, by contrast, has a great deal of room for improvement in its financing. The economic successes of basic research are by their nature long-term and contain an intrinsic element of calculated risk. But whoever invests too little in the basics will very soon not have anything to apply. For that reason, the field of basic research is entirely the wrong place for the all-too-common reflexive call for "return on investment."

"Research, technology and innovation are the preconditions for growth and employment. The Austrian government has thus set the ambitious goal of becoming one of Europe's innovative countries by 2020. The path to being an innovation leader requires considerable additional engagement." So states the introduction to a decision of the Council of Ministers of 8 November 2016. Science Minister Mitterlehner was clearly aware of the need for significant additional funds for basic research in our country, and as a result called on the Council of Ministers to appropriate an additional sum of € 281 million for the 2018–21 period.

The Austrian Science Fund (FWF) reacted quickly to this proposal and, supported by this very positive budgetary perspective, formulated strategic plans for the next few years that were clearly understandable and agreed on by all stakeholders. Just the prospects of significant additional funding, which for the FWF mean successive overall budget increases from the current € 184 million to € 290 million in 2021, have led to a general sense of elation within the scientific community. As soon as this announced increase is actually reflected in the federal budget, it will presage a very future-oriented approach to financing basic research in our country, one that finally provides a stable platform that all of the applied research, followed by development and application, and thus innovation in our country, can depend upon.

If the financial input for science and research is then answered by scientific output at the same level, we will definitely be on a successful course, and will have arrived as one of the world's attractive locations for science. A location for education and research that does not develop the misguided ambition of being excellent in every possible field (something no location can be, let alone a relatively small country such as Austria), but rather a scientific location that really is the best in the world in some fields while simultaneously offering a very good overall platform of education and research. A location for science that furthermore possesses numerous attributes that are attractive for excellent scientists and for innovative industries in equal measure.

And if the Styrian Research Council defines its vision as "Styria as a model region for education, research and education," then that is not just an expression of self-confidence, but much more a clear qualitative conception of goals that were developed to showcase one state, but which are well suited to being extended to all of Austria.

We only have to will it, and for this declared will to be clearly articulated, decisively pursued with an upright zeal that knows neither arrogance nor abjection, but which is borne by courage. And taking this common courage in both hands – that is what we should all do together, for the benefit of our country, our society and our future.

References

Der Wissenschaftsfonds FWF (2016). Strategische Vorhaben 2017 – 2020.

Österreichische Bundesregierung (2017): Für Österreich – Arbeitsprogramm der Bundesregierung 2017/2018, Vienna.

Sünkel, H. (2009). "Wissenschaften machen." In: *Wissenschaften Machenschaften – Gespräche zwischen Forschung und Öffentlichkeit*. (Ed.: E. Pernkopf, J. Rauchenberger), Königshausen & Neumann, Würzburg., pp. 65–72.

Sünkel, H. (2010). "Die österreichischen Universitäten in bewegten Zeiten." In: *Steirisches Jahrbuch für Politik 2009* (Ed.: Verein für Politik und Zeitgeschichte in der Steiermark), schnider's offene gesellschaft, Graz, pp. 167–174.

Sünkel, H. & Mössler, M. (2012) "Bildung, unser aller Zukunftsressource: Die Österreichische Universitätenkonferenz, ein Player im Feld österreichischer Politik?" In: *Wirtschaft & Geschichte & Politik – Festschrift Gerald Schöpfer* (Ed.: S. Karner), Leykam, Graz, pp. 223–226.

Sünkel, H. (2015). Österreich – DER Wissenschaftsstandort 2020. In: Wirtschaftswunder.at, Vienna, pp. 1–6.

Sünkel, H. (2016). Schafft Wissen Bildung (ab)? Vortragsmanuskript, Graz.

Sünkel, H. (2016). "Mut zur Grundlagenforschung – Gedanken des Altrektors der TU Graz und Vorsitzenden des Aufsichtsrates des Wissenschaftsfonds FWF über Wissenschaft und Forschung." In: Technische Universität Graz / *Talking about*, Graz.

SHORT BIOGRAPHY

HANS SÜNKEL, born in 1948, is professor for Theoretical Geodesy at Graz University of Technology since 1983. From 2000–2003 he was vice-president for research and from 2003–2011 president of Graz University of Technology. From 2010–2011 he was also president of the Austria's Rectors Conference. From 2001–2004 he was director of the Space Research Institute of the Austrian Academy of Sciences. He held guest professor positions in China, Canada and USA. Now Hans Sünkel is chairmen of the supervisory board of the Austrian Research Fund FWF and member of the university council of the Medical University Graz.

This report is originally published in German and has been translated into English.

12.

Performance Agreements in Austria: A Case of Simultaneous Under- and Over-Steering

Michael Stampfer

Abstract

This essay addresses governing Austria's public universities by means of performance agreements. The starting point is Austria's historically rooted and ambivalent basic attitude toward top academic quality. The latter is particularly important in research and in tertiary education, and in this paper I proceed from the assumption that quality can definitely be recognized. Further, it matters whether value for money for Austria's taxpayers can be created. Only subsequently are all governance and regulation questions as issues per se. The comparatively weak international positioning of Austria's universities makes attending to these questions more urgent.

The complex of problems concerning performance agreements can be briefly summarized as follows: The management approach chosen in Austria is comprehensive, does not discriminate between major and minor goals and activities, and every three years ends in very voluminous public agreements between the individual universities and the Federal Ministry of Science, Research and Economy (BMWFW). These, however, are furnished with few priorities and even fewer consequences. Together with other instruments, they represent over-steering because too many signals are produced on both sides with an enormous amount of effort. At the same time, they are a case of under-steering because they do not give the universities (and possibly also the state) any direction, and definitely no direction that leads to top international quality.

Whether the instrument of performance agreements has an overall positive effect on the productivity and improved performance of Austrian universities must remain an open question. The two illustrations in this essay, the poor positioning in rankings and the enormous amounts of paper in the performance agreements, can by no means be shown to be a causal relationship. Just the correlation, however, is sufficient to call for consideration. The three conclusions for the future might be more autonomy, more restraint in writing, and more competition in the system.

AUSTRIA AND ACADEMIC QUALITY: THE VIEW BY THE NIGHTSTAND LAMP

Austrian universities[1] are not conspicuously well positioned in international comparisons. That has historical roots (Pichler et al., 2007; König, 2012; Grandner et al., 2005). In addition to a process of catching up that began very late, i.e., in the 1970s, there were long-lived qualms about the term "quality," and the idea of competition that is tied to it. Points could be scored in discourse by whoever claimed that quality cannot be measured, or that the individual and group-specific properties are much more important, or that the quiet plains are a far more suitable goal than the cold peak. Among the friends of the broad middle ground were and are many representatives of the university system itself.

That has changed noticeably, but not yet completely. That is visible, among other aspects, in that the significant appropriations for the university system only set limited incentives for top performance. The steps taken and improvements attained are thus insufficient because in comparison to the past much greater efforts are being made around the world (and not only in Asia) to advance one's own university, or the universities in one's own countries. Integration in the European Research Area will also make it easier for talented people to seek out jobs at the best universities. That will make the situation for actors here relatively more difficult to find a place at the front. In our local discussion, however, we seem to turn such international comparisons on and off almost arbitrarily, like a lamp on the nightstand. If we want to read something, then it's on; if we want to sleep, then of course it's off. That also holds true for the recipients – the Austrian universities as a collective are not calling loudly for more competition and incentives for performance.

At the present, things do not look very good for Austria's universities in the international comparison noted above. We do not have to speak of the UK or the USA. According to the Times Higher Education Ranking (THES),[2] all of the smaller European countries to which we like to compare ourselves were able to better position their universities. There are surely many explanations for this as well, but the picture is actually quite robust. The university systems in Switzerland, the Netherlands, Sweden or Denmark are rather clearly and compactly in the lead (Fig. 1), while Austria is conspicuous for its *long tail* of universities.

How do people affected by this react, including people who would profit from a change in the situation? Some say it is not all true. The rankings are not really valid for us, and they are very distorting. *We* are more complicated, more special, and genuinely incomparable (see Österreichische Universitätenkonferenz, 2015)[3] – obvi-

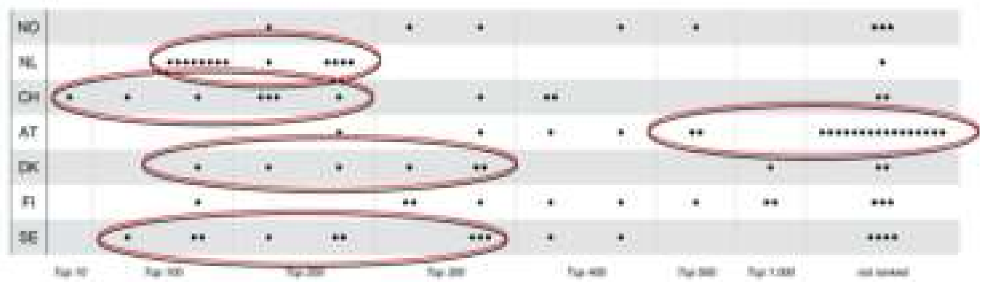
---

1 This essay speaks of universities, although in a few places it would be more correct to address the entire sector of higher education. The main reason for this choice is that the primary topic of the following pages is considering how the state manages and regulates its public universities.

2 Other rankings, although supported by different indicators, do not come to any fundamentally different results.

3 Recommended reading: There is nothing quite like the argumentation of the *uniko-"Vademecum"* about the rankings. It places Austria in an international context, but only as a negative demarcation.

ously along with six other wealthy European countries with which we are constantly happily comparing ourselves in other contexts. That is the Austrian nightstand lamp, and when it is a matter of the representatives of the universities themselves, then it is particularly remarkable.



University ranking (THES) for seven smaller European countries. Every point marks one university; a total of 92 universities are included. (THE World University Rankings 2016–2017, compilation by WWTF)

There is discussion about how precisely quality in teaching and research across institutions and countries can be measured in comparison (see for example OECD, 2014a; Ferlie et al., 2008; Geuna & Martin, 2003; Deem et al., 2009). Parliaments, governments and policy makers at least seem to proceed from the premise that quality can be addressed and assessed across national borders. They also support international undertakings such as the EU Framework Programs, the European Research Area, and the implementation of the Bologna Declaration. Such important European projects would be rightly challenged, if in addition to nurturing all of the special national qualities a common framework for measurements among countries did not exist, and if clearly recognizable quality across countries did not matter.

There are numerous reasons for the value of excellent universities in a country that have led to terms such as the “Scientific Wealth of Nations” (May, 1997) or the “Scientific Impact of Nations” (King, 2004). Top universities play an important role in a location’s ability to attract excellent scientists and talents, as well as corporate research. That holds true for first-rank research locations such as the Bay Area, Boston, Cambridge (UK) or Zurich, as well as for many others. Having very good universities seems to pay off; they are not sufficient for a place to be a first-rank intellectual and economic center, but they are an important condition. To enable top academic achievements to develop, many conditions are necessary (on universities Aghion et al., 2010; Janger & Nowotny, 2016; Janger, 2013; on research groups, compare Manville et al., 2015). Factors that are recognized in the literature as important include the competitive character of the system, the degree of the organizations’ autonomy, the structures of organizations and careers, as well as the amount of financing. While in Austria university autonomy is pronounced, with the exception of laws regarding university studies, we are not among the frontrunners in regard to the institutionally competitive element of the system. Sufficient financing is also required, and there is general consensus in Austria that there is still catching up to do in this area. Certainly this last element is often seen as a cure in itself, and the question of efficient use of resources is insufficiently examined.

COMPARATIVE UNIVERSITY MANAGEMENT: EVERYONE DOES IT SLIGHTLY DIFFERENTLY

In Europe, most university systems are primarily publicly financed, and primarily a part of the public sector (Estermann & Nokkala, 2009; Estermann et al., 2011; EUA, 2015). Austria is no exception in this regard. With the advent of strongly management-oriented approaches in public administration (new public management, management by objectives), almost everywhere ideas of greater autonomy, of increased management by targets and indicators, and of professionalizing university management and oversight structures hold sway (Whitley & Gläser, 2014; Paradeise et al., 2009; Geuna & Martin, 2003).

Alongside institutional arrangements such as board and leadership structure, curricular setup, or reforms in admissions, recruiting and careers, the form of financing has become more prominent in the last 20 years. The way that money is distributed and how it is coupled with expectations or success has, in recent years, become a key governance and regulation element in university policy. For this purpose, there is an array of differing instruments, targets, and means of measurement (Jongbloed, 2009; Ferlie et al., 2008; Hicks, 2012; Whitley & Gläser, 2014):

- The governance and regulation systems of individual countries differ first according to topic. Research, teaching and other missions are included in differing ways and in differing degrees of detail.
- A further major difference is between "basic" funding and competitive third-party funding for academic research. Numerous university systems depend on a large share of third-party funding in their financing mix, with management via quality signals and successes at the levels of projects and programs. (Janger et al., 2012; Auranen & Nieminen, 2010). Other countries have only a limited competitive share.
- Within the "basic" funding, there are differences between unconditional and "performance based funding systems" (Hicks, 2012). The former are appropriated in generally historically justified sums and in some countries continue to constitute a significant share of university financing. The latter are increasingly internationally in use. Many countries have a mix of both.
- Performance based funding systems can target past successes (*ex post*) or make awards for meeting agreed-on expectations (*ex ante*), for example, as spelled out in indicators (Janger, 2013).
- These should be distinguished from questions of the degree to which the system will be geared toward inputs, such as new matriculants, or outputs, such as graduates (Engwall & Nyborn, 2007).

- Examination of the agreed-upon indicators or equivalents can be carried out on a purely quantitative basis, or it can contain a peer review element of varying importance.
- Additional, increasingly used instruments are performance agreements (cf. De Boer et al., 2015). These are contractual, usually multi-year agreements between the state as a funder and the receiving university about future performance and expectations. Here as well there are further subdivisions:
  - Performance agreements can be either the sole governance and regulation element or exist in parallel to indicator-based, performance-related systems of financing.
  - The binding character of the performance agreements, and the consequences for meeting the underlying indicators, can be significant or limited.
  - Goals and indicators in the performance agreements can either be the same for all universities in a system or (in part) completely individual.
  - Similarly, some performance agreements only cover the "surplus," that is, the increase compared with the previous period and thus only part, or the cover the entirety each time.

Each country has not only its own university system (cf. Estermann et al., 2011) but also its own mix of governance and regulation elements. Austria has opted for a system that covers all fields of activity with common performance agreements, but with fairly limited consequences. The border between basic financing and performance-driven financing is in reality rather fluid. More, basic financing is presented as performance-driven financing – this is another reason that both demands and consequences are kept low. Some *ex post* indicators are anchored in the system of financing, but there are no hard, generalized indicators and also no peer-based quality-assurance system as, for example, in the UK.

Each country also has corresponding criticism of this management trend, usually strongly given voice by the academic community that is affected. While it is the profession of academics to investigate the forms of regulation of all systems, from cells in the body, through technical/physical artifacts, companies, national economies, up to whole societies and to make suggestions for implementing this regulation, such efforts should stop at the gates of academia. Universities themselves, however, should be the eye of the hurricane according to this view: they should be fully self-regulating in their organization. Based on the university as an expert system, and the tradition of academic self-governance, there are indeed some arguments in favor of this position.

At the same time, the state has come to expend a great deal of money on universities. It largely abstains from direct interventions, and a consensus has also emerged that in addition to teaching and research universities have other important societal functions, ranging from emancipatory to economic policy ideas. As a result, the mechanisms that are chosen are always a compromise between government regulation, university autonomy, and the academics' self-understanding that they are the initiators rather than the recipients of guiding stimuli. Regulation[4] is also a misunderstandable word, one that allows the belief that there are simple effects in complex systems. That is badly mistaken, and not only on the subject of universities. Attempts to directly compare various management systems with academic output and thus to compute the relative efficiency of national systems do not always come to clear results (Auranen & Nieminen, 2010). Aghion et al. (2010) nevertheless find a significant correlation between a university's research performance and the competitive awarding of funding. The high costs and trade-offs of some systems are sharply criticized with good reason (such as the UK's REF, e.g., Martin, 2011). What *many* systems have in common, however, is an effort toward consistency; that is, to formulate targets, indicators, instruments and consequences clearly and in relation to one another.

EMBEDDING PERFORMANCE AGREEMENTS IN AUSTRIA

As in other countries, the performance-driven elements of university management, the performance agreements in our case, are contextually embedded.

One aspect is the stronger orientation toward effectiveness ("*Wirkungsorientierung"*) and the global budgeting in the national budget itself, in which the current university financing is older than the new law on national budgets (Bundeshaushaltsgesetz, see Schilhan, 2010, p. 9). Nevertheless, there is a context to the rationale: We, the state, give to you, the universities, public monies without controlling the details. You, the universities, are our contractual partners and in this framework we have to agree on what you want to do with this money.

A second aspect is the far-reaching university reform enacted with the Law on Universities from 2002 (Universitätsgesetz 2002, hereafter "UG 2002"), which set out the autonomy and the full legal independence of the numerous public Austrian universities. The UG 2002 attempts to preserve a balance between the independent paths of development of the universities with the framework of far-reaching professionalization, securing state management and the fulfillment of state goals. It was a major and mostly successful reform that made the universities in Austria for the first time into fully functional organizations. However, in our context the following should be noted:

- The UG 2002, like many Austrian reform provisions, is characterized by a formidable density of regulation.[5] It is a very extensive law, which now reaches more than 150 paragraphs, some of which are up to four pages long. Additional amendments have added further provisions. This density of regulation necessarily gives birth to new regulations. Why that all comes to pass may have to do with some specifically Austrian traits. These could include the pressure to regulate possible future problems in advance instead of limiting matters to general regulations;

[4] In the German version I use the term "Steuerung" which has a broader meaning then "steering" in English".

[5] To say nothing of the additional relevant laws such as the Law on Quality Assurance in Higher Education.

further, the necessary compromise during the law's passage with entrenched interests, such as professors' and students' associations or the trade unions; finally, the tendency of stakeholders to push forward social reforms within Austrian universities that are too tough to move forward in society as a whole.
- By contrast, the Scandinavian countries have laws on higher education that are short and succinct, although these states have the opposite of laissez-faire societies. Sweden,[6] Denmark[7] and Norway[8] have extremely short laws on higher education with just a few paragraphs. Norway, for example, needs 34 pages and also covers the accreditation body and the universities of applied sciences. This concise form and its regulation of fundamentals set the standard for the levels beneath it in the cascade.
- The UG 2002 gives universities full legal independence and autonomy for the first time. This suggests that the universities themselves can and should act. "It would be consistent if a university that enjoyed full legal independence would also be able to shape its academic programs and research activities autonomously" (Mayer, 2010, p. 7). On the opposite side of this argument are the legitimate interests of the public. Services such as academic programs must be delivered, and from there it is not far to a question of balancing, of negotiating, and of drafting the performance agreements.

A third aspect is that the performance agreements are based on the universities' *development plans*, which are also respectably sized documents. They are internal documents of the universities and express the planning for the relevant three-year cycle (and beyond), describing which steps should be undertaken next in which areas. These plans provide predictability, but also inflexibility in some questions. In general, the development plans are important and positively seen instruments for planning and management (Wissenschaftsrat,[9] 2016). In addition, each university prepares extensive annual intellectual capital reports.

A fourth aspect is that the development plans and the performance agreements also set up the framework for *internal performance agreements*, as well as other documents within the universities. That means that the form and extent of key governance and regulation documents diffuse within the individual organization as a "cascade" (and the more that is regulated at the top, the wider and more comprehensive the cascade). "The purpose of this construction is to allocate the financing received from the national government on a performance-driven basis within the university as well" (Kucsko-Stadlmayer, 2010, p. 21).

A fifth aspect is that the performance agreements are also part of a *larger regulatory context*. In the course of the first decade of university autonomy, ambition could occasionally be observed to fence in autonomy selectively, to introduce a form

6 https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/hogskolelag-19921434_sfs-1992-1434

7 https://www.retsinformation.dk/pdfPrint.aspx?id=168797

8 http://app.uio.no/ub/ujur/oversatte-lover/data/lov-20050401-015-eng.pdf

9 That is already the second cyclical position that this advisory body has taken on performance agreements, following Wissenschaftsrat, 2013.

of coordination that had not succeeded via the existing governance and regulation instruments. To this end, items such as the all-Austria university development plan (BMWFW, 2015) and the Conference of Higher Education Institutions were introduced to regulate thematic specialization, cross-university cooperation and similar questions with a little bit of pressure and a lot of guidance and negotiations. This process can be described as open-ended, in the best case.

If the hopes for serious management impacts are tied to that, I am compelled to recall the situation when I was a staff member in the Ministry of Science and Research in the early 1990s. At that time, there was no autonomy, and the ministry had all of the decision-making power concerning universities in its own hands, down to the smallest pen purchasing, and even then the results of all of the attempts at regulation in regard to distribution of subjects, differentiation and specialization were distinctly limited. In Austria, managing by speeches, negotiations and to-do lists generally leads to insufficient clarity and obligations.

A sixth aspect is the competitive financing, primarily from the Austrian Science Fund (FWF), which of course is available, but much less widespread than in comparable countries such as Sweden, Switzerland, the Netherlands or Denmark.

Finally, within the framework of the structural funding for higher education there are also clearly *indicator-tied shares* of Austrian university funding (cf. De Boer et al., 2015, p. 43; Wissenschaftsrat, 2016, p. 11ff.). Details of this element and the system of structural funding for the higher education area ("*Hochschulraum-Strukturmittel*") are beyond the scope of this essay, and we now turn to the performance agreements.[10]

HOW IMPORTANT ARE THE PERFORMANCE AGREEMENTS?

Shortly after the introduction of the new framework for universities in Austria, the system of performance agreement also entered into force. The first three-year period began in 2007; at present the fourth period is underway (2016–18) and discussions about the arrangements for the fifth period (2019–21) are ongoing. All of the public universities regulated by UG 2002 are subject to this regime of performance agreements and development plans.

The UG 2002 also regulates performance agreements, and how they are embedded. The starting point is the universities' scope of action (§7), which essentially stipulates which academic programs will be offered and which broad research topics will be investigated. Changes in the scope of action, except by legal acts ("*Verordnungen*"), are only allowed via performance agreements (and their adaptations within the three year period), encompassing the university's full spectrum of activities. A later section (§12) couples the flow of funds from the global public budget (basic and formulated budgets) to the performance agreements. Both norms codify that the Austrian agreements are not merely about the distribution of a surplus or accompa-

[10] Writing on this subject is forthcoming.

nying measures but rather the key governance and regulation element in university financing.

The following section (§13) regulates the performance agreement as a public contract with rights and duties for both sides, and sets out procedures in case changes should become necessary. The exact description in the act extends over nearly four pages, in great detail, and the pendulum swings between the large and the small. On the one hand, it is a matter of specifying the "... long-term goals as well as those that should be reached during the term of the performance agreement ... The university is required to make known its particular points of emphasis and strengths, and the allocation of resources that is derived from them" (§13 Abs. 2 Z. 1 lit a). On the other hand, it is also a requirement to "make known planned and continuing research projects" (lit b). Along these lines, there follows a long list with everything that a contemporary university might offer, in the form of goals, programs, steps toward improvement, measures and much more for research, teaching, society, employees, cooperation with other universities and much more.

The extremely high degree of detail in the performance agreements is thus partly attributable to the law, and above all to the requirements of the ministry. The guidance ("*Arbeitsbehelf*") provided (BMWFW, 2014) is exceedingly extensive and also a "great leveler;" everything that is important in the BMWFW or the relevant outside world, whether small or large, strategic or operational, is taken up in a similar granularity in the requirements. Just the guidance comprises 60 pages. I would gladly describe it here, but it is not possible. In §13 of the UG 2002 no formal requirements for the performance agreements were listed, but that was exhaustively made good in the guidance. The Austrian Science Board (Wissenschaftsrat, 2016, p. 16ff.) sees the products that were developed as having degenerated[11] "... as a result of the required level of detail into a combination bookkeeping statement of accounts, abridged institutional biography, and constricted look at the future."

Then there are quantitative values to be measured. "Indicators should be codified, according to which the achievement of certain goals in a performance agreement can be measured; the indicators in question should be incorporated in the universities' intellectual capital reports (Kucsko-Stadlmayer, 2010, p. 26). These indicators, however, largely float around in the air, or at least in the intellectual capital reports.[12] They lead to negligible or no consequences. They definitely cannot be called key performance indicators (KPIs). Not without a certain amount of humor, the Austrian Science Board observed, "They constitute the most important legitimation procedure for existing funding, but they apparently do not determine the amount of funding. ... Nor can any measures be extracted from the performance agreement for the case that individual plans or goals are not fulfilled" (Wissenschaftsrat, 2016, p. 17).[13] That means, insofar as the non-apparent is actually apparent. What is most astonishing

[11] Author's note: I have supplied the verb.

[12] In contrast to some indicators that are coupled to financial outcomes among the generally output-oriented goals in the higher education area structural funds ("*Hochschulraum-Strukturmittel*").

[13] There is, however, a procedure for negotiations and potential sanctions if a goal is missed. But what are the goals?

about the performance agreements is how much was seen as worth writing down without coming to a link between goals, funds, indicators and consequences. The "weight" of the performance agreements can be taken literally (see Table 1).

A second recollection, passed down to me in my early career in the Ministry of Science and Research is the creation of a draft for a fire protection regulation for the ministry by one of its senior civil servants. This had to regulate everything in advance, and allegedly ran to 50 pages. Erhard Busek, the minister at the time, rejected the draft on the grounds that in case of an actual emergency reading the regulation would surely lead to death by burning or suffocating. That was 25 years ago.

Tabelle 1: 1537 Pages of Performance Agreements, and 1843 Pages of Development Plans

Performance Agreements	Pages	Development Plans	Performance Agreements	Pages	Development Plans
Univ. of Vienna	107	136	Univ. of Innsbruck	92	94
MUW	58	61	Univ. of Graz	80	195
WU Vienna	65	47	Univ. of Salzburg	70	85
TU Vienna	70	56	MUL	62	75
Vetmed Uni	80	80	Univ. of Linz	66	68
BOKU Vienna	106	139	Univ. of Klagenfurt	174	94
Fine Arts	68	111	Univ. of Salzburg	60	85
Applied	32	110	Univ. of Music and Performing Arts Graz	60	138
Performing Arts	41	38	Univ. of Art and Design Linz	40	31
			DUK	68	57
			MUI	58	44
			MUG	80	99

Performance agreements 2016–18, total pages	1537
Development plans 2016–18, total pages	1843

The 1537 pages of performance agreements are a lot of text, all the more so in that they primarily comprise agreed-on goals and, above all, individual activities. The victor in the length category is the relatively small University of Klagenfurt, with 174 pages. Even the performance agreement with IST Austria, which is not regulated by UG 2002, and whose legal founding act is, by Austrian standards, frighteningly slim, follows this trend toward a generally larger number of pages and greater degree of detail. That makes the Austrian Academy of Sciences (ÖAW) all the more astonishing, as it manages to implement the three-line, 19th century Imperial legal foundation in a performance agreement that runs to only 20 pages. Yes, it can be done.

Conjectures about selected effects of the performance agreements

Concerning the amount of work undertaken by universities to draw up the performance agreements there is considerable, mainly anecdotal, evidence. One rector says, "When we have finished one period for planning and performance agreements, then the work on the next one begins immediately." The fine-grained structure of these documents, their ties to the development plans, and the connection to intra-university performance agreements propagates the encyclopedic character of these documents in both space and time, in the cascades noted above. A great volume of work can be presumed. The large amount of work is justified, if real goals can be worked out and if rewards are also tied to performance. Neither is the case; "Everything is actually very special" (Wissenschaftsrat, 2016, p. 19).

For the processing in the responsible ministry, these documents must pose a monumental challenge for every sort of governance and regulation, simply as a result of their length. However, we do not exactly know what actually takes place there; the report from the Austrian Science Board (Wissenschaftsrat, 2016, p. 19) presumes that in the course of negotiations the BMWFW "... takes a meta-view of the entire landscape, but it is not obvious how such an assessment is expressed in the concluded agreement." The list of special interests in the performance agreements is certainly long, and is possibly related to the fact that many people in the ministerial department are engaged with it with an eye toward, and perhaps only toward, advancing particular topics. These many topics and special interests are not, or only partly, prioritized. That can lead to an inability to discuss new topics openly.: People involved all have the impression that their concerns will just disappear into the performance agreements.

If that is the case, then the performance agreements are rather a bottom-up instrument for government and regulation, at least on the funder's side. That would be a rather unusual approach. It is possible, but not certain, that the 1537 pages lead to clear and coherent views within an organization. Clear and coherent views are, however, essential for management and steering.

As with the guidance ("*Arbeitsbehelf*") noted above, it is impossible and probably also fruitless within this short essay to take up, even with just an exemplary listing, the topics and headings of the performance agreements. The "basically everything" noted above must be sufficient here; the 1537 pages can be seen on the internet.[14] The "everything" noted here stands in contrast to another requirement: "Developing a profile means that the university defines and codifies its particular strengths and skills, which existing strengths can be extended so that the university can successfully position itself in international competition in the coming years" (ErlRV UG 02, p. 72, in Kucsko-Stadlmayer, 2010, p. 25). This concept in the law, that positioning in international competition is of central importance, has retreated into the background thanks to the flood of goals, activities and regulations in university management.

[14] https://oravm13.noc-science.at/apex/f?p=103:36:0::NO:::

However, for the people affected – university staff, university leadership, and civil servants in the ministry – the performance agreements have an important management function for another reason. Their form exercises a certain kind of compulsion for completeness. What is not in the performance agreement has not been agreed on and can thus only with great difficulty be put into practice. One good example is the recruitment of top scholars whose placement was not anticipated years in advance and incorporated in the development plans and in the performance agreements. To get someone outside of the planned norm is a disturbance in the system and triggers substantial work in organizational adaptation. This further strengthens the tendency of Austrian universities to look for "successors" for retiring professors more within the confines of narrowly defined institutes rather than to attract the best talents from a wider thematic area. Opportunity hiring, when the best talents knock on the door, is a known pathway to success by top universities (Janger & Pechar, 2010), but it can hardly be practiced in Austria.

Conversely, in the existing system representatives of the bureaucracy tend to steer the universities, when it comes to the many justified additional projects and wishes, by pressure to incorporate the topic into the performance agreements, instead of making separate financing possible by extra, dedicated funding. "Just add that in as well," is, in light of the possibilities available to the BMWFW, the standard answer, whether it fits or not. This happens with small projects as well, and with the concerns of third parties. That makes the performance agreements even more voluminous, the management signals even more fragmented, and even more interested parties have to divide the basic financing into even smaller shares.

Whether the instrument of performance agreements has a positive effect on productivity and improving performance in Austrian universities cannot be definitively evaluated. In the various university rankings, whether from Leiden, Shanghai, or THES, no significant improvements or jumps can be observed since 2004. The simple purpose of this essay is to show that the enormous amount of effort must be seen alongside very unclear systems of targets and indicators. That also means it cannot be said whether the instrument is effective. What can, however, be said is that hundreds of senior staff in the Austrian university system spend a great deal of time with an instrument that has little direct connection to or influence on reaching major goals such as international competitiveness. One important question is that of the costs and lost opportunities in Austria's universities. No causal connection can be established between the first image (Fig. 1) of Austria's universities far back in the rankings and the second image (Table 1) of the mountains of paperwork, but the correlation is fully sufficient to want to reflect about changes.

This reflection includes the question of why the universities complain only a little: naturally, it is the only major financer who is on the other side of the table. One could also suppose that the process, and the slowdown that it imposes on stratification among Austrian universities, gives everyone security: the pacification of possible conflicts over inequality and stratification through complete representation of all interests in the performance agreements, again, the "great leveler." It would be possible to also suppose that the type of intra-university decisions and allocations made via performance agreements turn out the way they have to turn out, with few major and hard decisions. That, in turn, would be an intra-university stabilizing factor. Playing it safe on both sides? Here, in fact, one can say, “More research is needed.”

What could the next steps be?

For me, the three conclusions are autonomy, dieting and competition. They are based in both arguments: first, that the current system of governance and regulation expends a lot of work to send unclear signals; and second, that too little attention is paid to international competitiveness, top performance, and the attractiveness of universities, which necessarily brings with it a greater stratification within the sector. International comparative studies (e.g., Aghion et al., 2010) reach the conclusion that a high degree of autonomy and a clearly competitively oriented environment have a positive effect on universities’ output.

- *Autonomy* means that in cases of uncertainty about where management takes place, the decision should be taken in favor of the university level. It is better that something unexpected is done for a change than that people in the whole system continuously hold each other’s hands. This would be a reversal of the current trends. Certainly greater autonomy must be paired with appropriate forms of responsibility.
- *Diet* means quite simply that the documents could be slimmer. With the UG 2002, avoiding further growth among the paragraphs would already count as a success. With the performance agreements, everything important could be written down on 20–30 pages every four years, if it was clear what is important and if a couple of effective indicators are highlighted.
  - In Bavaria, for example, the performance agreements are kept very brief; they mainly regulate the surplus for the next period (Bayerisches Staatsministerium, 2013a, 2013b, 2013c).
  - At the ETH Zurich, Switzerland makes do with an eight-page performance mandate for four years, with goals and indicators, and without any decorative border (https://rechtssammlung.sp.ethz.ch/Dokumente/115.pdf).[15]
  - In Luxembourg, in turn, the target-indicator relations are precisely regulated in very short performance agreements with four-year terms, and consequences (OECD, 2016, p. 120f.).
  - The performance agreements in the Netherlands are precise because they are selective and individual, and they also have clear indicators (OECD, 2014b, p. 212ff.). “Freed as much as possible from formative requirements, the institutions of higher education only have to keep themselves to a firm page limit” (Wissenschaftsrat, 2016, p. 21). That sounds like a good plan.

[15] The Swiss cascade starts with a four-year Research and Higher Education Framework Law (draft law) and proceeds to negotiations between the state and the ETH Board, then a performance mandate between the Board and the individual ETH institutions, followed by internal regulations.

- *Competition* for funding ultimately means first, that the budget for the FWF has to be massively increased (and that funding in higher education structural funds, called "*Hochschulraum-Strukturmittel*") has to be so generously provided that acquiring funding for infrastructure or new initiatives makes a real difference). The FWF in particular has shown over the course of decades that its instruments enable the establishment of growing islands of quality and communities. Such instruments are notably underfinanced in international comparison. Competition means, second, more competition within and between universities, not (only) at the cost, but also with the goal of having different paths of development and different speeds in the Austrian higher education system.

REFERENCES

Aghion, P., Dewatripont, M., Hoxby, C., Mas-Colell, A. & Sapir, A. (2010). "The Governance and Performance of Universities: Evidence from Europe and the US." *Economic Policy* 25 (61), pp. 7–59.

Auranen, O. & Nieminen, M. (2010). "University research funding and publication performance: An international comparison," *Research Policy*, Vol. 39, pp. 822–834.

Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst (2013a). Innovationsbündnis Hochschule 2018, Munich. http://www.km.bayern.de/studenten/wissenschaftspolitik/innovationsbuendnis.html

Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst (2013b). Zielvereinbarung zwischen der Ludwig-Maximilians-Universität München und dem Bayerischen Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst, Munich. http://www.km.bayern.de/studenten/wissenschaftspolitik/zielvereinbarungen.html

Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst (2013c). Zielvereinbarung zwischen der Technischen Universität München und dem Bayerischen Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst, Munich. http://www.km.bayern.de/studenten/wissenschaftspolitik/zielvereinbarungen.html

BMWFW (2014). Leistungsvereinbarungen. Muster und Arbeitsbehelf 1.0 für den Entwurf von Leistungsvereinbarungen.

BMWFW (2015). Der gesamtösterreichische Entwicklungsplan 2016–2021.

Bundesgesetz über die Organisation der Universitäten und ihrer Studien (Universitätsgesetz 2002 – UG), BGBl. I 2002/120 idF. BGBl. I 2015/131.

Deem, R., Mok, K. H. & Lucas, L. (2007). "Transforming Higher Education in Whose Image? Exploring the Concept of the 'World Class' University in Europe and Asia, "*Higher Education Policy* Vol. 21, pp. 83–9.

De Boer, H., Benneworth, P., Cremonini, L., Jongbloed, B., Kolster, R., Kottmann, A., Lemmens-Krug, K. & Vossensteyn H. (2015). Performance-based funding and Performance Agreements in fourteen Higher Education Systems. Report to the Ministry of Education, Culture and Science, CHEPS.

Engwall, L. & Nybom, T., (2007). "The Visible Hand Versus The Invisible Hand. The allocation of research resources in Swedish Universities," in Gläser, J., Whitley, R. (Eds.), *The Changing Governance of the Sciences*, pp. 31–49, Springer.

Estermann, T. & Nokkala, T. (2009). University Autonomy in Europe I, exploratory study, European University Association Publications.

Estermann, T., Nokkala, T. & Steinel, M. (2011). University Autonomy in Europe II. The Scorecard. European University Association.

European University Association (2015). Public Funding Observatory 2015, EUA.

ETH Zürich (2012). Zielvereinbarung 2013-2016 zwischen dem ETH-Rat und der ETH Zürich, https://www.share.ethz.ch/sites/rechtssammlung/Rechtssammlung/1%20Grundlegende%20Erlasse

%20und%20ETH-Bereich/Zielvereinbarung%202013-2016%20zwischen%20dem%20ETH-Rat %20und%20der%20ETH%20Z%C3%BCrich.pdf

Ferlie, E., Musselin, C. & Andresani, G. (2008). “The steering of higher education systems: A public management perspective.” *Higher Education*, 56, pp. 325–348,

Geuna, A. & Martin, B. (2003). “University research evaluation and funding: An international comparison,” *Minerva*, 41, pp. 277–304,

Grandner, M., Heiss, G. & Rathkolb, O. (Eds.). (2005). *Zukunft mit Altlasten. Die Universität Wien 1945 bis 1955*. StudienVerlag.

Hicks, D. (2012). “Performance-based university research funding systems,” *Research Policy,* Vol. 41, pp. 251–261.

Janger, J., Hölzl W., Hranyai K. & Reinstaller, A. (2012). Hochschulen 2025, eine Entwicklungsvision. Study for the Austrian Federal Ministry for Science and Research, WIFO.

Janger, J. (2013). Hochschulsteuerung im Kontext der Autonomie der Universitäten. WIFO-Monatsberichte 86, Nr. 2, pp. 159–71.

Janger, J. & Nowotny, K. (2016). “Job choice in academia.” *Research Policy* 45, 8, pp. 1672–1683. doi:10.1016/j.respol.2016.05.001

Janger, J. & Pechar, H. (2010). Organisatorische Rahmenbedingungen für die Entstehung und Nachhaltigkeit wissenschaftlicher Qualität an Österreichs Universitäten. WIFO. http://www.wifo.ac.at/wwa/jsp/index.jsp?fid=23923&typeid=8&display_mode=2&id=40013.

Jongbloed, B. (2009). Higher Education Funding Systems: An Overview Covering Five European Jurisdictions and the Canadian Province Ontario, Report prepared for the Hongkong university Grants Committee, CHEPS.

King, D. (2004). “The Scientific Impact of Nations,” *Nature* 430, pp. 311–316.

König, T. (2012). *Die Frühgeschichte des Fulbright Program in Österreich. Transatlantische “Fühlungnahme auf dem Gebiete der Erziehung”*. StudienVerlag.

Kucsko-Stadlmayer, G. (2010). In Mayer, H. (Ed.), *Kommentar zum Universitätsgesetz 2002*, 2. Auflage, Manz.

Manville C., Hinrichs, S., Parks, S., Kamenetzky, A., Gunashekar, S., Wilkinson, B. & Grant, J. (2015). Characteristics of high-performing research units. HEFCE.

Martin, B. (2011). “The research excellence framework and the impact agenda: are we creating a Frankenstein monster?” *Research Evaluation*, 20 (3). pp. 247–254.

May, R. (1997). “The Scientific Wealth of Nations,” *Science* Vol. 275, 5301, pp. 793–796.

Mayer, H. (2010). in Mayer, H. (Hg.), *Kommentar zum Universitätsgesetz 2002*, 2. Auflage, Manz

OECD (2014a). Promoting Research Excellence. New Approaches to Funding.

OECD (2014b). OECD Reviews of Innovation Policy – Netherlands.

OECD (2016). OECD Reviews of Innovation Policy – Luxembourg.

Österreichischen Universitätenkonferenz (Arbeitsgruppe Hochschulrankings; Sorz, J., et al.) (2017). Internationale Hochschulrankings und ihre Bedeutung für die Österreichischen Universitäten. Vademecum.

Paradeise, C., Reale, E. & Goastellec, G. (2009). “A Comparative Approach to Higher Education Reforms in Western European Countries,” in Paradeise, C., E. Reale, I. Bleiklie and E. Ferlie (Eds.), *University Governance. Western European Comparative Perspectives*, pp. 197–226, Springer.

Pichler, R., Stampfer, M. & Hofer, R. (2007). *Forschung, Geld und Politik. Die staatliche Forschungsförderung in Österreich 1945–2005*. StudienVerlag.

Schilhan, C. (2010). Das neue Bundeshaushaltsrecht. Rechtliche Grundlagen; Bundesministerium für Finanzen, https://www.bmf.gv.at/services/publikationen/BMF-BR-BU_Haushaltsrechtsreform.pdf ?5nb0ta, Vienna.

Whitley, R. & Gläser, J. (Eds.), (2014). “Organizational Transformation and Scientific Change: The Impact of Institutional Restructuring on Universities and Intellectual Innovation.” *Research in the Sociology of Organizations* Vol. 42, Emerald.

Wissenschaftsrat (2013). Analyse der Leistungsvereinbarungen 2013-2015 und Stellungnahme.

Wissenschaftsrat (2016). Analyse der Leistungsvereinbarungen 2016-2018 und Stellungnahme.

SHORT BIOGRAPHY

MICHAEL STAMPFER is Managing Director of the Vienna Science and Technology Fund (WWTF) since 2002.
WWTF was set up in 2002 as a private non-profit funding organisation for scientific research in Vienna. WWTF funds larger projects and group leader positions in Vienna in fields like Life Sciences, ICT, Cognitive Sciences or Applied Mathematics.
Michael holds a doctoral degree of the faculty of law of the University of Vienna. He has long time experience in the field of Austrian and international research and technology policy and has authored / co-authored many publications. As well, Michael is a co-founder of the Austrian RTD evaluation platform FTEVAL.
He has been member of different EU working groups and involved in a number of international projects including different OECD innovation reviews. Among various EU project participations EURECIA in FP7 dealt with ERC early impacts and ways to detect and assess them.

michael.stampfer@wwtf.at; www.wwtf.at;
for a longer CV seehttps://www.wwtf.at/upload/CV_M_Stampfer_engl_2017.pdf

The author thanks Jürgen Janger (WIFO), Fritz Ohler (Technopolis) and Michael Strassnig (WWTF) for important discussions, useful pointers and careful proofreading. All mistakes and errors are, as always, the sole responsibility of the author.

This report is originally published in German and has been translated into English.

13.

Career options and working conditions academics

Hans Pechar

Abstract

Career paths and working conditions of academics are a central issue of the Austrian higher education policy. While this issue has not attracted as much public attention as study fees or access policies, it is a high priority in internal academic debates. Since the 1990s, academics have been affected by profound changes. The change from civil service to private employment contracts by the UG 2002 was felt as a shock; it is still rejected by many. A further transformation has taken place less spectacularly, but has now become a central issue of conflict: the increase in temporary employment, especially for young academics.

This paper will bring the changed framework conditions for academics into the context of ongoing expansion of higher education. To what extent does the changed scope of the higher education system affect the nature of academic work and the professional role of academics? Is the traditional role model – unity of research and teaching – appropriate for a mass higher education system? What are the answers to the unsustainable working and employment conditions for growing parts of academics? A stronger differentiation of the supply of studies is considered to be an important pre-condition for organizing the expansion of higher education. Should there be an increased diversity in professional roles?

Conflicts between academic status groups

Since the 1970s, there have been two major governance reforms with different and, in some cases, conflicting objectives in Austrian higher education policy. The UOG 1975 brought to a close the unconditional dominance of full professors (*Ordinarienuniversität*) and gave "co-determination rights" for the non-professorial status groups (i.e. for the first time non-professorial academics could vote in collegial bodies). The law also extended the state's ability to guide higher-education policy. Nearly 30 years later, the UG 2002 led to deregulation and increased institutional autonomy for universities. Since that law entered into force, universities have had the legal form of publicly chartered corporations; that is, they continue to have a public character, but they are no longer state institutions. Many critics of this law interpreted this as "privatization". One reason for this may be that academics are no longer civil servants but have private employment contracts; the university is now the employer of their personnel. At the center of the public discussion on this issue was the fact that under the new law the co-determination rights of non-professorial academics (*Mittelbau*) have been reduced. However, the UG 2002 did by no means revive the *Ordinarienuniversität*; on the contrary, the strengthening of institutional management and administration has placed clear limits on the professoriate's room for maneuver (as became clear in numerous conflicts, such as in additional employment). Nor had the "group university[1]", which had been posthumously glorified, abolished the guild-like divisions among different academic status groups; they were merely weakened. The governance reform offered the chance to put relations among different academic status groups on a fundamentally new basis and to replace the deep gap between professors and non-professorial academics by a gradual differentiation according to the pattern of the North American Tenure-Track. The legislation did not use this opportunity. The division into different "curiae[2]" was maintained (Pechar 2012).

What are the advantages of the North American Tenure-Track, what are its constitutive features, and how is this career model different from the German-language habilitation model?

- At North American universities, the most important decisions that are relevant for a career take place at a relatively early stage. The selective recruitment of academics from an applicant pool does not take place at the final step of the career (entry into the full professorship), but at the time of entry in the tenure track (the assistant professor). The term "assistant professor" is misleading in the North American context, because that person is not assigned to a full professor in order to assist him / her. Rather, this career step allows and requires self-responsible research and teaching. Much earlier than the habilitation model, the Tenure-Track thus enables independent professional activity, without dependence on professorial mentors (Pechar & Andres 2015).
- The position of Assistant Professor in North America is a probationary period limited to six or seven years, with an evaluation at the end of it. In the positive case, this leads to promotion to Associate Professor; in the negative case, it leads to exiting the tenure track ("up or out"). People who pursue an academic career path thus receive a signal at a relatively early age (mid-30s) whether they are able to establish themselves successfully. In the negative case, a new choice of careers is relatively simple at this age. In the habilitation model, this signal often occurs in a later life phase as soon as the chain contract regulation no longer permits temporary employment.
- At first glance, the three-tiered career structure appears to be a common feature of both systems, which is also reflected in the terminology. But this impression is misleading. As mentioned, the assistant professor in the tenure track is an independent position, while the assistant in the habilitation model is dependent on a professorial mentor. The "up or out" evaluation at the end of the assistant professorship could be compared with the habilitation. The difference: in North America,

[1] In Austria and Germany, this term refers to a type of governance comprised of academic status groups with conflicting interests.

[2] This term, originating from Catholic canonical law, legally defines the academic status groups.

a positive evaluation leads to tenure, employment for life with protection against being fired. A successful *Habilitation* process, by contrast, leads to a full teaching license but not to employment. It is true that in Austria before the UG of 2002 assistants with provisional employment had their contracts converted into unlimited contracts after the *Habilitation*. But that was a deviation from the basic norm of the *Habilitation* model, which defines all positions prior to a full professorship as training positions. According to this norm, the *Habilitation* leads to a title (*Privatdozent*) and the right to teach at a university but not to employment.

- The most important difference is that the three career tiers of the tenure track feature a flat hierarchical structure. It is not the differences and opposing interests of the status groups which are the focus of attention, but rather their common interests. In contrast, under the *Habilitation* model the relations of the academic status groups to each other are shaped by conflicts between the ranks, for example, concerning the degree of rights to participate in collegiate bodies. As a result, the professors on one side and non-professorial academics on the other side are assigned to different "curiae," a concept that does not have a parallel in the North American tenure track.

Why has the relationship between the academic status groups developed so differently in the two systems? A major factor was the different governance models. In the German-speaking world the "internal academic matters" of the universities were regulated by collegiate bodies, in which the professors dominated. Before the UOG 1975 these bodies were exclusively occupied by professors, but this group had a dominant position in the phase of the "group university" as well. The linchpin of this governance was to define a (relatively small) group of persons who possessed the power to decide on internal academic matters. In this model, conflicts with the status groups that were excluded from decision-making power were pre-determined. On the other hand, there were no fundamental conflicts of interest between the university's leadership bodies and the group of professors because the rector was a *primus inter pares*, who did not have to make any hard decisions about management. The lines of conflict did not run between the university leadership and academic personnel, but between the different status groups of academics.

Governance is quite different in North America. There, the university administration (the president and his/her administration) always had a very broad decision-making power, whereas the influence of academics on academic matters was much less than in Europe. The conflict lines ran between the management and academics. At the same time, this common opponent strengthened the solidarity between the different academic status groups. This distinction between the German-speaking (or in general the European) and the American pattern became particularly clear in the formation of the organizations that represent academic interests. In Europe in the 19th century, organizations to represent the interests of academic personnel were formed. These organizations were separated according to status. They pursued goals that were in part different, and even in the present day they are instruments of the struggles among the academic ranks. In contrast, at roughly the same time in the USA, the American Association of University Professors was founded, not as an organization representing a particular rank, but rather as a professional organization that includes academics of every status. The initiative to found the association did not arise from young scholars fighting for their social rights, but rather from leading members of the academic profession. “The fact that this initiative was assumed by the academic elite in this country points to the special context in which the call for professional unity arose. Here professors were not members of autonomous guilds or of a high and privileged stratum of the civil service; they were employees of lay governing boards in private and public institutions.” (Metzger, 1987, 168).

The UG 2002 incorporated the most important aspects of the American model of governance: strengthening university leadership, introducing university oversight boards, the restriction of the competences of collegiate bodies. As expected, tensions increased between the newly strengthened decision-making bodies and academic personnel. That could have created good conditions for re-working the academic career path, with potential for reducing conflicts between the academic status groups. The UG 2002 did not make use of this possibility, it has maintained and initially even tightened the status quo, because a radical philosophy of fixed-term contracts, modeled on Germany, was adopted for several years. All academics below the professoriate were only employed for a limited period. The collective agreement dating from 2009 has corrected this and created an Austrian version of a tenure track (career path or *Laufbahnstellen*). The new type of assistant professor largely corresponds to the American model. Entry into this position no longer takes place on the basis of internal and informal recruiting, but via a competitive application process. The position is for a limited probationary period, and the evaluation of the agreement about qualifications corresponds closely to the North American “up or out” process. A positive evaluation leads to promotion to a permanent associate professorship. The collective agreement did not abolish the “unbridgeable gap” (Ben-David) between academic status groups. Such a break would have required the elimination of the corresponding passage in the UG 2002 that categorically contrasted the positions of professors with all other academic groups. Moreover, a full professorship requires a separate appointment procedure. Promotion of associate professors after successful evaluation (as in the North American Tenure-Track) is not (yet) possible.

Implementation of the collective agreement has reduced the gap among academic status groups. The new academic positions (“*Laufbahnstellen*”) are handled differently by the individual universities but, with few exceptions, this new career path is accepted and considered as an improvement (Pechar, Brechelmacher & Park 2015). New “career path” positions mainly serve as a substitute for the instructors with *Habilitiation* under the old system, who are fading out. Like these instructors, they secure permanent positions based on positive evaluations, but the processes for recruitment and quality control are much more rigorous for the new career-path positions than under the old system. At most universities, career-path positions are handled as a shortened tenure track (except promotion to full professor). Qualification criteria that are laid out for recruitment (“junior professorial searches”) and evaluation of these positions are similar to those that are usual on the North American tenure track. The UG amendment of 2015 has created a status gain for the holders of career path positions and increased participation possibilities. For those academics who have a permanent position or a realistic chance of gaining one, the career pattern has thus improved. There are good chances that Austria will implement a tenure track system on the American model in the foreseeable future.

Increase in precarious employment

However, a new problem has arisen parallel to this positive development. A growing portion of academic personnel is in fixed-term employment, without realistic prospects of gaining permanent positions. This problem is not new, and it existed even before the UG 2002, but in recent years it has both quantitatively gotten worse and qualitatively changed, so that today it is necessary to speak of a growing academic "precariat."

In all OECD countries there were a few decades after the end of the Second World War in which the number of stable academic positions rose along with the growth in demand from students. In Austria, this was approximately two decades (end of the 1960s to the end of the 1980s) that one can consider as the higher-education policy equivalent of the "30 glorious years" of the welfare state. From a longer historical perspective, this is more of an exceptional situation, but especially to persons who were intellectually socialized in this time, it appears not only as an ideal situation, but also as the normal situation. However, in reality a different normality has dominated in all OECD countries for roughly the last 20 years. The number of students continues to grow, and there are no signs that this trend will change (Marginson 2016). However, a growing share of teaching is no longer done by academic personnel in permanent positions; rather, it is done by instructors in precarious employment. The core problem today is not the conflict between the professorial and non-professorial status groups, but the increasing difficulty of young academics in finding stable jobs. In contrast to the area of conflict discussed in the first portion of this paper, this is not a regional but a global problem. The status division of academic personnel is a problem that is exclusive to *Habilitation* systems; the academic precariat, by contrast, is increasing in almost all OECD countries (Park & Pechar 2015).

A precise statistical representation of this change is not possible, because multiple changes in legal regulations makes a longitudinal analysis impossible. But there is ample evidence to illustrate the dramatic nature of the change. A policy document of the Federal Ministry speaks of a "two-world situation – namely, personnel financed by third-party funding versus personnel funded by the general budget" and a "massive expansion of employment dependent on third-party funding (particularly at the pre-doctoral level). Thus in 2013 already an average of 25 percent (in full-time equivalents) of academics were financed by third-party funding, and at some universities, primarily technical universities, this applies to every second academic position" (bmwfw 2015, 9).

There are three groups that are particularly affected by these changes. Lecturers and employees in third-party projects (Prädoc and Postdoc) are the main ones. The reasons which led to the increase in these two groups are discussed below. Secondly, the university assistants under § 26 KV (regarded as "core personnel") are affected. They are on fixed-term contracts, as was the case before the UG 2002. Under the old regime they had a realistic chance of obtaining a permanent position (following a successful *Habilitation*); now this option has been closed (unless they can change to a career-path position). In contrast to instructors and researchers supported by third-party funding, which are not counted as core personnel, these assistants are, as a rule, well integrated into the institutional infrastructure. Nevertheless, their classification as core personnel is questionable; it is a matter, so to speak, of core personnel with an expiration date.

A review of the relevant literature quickly makes clear that the academic precariat is a global phenomenon (see, for example, Birdsell 2011, Scheller 2015). Even the USA, whose tenure track system is with good reason seen as a role model for a modern academic career path, is affected. "In 1969, tenured and tenure-track made up approximately 78.3 percent of the faculty, and non-tenure-track positions accounted for about 21.7 percent (. . .). By 2009, data from the National Center for Education Statistics's Integrated Postsecondary Education Data System show these proportions had nearly flipped; tenured and tenure-track faculty had declined to 33.5 percent of the professoriate, and 66.5 percent of faculty were ineligible for tenure. Of the 66.5 percent, 18.8 percent were full-time, non-tenure-track, and 47.7 percent were part-time" (Kezar & Maxey 2013).

There are two main drivers of this development. On the one hand, financial pressure is increasing on expanding systems of mass higher education. The discrepancy between the financial resources that institutions of higher education have available and the requirements for the educational services that they are expected to provide is growing. This is due to many causes, and to discuss them in detail is beyond the scope of this paper. Because of the "cost disease" of labor-intensive services (Bowen 2013), teaching is increasingly expensive compared with other goods in a capitalist economy. At the same time, public spending per student is falling worldwide. Although the absolute amount spent on higher education is increasing in most countries, the growing number of students means that the amount that higher education institutions have available per student is shrinking. Governments are neither willing nor able to finance for increasing student demand the same conditions that they were in the golden years of the expansion of higher education. Some countries are attempting to close the resulting gaps with drastically increasing tuition fees. In Europe, where this policy is not possible (with the exception of the UK), inflation-adjusted spending per student has been falling for several decades. Institutions of higher education are reacting to this development with strategies to reduce costs. One of the most effective means of saving is to replace expensive instructional personnel with less expensive instructors. In every system of higher education, most expensive is teaching by permanent staff, especially by professors. The least expensive everywhere is teaching by instructional personnel on fixed-term contracts, whether they are called lecturers (*Lektoren*) as in Austria, instructors (*Lehrbeauftragte*) as in Germany, or adjunct (contingent) faculty as in North America.

The second megatrend is a change in research funding, that is the shift from basic funds to research financed by third-party funding. The share of third-party research in the total research output of universities has risen steeply in recent years. A constantly increasing share of research is no longer financed by basic funding for higher education (and is not undertaken by permanently employed staff as part of their time that is made available through relatively low teaching loads), but rather by separately funded contract research. There are many good reasons for the extension of third-party financing. Evaluation of proposals enables the more targeted use of limited research funding and can produce improved quality in output. Problems, however, arise when the balance is lost between this contract research, which goes hand in hand with the qualification of young scholars, and stable prospects for employment financed by the basic budget. Then part of the young scholars who have been qualified by third-party projects winds up in a dead end. Exactly that has happened in recent years, and not only in Austria.

It would be possible to counter these two drivers of increasing precariousness by increasing the budget for higher education. If the universities had a higher basic budget, they would be able to set up more career-path and professorial positions. A larger share of teaching could then be covered by permanent personnel, and more career-path positions could be advertised for post-docs who had proven themselves in third-party projects. That there is a causal connection between expenditures on higher education and the number of permanent, professional academic positions is obvious and trivial. There is also a far-reaching consensus that Austrian universities need better funding. But can a (realistically calculated) increase of expenditures on higher education do more than mitigate the problem in question?

Public spending on higher education has recently grown significantly; at 1.5 percent of GDP, Austria is above the OECD average, and only a few European countries spend more. Nevertheless the distance to the government's oft-proclaimed goal 2 percent of GDP is considerable. Seen realistically, in the near future spending on higher education will approach this goal at best slowly. Moreover, no European country has reached this target value. Only countries in which the private share of higher education spending is very high (some countries in North and South America, and in Asia) spend more than 2 percent of GDP on their systems of higher education. Given this background, simply hoping for the bounty of the finance ministry's cornucopia will not help to reach the goal of improving employment conditions for young scholars. In addition, one should consider new forms of differentiation in the spectrum of tasks of academic personnel.

Differentiation in curricula and personnel

Not every limited contract position is precarious. In many cases, such jobs are part-time positions for people who are established in their profession outside of the university. Such cases, in which the courses the university offers are extended and enriched by practical experience, should be the primary motivation for employing adjunct personnel. A short-term contract position in a project supported by third-party finance is often an intermediate step on the path to a career in research outside of the university. Moreover, universities have a legitimate interest in a sufficient reservoir of flexibly deployed teaching staff to adapt the volume and the focus of teaching to fluctuations in demand. However, the increase of both adjuncts and researchers supported by third-party funding has gone far beyond the amount that can be legitimated by such arguments. Institutions of higher education are not employing adjuncts primarily because of their flexibility, but because they are less expensive than permanent personnel. And for a growing share of adjuncts and researchers supported by third-party funding, their short-term employment is neither a second job nor a stepping stone, but rather their most important source of income and the center of their professional life. They aspire to an academic career and they are eminently qualified for one, but because of the shortage of permanent positions, short-term contracts turn into long-term solutions. That is a precarious employment situation, in most cases poorly paid and with no way for the people in such a position to plan for the future.

That this problem could be mitigated with more money is obvious and was already noted. But are there possibilities to counteract the precariousness if not "cost neutral", at least with comparatively small additional costs? Anyone who engages in considerations of this sort is confronted with accusations of providing the government with more budget-cutting arguments. But I believe that both are necessary. A reasonably realistically calculated increase in public budgets for higher education will not be sufficient to create stable employment conditions for a majority of precarious academics. There is no silver bullet. Rather, it will be necessary to adjust the machinery using several different tools.

One key feature of successful expansion is increased differentiation of higher education (Altbach, Reisberg & de Wit 2017). That Austria shows shortcomings in this regard is well known. Non-university sectors were developed very late, and even today they include only approximately 20 percent of all students in higher education. In no other OECD country are 80 percent of the students enrolled in the research universities. For that reason, for a long time efforts have been made to increase the share of other sectors, particularly the universities of applied sciences. In 2011, an expert advisory board recommended raising the share of students at universities of applied sciences to 40 percent of all higher-education students. Whether and how quickly this goal can be reached will depend on how the framework conditions – above all, policies for admission to higher education – are shaped.

Differentiation in curricula must be reflected in the personnel structure. In the universities, there is a different profile for academics than in non-university higher education institutions. However, greater differentiation among academic personnel is also sensible within each sector of higher education. In Austria, where the university sector is oversized and the non-university sector is undersized, this applies in particular to academics at research universities. In a sense, this differentiation has already been introduced. The extension of an academic subclass to third-party workers and lecturers, as described above, is a form of differentiation, although it is a very disadvantageous form for those concerned. These groups are not recognized as "true academics" because they do not meet the gold standard of combining teaching and research.

Post-docs in third-party projects are doing research (without teaching), and adjuncts do the opposite. Both of these groups cover an increasing share of the spectrum of the work of institutions of higher education. Under the conditions of de facto unbundling of the core tasks of a university, is it possible to hold on to the norm of a generally binding unity of research and teaching, and only grant respectable conditions to that portion of academic personnel who meet this norm? Or should one note the unavoidability of unbundling, and modify the idea of the role of academic personnel accordingly? This consideration is behind the proposal to introduce teaching professorships. The German Council of Science and Humanities recommended this step years ago (Wissenschaftsrat 2007) and some German states have followed the recommendation. In numerous European countries – such as England, Sweden, and France – this has been a long-standing reality. There, academics below the professorship, after a short period of probation, is given a permanent employment relationship with, in some cases, an increased teaching obligation.

Reinhard Kreckel (2014) characterized the career structure in these countries as a "tenure system." In contrast to the tenure track in North America there is no expectation in these systems that all academic personnel in permanent positions will, or should, eventually be promoted to a full professorship. Only roughly one-third of newly hired academic personnel achieves that career step in Sweden; in England it is only about one-fourth. But in contrast to the *Habilitation* system of the German-speaking countries, stable employment relations are accepted in these countries below the rank of full professor. There is a correspondingly lower share of personnel on short-term contracts. In North America, where the share of tenure-track positions is shrinking, there are discussions and initiatives about how to help this group of instructors, who are after all indispensable but who enjoy neither job security nor academic recognition, out of their predicament. For example, in 2007 the University of British Columbia introduced a new professorial stream with three ranks that are parallel to the traditional professorship stream: "the Professor of Teaching, which places an emphasis on excellence in educational leadership, as well as teaching and learning, and which rewards the kind of originality and innovation that characterize the best teaching." (UBC 2016) Numerous additional examples could be cited.

In German-speaking *Habilitation* systems, the proposal for a teaching professorship stream provoked strong emotional reactions and has been largely met with rejection. It is still interpreted as a "degradation of the professorship" (see Hilbrich, Hildebrandt & Schuster, 2014) and as a attempt by the public treasury to save money. Nowhere else is the share of academic personnel in precarious employment as large as in these countries; however, time-honored principles are defended particularly stubbornly. The choice is, however, not at all whether the unity of teaching and research are retained, but what implications are drawn from their *de facto* decoupling. At present, a minority (roughly a quarter) conducts both teaching and research under regular employment conditions, while the majority of academic personnel pursue these activities under precarious conditions that should, if one takes the fundamental unity of teaching and research seriously, simply not exist to this extent. Should one continue to interpret the situation of a minority as the only legitimate normal case?

HOW CLOSELY ARE TEACHING AND RESEARCH LINKED IN MASS SYSTEMS OF HIGHER EDUCATION?

The ideal of a close link between teaching and research arose in a particular historical moment and has lost its plausibility to the extent that this moment has vanished. The defining feature of university teaching was that it took place in an elite system (in the sense of Trow, 1973). The elitist status of the nineteenth-century universities was not primarily based on the intellectual level of their students but on their social selectivity. Even in the 19th century, the intrinsic interest of some of the students in their professors' research was less than their excitement about beer-soaked boyish glory. But the minority status of the students as well as the social background they had in common with their professors enabled an interaction that contributed to the socialization of an educated elite. Research during the 19th century was largely undertaken by individuals in "loneliness and freedom." There was cooperation with other colleagues, but not in the form of the division of labor that is common in "big science". Specialization in research, which took off rapidly from the middle of the 19th century, was not so advanced that there was not a connection between a professor's research interests and what was taught to the majority of students.

Beginning in the middle of the 20th century, research and teaching at universities grew further and further from the constellation of circumstances that made a close connection between teaching and research so plausible in the 19th century. With the exception of certain forms of graduate studies (primarily the PhD), most teaching takes place in the form of large, anonymous classes, whose contents generally have no direct connection to the lecturers' extremely specialized research activities. Reciprocal fertilization of research and teaching is largely restricted to the doctoral programs. Among both students and academic personnel, the expansion of higher education has brought with it an expansion of heterogeneity of abilities and interests. A large and growing share of students is primarily interested in a high-quality professional qualification. The situation is more complex for academic personnel. In the majority of cases, they will claim to actively carry out research. A closer look, however, shows that research activity – at least the research output that is recognized by the academic community – is very unevenly distributed. Kwiek writes about "different 'academic professions' in European universities, with a small share of highly productive researchers and a large share of relatively middle to low productive academics. (. . .) The upper 10 percent of highly productive academics are responsible for about half of all academic production; and the upper 50 percent – for more than 90 percent." (Kwiek, 2015, 223)

The traditional understanding of the unity of teaching and research at the university rests on a dualistic concept of differing cultures of learning. Whereas the school is thought to be a place purely for reception of established knowledge, the university is the place where an open-ended engagement with the subject matter takes place, and the results of new research continuously call established insights into question. Whether this binary juxtaposition was ever truly the case is an open question. It falls short of the learning culture of the 21st century in two ways. First, the majority of bachelor's students are not involved in research activities that are breaking new academic ground. This involvement takes place partially during studies for a master's degree, and fully only with doctoral studies. Second, various forms of "learning from research" also take place in secondary school. Clearly, the idea of research behind this pedagogical concept is not identical with the academic research that materializes in specialized publications. What is crucial is that innovative educators today presume that children, too, can and should independently gain new insights through active engagement with problems. They should not limit themselves to receptively taking in pre-set knowledge from their teachers. This learning behavior no longer differs fundamentally, but rather only in degree, from the behavior that one can realistically expect from tertiary students in the early stages of their studies.

Paths out of precariousness

The latest changes in academic working conditions in Austria are not just a story of loss. The fears that were expressed when private sector workplace regulation was introduced have not been fulfilled. The career path positions point in the right direction; they just need to be offered more often. But the tendency toward precariousness in academic employment can no longer be ignored. This is not an Austrian phenomenon, but a global trend. However, political and higher-education leaders have the means to counteract this trend. It is not about the restoration of the career model before the UG 2002, which was by no means as rosy as the nostalgic retrospect suggests. The aim is to make the restructuring of the personnel structure, which was initiated by the governance reform, socially compatible.

The teaching professorship that was introduced for discussion here is only one of numerous possible measures. The establishment of such a new academic post would not change the necessity of creating additional career-path positions and professorships. Without the extension of such positions, the question arises of why so many young scholars are trained who, in the end, can find no opportunities for stable employment. But in addition to an academic profile where research and teaching are equally weighted, other forms of regular academic work are also needed. Alongside a teaching professorship, for which the highest requirements can be set, universities could make greater use of the opportunities that already exist. Job descriptions of senior lecturer and senior scientist, which are already spelled out in the collective agreement, could enable people who are currently teaching and researching in short-term and insecure employment to find regular positions. At present, this option is rarely used. This is due not least to the normative fixation on the traditional role of the professorship.

None of these measures is cost-neutral. The most expensive personnel categories are of course professorships and career-path positions, but all of the other academic jobs discussed here cannot be implemented without additional financial resources. As a result, these considerations should by no means be considered as an alternative to the demand for increased public spending on higher education. But additional public funds should primarily be used to improve the conditions for young scholars. Measures against the precariousness of academic work should be a key focus of future development in higher education. It is a matter of fairness to the generation of future scholars, as well as the competitiveness of Austria's system of higher education. Only if this system offers attractive conditions of employment will it be possible to motivate the most talented young people for academic work.

REFERENCES

Altbach, Philip, Liz Reisberg, and Hans de Wit (2017), *Responding to Massification. Differentiation in Postsecondary Education Worldwide*. Hamburg: Körber Foundation

Birdsell Bauer, Louise (2011), Permanently Precarious? Contingent Academic Faculty Members, Professional Identity and Institutional Change in Quebec Universities. MA Thesis at Concordia University

bmwfw (2014). Universitätsbericht 2014, Wien: bmwfw

bmwfw (2015). Aktionsplan für einen wettbewerbsfähigen Forschungsraum, Wien: bmwfw

Bowen, William G. (2013), *Higher Education in the Digital Age*, Princeton: Princeton University Press.

Hilbrich, Romy, Karin Hildebrandt, and Robert Schuster (2014). *Aufwertung von Lehre oder Abwertung der Professur? Die Lehrprofessur im Spannungsfeld von Lehre, Forschung und Geschlecht*. Leipzig: Akademische Verlagsanstalt.

Kezar, Adrianna and Daniel Maxey (2013), "The Changing Academic Workforce." *Trusteeship*, May/June 2013 Number: 3 Volume: 21

Kreckel, Reinhard and Karin Zimmermann (2014), *Hasard oder Laufbahn. Akademische Karrierestrukturen im internationalen Vergleich*. Leipzig: Akademische Verlagsanstalt

Kwiek, Marek (2015), "Inequality in Academic Knowledge Production. The Role of Research Top Performers across Europe" in: E. Reale and E. Primeri (Eds.), *The Transformation of University Institutional and Organizational Boundaries*, pp. 203–230.

Marginson, Simon (2016). "High Participation Systems of Higher Education." *The Journal of Higher Education*, Vol. 87, No. 2, pp. 243–271

Metzger, Walter P (1987): "Academic Profession in United States" in: Clark, Burton R (ed.): *The Academic Profession. National, Disciplinary, Institutional Settings*. Berkeley: University of California Press

Park, Elke and Hans Pechar (2015). "Academic Research and Employment: Recent Changes in Europe and the United States" in James D. Wright (editor-in-chief), *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Vol 1. Oxford: Elsevier, pp. 49–53

Pechar, Hans (2012). "Karrierechancen für den akademischen Nachwuchs in Österreich" in österreichischer Wissenschaftsrat (Ed.): *wissenschaftliche Karriere und Partizipation – Wege und Irrwege*. Wien: Österreichischer Wissenschaftsrat, pp. 77–92.

Pechar, Hans and Lesley Andres (2015). "Academic Careers in Comparative Perspective" in James D. Wright (editor-in-chief), *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Vol 1. Oxford: Elsevier, pp. 26–30.

Pechar, Hans, Angelika Brechelmacher, and Elke Park (2015). Qualitätssicherung von Laufbahnstellen an österreichischen Universitäten. Research report for the bmwfw.

Scheller, Melanie (2015). Die politische Erzeugung von Prekarität im akademischen Mittelbau. Zentrum für Ökonomische und Soziologische Studien, Universität Hamburg http://www.wiso.uni-hamburg.de/fachbereiche/sozialoekonomie/forschung/zoess/publikationen

Trow, Martin (1973): *Problems in the Transition from Elite to Mass Higher Education*, Carnegie Commission on Higher Education, Berkeley.

UBC (2016), President's Message: A Decade of Progress http://trekmagazine.alumni.ubc.ca/2016/spring-2016/departments/presidents-message-a-decade-of-progress/

Wissenschaftsrat (2007). Empfehlungen zu einer lehrorientierten Reform der Personalstruktur an Universitäten. Berlin.

Short Biography

HANS PECHAR was professor for higher education at the Alpen-Adria University (Vienna location) until his retirement in 2015. The focus of his research is comparative higher education, economics of higher education, and equity in education. He was a Fulbright Scholar at the University of California, Berkeley, and guest professor at the University of British Columbia (Vancouver), Humboldt University at Berlin, and the University of Bremen. Until 2014 he represented Austria in the governing board of OECD CERI.

This report is originally published in German and has been translated into English.

III.

GLOBAL KNOWLEDGE AREA AND DIGITALIZATION

14.

UNIVERSITIES IN THE DIGITAL AGE: FROM THE MEDIEVAL *UNIVERSITAS* TO THE GLOBAL *KNOWLEDGE NETWORK HUB*

Hannes ANDROSCH, Johannes GADNER, Anton GRASCHOPF

ABSTRACT

Education, science and research are decisive components in the development of modern societies and economies. For centuries, universities have been central to these developments, and today more than ever they are challenged to be a part of shaping necessary social, economic and ecological changes. Digitalization in all areas of life offers new instruments for these processes. The new tools make direct interactions easier, changes processes, offer new perspectives, and open alternative approaches and possibilities. This essay sketches the history of universities from their founding as institutions of Christian education roughly 900 years ago in Europe through their contemporary role as hubs of digital networks. The importance of universities for the scientific and industrial revolutions will also be addressed, as will their contributions to the development of the foundations of the internet and today's digitalization. Finally, some key challenges for institutions of higher education and research in the digital age are discussed. In that discussion, the focus is on risks and opportunities that arise from global megatrends such as big data, artificial intelligence, open access, and the internet of things.

INTRODUCTION

Universities in the form that we know them today look back on a 900-year history. They originated in Europe as protectors of the erudition of the Greeks and Romans, but not without influence and transmission of knowledge from the Arab world. In the time since their origin, it is not only the universities themselves that have changed. The world in which they were originally founded as institutions of Christian education has long since passed, and the universities' contemporary form is dominated by technological and societal changes that were unknowable at the time of their founding, as well as by geopolitical shifts. The present is characterized by environmental pollution and climate change, a lack of clean water and shortages of food in many parts of the world, explosive population growth in some places with shrinking, aging societies in others, and unsolved problems in the world economy and in finance. The present is, however, also characterized by an incomparable improvement in the standard of living in large parts of humanity, as well as previously unimagined successes and opportunities opened up by scientific, economic, medical and technological progress. This paradox of progress has put far-reaching changes on the agenda and made old certainties fragile.

These transformations are a result of the scientific and industrial revolutions, which, after the Neolithic revolution and the invention of agriculture 10,000 years ago, represent the second great caesura in human history. Replacing muscle power with machines, and the possibilities that brought about for the Industrial Age, started a unique development that led to incomparable economic growth and improvement in human welfare. With recent scientific successes and technological innovations we stand today at the start of a new revolution. Whether the internet of things, intelligent production, self-driving vehicles, 3-D printers, artificial intelligence or cyber-physical systems – we are standing at the start of a digital revolution that will fundamentally change how we live and work.[1] The key characteristic of this change is the uncannily rapid and systematic fusion of technologies that increasingly break down the borders between the physical, digital and biological worlds. The transformative and disruptive potential of this technological change is so far-reaching that it will not only fundamentally alter our societal, economic and political structures; it will revolutionize *homo sapiens* as a whole.[2] The digital revolution holds the potential for a new epoch. With it, humanity, which only recently moved from the Holocene to the Anthropocene,[3] stands before the entry to the digital age.

In light of these developments, universities and institutions of higher education in the early 21st century face completely new challenges. The question thus arises of how universities, which have helped to trigger these developments, can and should appropriately react. This essay first sketches the history of universities emerging in Europe and then successfully expanding around the world. Following that, the role played by universities in developing the basic conditions for launching the digital revolution is outlined. In conclusion, some considerations about the contemporary meaning and future tasks of universities are taken up.

THE INVENTION OF THE UNIVERSITY, AND THE INVENTION OF INVENTION IN EUROPE

The first references to schools and scholarly places, as well as collections of institutional knowledge, are present already in the time of Mesopotamia's ancient civilization, four thousand years BCE.[4] From antiquity, we know of numerous records of places for education and scholarship that tell us about the cultural development and state of knowledge at that time. For the sixth to third centuries BCE, Greek history gives considerable evidence for the existence of training schools and libraries, such as

1 Schwab, K.: *Die Vierte Industrielle Revolution*. Pantheon Verlag, Munich. 2016, p. 17.

2 Harari, Y.: *Homo Deus. A Short History of Tomorrow*. Harvill Secker, London. 2016, p. 43ff.; Kurzweil, R.: *Menschheit 2.0. Die Singularität naht*. Lola Books, Berlin. 2013.

3 Crutzen, P. J.: (2002) *Geology of mankind*. Nature 415, 23.

4 Fara, P.: *4000 Jahre Wissenschaft*. Spektrum Akademischer Verlag, Heidelberg. 2010, p. 1ff.

the specialized medical libraries, dating from the fifth century BCE, that were established by the medical schools in Knidos and Kos.[5] Above all, the *Akademeia*, founded by the Greek philosopher Plato near Athens, is considered one of the oldest and most long-lived institutions for scholarly discourse and philosophical instruction.[6]

Concrete predecessors of universities arose in other cultures as well. The oldest currently known training school whose basic ideas are similar to that of a university is that of the Buddhist center of monasteries in Nalanda, which arose in the fourth or fifth century CE in what is today the Indian state of Bihar.[7] Ez-Zitouna (Al Zaytunah, in Tunis) University, founded in 737, is considered the oldest institution in the Arabic world that is comparable to a university. Ez-Zitouna is also the world's oldest educational institution in which instruction continues through to the present.[8]

In Europe, around the turn of the first millennium CE monastic and cathedral schools developed into the first universities that also bore the name, which is derived from the Latin phrase *unversitas magistrorum et scholarium*, i.e. community of teachers and students. Among the oldest are places that are still accounted centers of learning, including Bologna, Paris, Oxford and Cambridge, whose university foundings date back to the 11th and 12th centuries.[9] The University of Vienna, founded in 1365, was the second German-language university after Prague (1347).[10] By the end of the 15th century, the university as an institution had established itself across Europe, and it slowly grew into a central institution. A university enjoyed a legally independent status, generally based on a charter from the Pope, though sometimes from the Emperor, and had the purpose of enabling members of the university to partake of a *studium generale* of the totality of knowledge.[11] Its effects, however, remained generally limited to a small number of academics, and the dispersal of teachings had little influence on the society of the time.[12] The number of students and the educational attainment of most of them at that point in history can be generally counted as

---

5 Müller, C. W.: "Griechische Büchersammlungen und Bibliotheken." In: Elke Blumenthal, Wolfgang Schmitz (Eds.): *Bibliotheken im Altertum*. 2011

6 The Academy (Greek: *akademeia*) was originally the name of a temple district in Athens. When Plato founded his school nearby in 385 BCE, the name of the district became attached to the school. Cf. Störig, H. J.: *Kleine Weltgeschichte der Philosophie*. Fischer Taschenbuchverlag, Frankfurt am Main. 1993, p. 156.

7 Spektrum der Wissenschaften 5.17: *Monumente II, Die älteste Universität der Welt*. p. 18-21.

8 Astinus, A. D.: *Die neun ältesten Universitäten der Weltgeschichte: Die ganze Welt der Universitäten – Von Montpellier bis Cambridge.* Neobooks. 2015

9 Burke, P.: *Papier und Marktgeschrei. Die Geburt der Wissensgesellschaft*. Verlag Klaus Wagenbach, Berlin. 2001, p. 46; Fisch, S.: *Geschichte der europäischen Universität. Von Bologna nach Bologna*. Verlag C.H. Beck, Munich. 2015, p. 9ff.

10 Weber, W.: *Geschichte der europäischen Universität*. Verlag W. Kohlhammer, Stuttgart. 2002, p. 22f.

11 Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band I: Mittelalter*. Verlag C.H. Beck, Munich. 1993, p. 49ff.

12 Burke, P.: *Papier und Marktgeschrei. Die Geburt der Wissensgesellschaft*. Verlag Klaus Wagenbach, Berlin. 2001, p. 52 ff, 63f.

very low.[13] The main reason was that in the Middle Ages the university, by its nature, was a place for the "thoughtful acquisition of tradition," at which one studied preset approaches to the authoritative texts of a received canon – above all, the Bible.[14]

That changed slowly with the onset of the Renaissance in which, as Pulitzer Prize winner Stephen Greenblatt vividly describes,[15] the cultural achievements of Greek and Roman antiquity, and thus stores of knowledge that had long existed, were rediscovered via the mediation of Arab scholars, and civilizational achievements from the Arabic-Islamic realm – in astronomy, medicine, and mathematics for example – came to Europe.[16] At the same time, an increasingly systematic approach to the development of new knowledge based on empirical observation began to emerge, and it first took hold outside of the established universities. The reason was that although many of the leading minds of this movement had positions at universities, in academic circles there was considerable resistance to these new ways of thinking.[17] With the presentation of the heliocentric view of the universe in his work *De revolutionibus orbium coelestium* in the year 1543, Nicolaus Copernicus set in motion a slow but nonetheless enduring process of changing the medieval view of the world, which ultimately led to the development of a new, genuinely European way of thinking and started a proper "scientific revolution."[18]

The fundamental approach for this new way of thinking was provided by Francis Bacon in the year 1620 with his scientific manifesto, *Novum organum scientiarum*. The title translates roughly as "New tools of knowledge." The work took aim at Aristotle's *Organon*, which was a mainstay of the scholastic orthodoxy that was still widespread at the universities of the time. Bacon aimed to overcome the allegiance to Aristotle and replace his old-fashioned logic with a new, experimental approach to research.[19] What was new about this approach was the idea, revolutionary at the time, of uniting science and technology. The idea was based on a combination of three characteristics: first, confessing ignorance, or at least recognizing that everything that we believe we know can be refuted by new insights; second, the increasing importance of observations that can, with the help of mathematical models, be combined into universally valid theories; and finally, third, the ability to develop new technologies on

13 Miethke, J.: *Die mittelalterlichen Universitäten und das gesprochene Wort*. Stiftung Historisches Kolleg, Munich. 1990, p. 11f.

14 Fisch, S.: *Geschichte der europäischen Universität. Von Bologna nach Bologna*. Verlag C.H. Beck, Munich. 2015, p. 22f.

15 Greenblatt, S.: *Die Wende – Wie die Renaissance begann*. Siedler Verlag, Munich. 2012

16 Fara, P.: *4000 Jahre Wissenschaft*. Spektrum Akademischer Verlag, Heidelberg. 2010, p. 47ff.; Liessmann, K. P.: *Der Aufgang des Abendlandes. Eine Rekonstruktion Europas*. Sonderzahl Verlag, Vienna. 1994, p. 43f.

17 Burke, P.: *Papier und Marktgeschrei. Die Geburt der Wissensgesellschaft*. Verlag Klaus Wagenbach, Berlin. 2001, p. 52f.

18 Watson, P.: *Ideen. Eine Kulturgeschichte von der Entdeckung des Feuers bis zur Moderne*. C. Bertelsmann Verlag, Munich. 2006, p. 754.

19 Fara, P. (2010): 4000 Jahre Wissenschaft. Spektrum – Akademischer Verlag, Heidelberg, p. 149ff.

the basis of these theories.[20] Bacon's book is considered a turning point between the medieval view of the world and modern, systematic research that is oriented toward scientific and technological progress for general use.[21]

It is evident that this new approach to thinking stood in stark contrast to the medieval *weltanschauung* that was oriented toward the correct interpretation of the Bible, according to which, as stated by church dogma, there could be nothing new under the sun.[22] Although the discovery of America in 1492 has shaken Europeans' understanding of themselves and confronted them with the fact that more weight could be ascribed to new discoveries or empirical observations than to the old traditions or Aristotelian logic.[23] The church, however, took harsh action against works and views that diverged from the Bible or from prevailing dogmatic positions.[24] The conflicts that resulted from the reigning orthodoxy and the prophets of the new thinking can be seen in many examples. One of these involved the priest and astronomer Giordano Bruno, who postulated the infinity of space and the eternal duration of the universe; for these and other teachings that the church deemed heretical, he was burned at the stake on 17 February 1600 on the Campo de' Fiori in Rome. The most prominent is certainly the case of Galileo Galilei, who, as is well known, was pronounced guilty of heresy by the Pope on 22 June 1633 after a show trial in Rome – and who only escaped execution by burning by recanting his heretical teachings.[25]

This putative victory of the church could not, however, halt the rise of the new thinking. In the wake of the scientific revolution of the 16th and 17th centuries, scholasticism, the method of proof that was usual in universities of this time, came under increasing pressure about its legitimacy and was gradually replaced by the new method of repeatable experiments and empirical observations.[26] The writings of René Descartes and Gottfried Wilhelm Leibniz, along with many others, finally mark a definitive turning point, as a result of which belief in religious revelation or trust in traditional wisdom were no longer recognized as the sole source of knowledge and as an authority for orientation. These were replaced by reason. "Where previously philosophers had consulted Bible passages or quotations from antiquity as proofs, the champions of the new thinking only counted rational criteria as valid."[27] This view

---

20 Harari, Y. N.: *Eine kurze Geschichte der Menschheit*. Schriftenreihe der Bundeszentrale für Politische Bildung, Volume 1392, Bonn. 2013, p. 306.

21 Fischer, E. P.: *Die andere Bildung. Was man von den Naturwissenschaften wissen sollte*. Ullstein, Munich. 2001, p. 52f.

22 Liessmann, K. P.: *Der Aufgang des Abendlandes. Eine Rekonstruktion Europas*. Sonderzahl Verlag, Vienna. 1994, p. 43f.

23 Harari, Y. N.: *Eine kurze Geschichte der Menschheit.* Schriftenreihe der Bundeszentrale für Politische Bildung, Volume 1392, Bonn. 2013, p. 353; Liessmann, K. P.: *Der Aufgang des Abendlandes. Eine Rekonstruktion Europas*. Sonderzahl Verlag, Vienna. 1994, p. 43f.

24 Feyerabend, P.: *Wider den Methodenzwang*. Suhrkamp Verlag, Frankfurt am Main, p. 206ff.

25 Fara, P. (2010): 4000 Jahre Wissenschaft. Spektrum – Akademischer Verlag, Heidelberg, p. 132f.; Feyerabend, P.: *Wider den Methodenzwang*. Suhrkamp Verlag, Frankfurt am Main, p. 208ff.

26 Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band II: Von der Reformation bis zur Französischen Revolution 1500 – 1800*. Verlag C.H. Beck, Munich 1996, p. 425ff.

27 Blom, P.: *Die Welt aus den Angeln. Eine Geschichte der Kleinen Eiszeit von 1570 bis 1700 sowie*

of the world was able to establish itself completely following, and as a result of, the Enlightenment of the 18th century. With the Enlightenment's triumph, the medieval view of the world was utterly shattered, and the religious, ethical, philosophical, and political norms and "truths" that had previously provided orientation lost their meaning. In their place stood human reason and rational thinking, as they were defined by Immanuel Kant in his *Critique of Pure Reason*, published in 1781.

In *An Answer to the Question: What Is Enlightenment?* (1784), Kant proclaimed "humanity's exit from its self-made immaturity" and humanity's ability to use reason to improve the world. This consummated the decisive renunciation of all previous dominant aspects of thinking and acting. The establishment of the rational paradigm as the first and last criterion of thinking and acting is considered a significant achievement that differentiates Europe from all other societies and cultures.[28] It fundamentally changed the Europeans' self-understanding. Into the late Middle Ages, life was understood as static and time as cyclical with parts that were always the same, as what Friedrich Nietzsche later called "the eternal return of the same." But the upheavals that were unleashed by empirical observations and scientific insights produced a revolution in the true sense of the word: a fundamental and durable structural change in the European view of the world, one that was attended by belief in progress toward a better world.[29]

An important prerequisite for these developments was Johannes Gutenberg's invention of movable type printing around 1450. This revolutionized the way that knowledge could be documented and reproduced – with hitherto unknown consequences for the dissemination of knowledge.[30] This was, in addition to its central importance for the scientific revolution, one of the fundamental conditions for the "explosion of knowledge"[31] as well as for the establishment of our contemporary scientific system of knowledge. It is based on the foundations of earlier insights, upon which it can build and develop itself further. This principle led to more consistent progress than the earlier unsystematic approach, and even today forms one of the central preconditions for modern science and the knowledge society.

A radical "unbinding of Prometheus"[32] was the result. That is, the scientific insights and the technical innovations that formed the basis for the "invention of in-

der Entstehung der modernen Welt, verbunden mit einigen Überlegungen zum Klima der Gegenwart. Hanser Verlag, Berlin. 2017, p. 142.

28 Liessmann, K. P. (1994): *Der Aufgang des Abendlandes. Eine Rekonstruktion Europas*. Sonderzahl Verlag, Vienna, p. 39f.

29 Rossi, P. (1997): *Die Geburt der modernen Wissenschaft in Europa*. C.H. Beck, Munich, p. 16ff.

30 Burke, P.: *Papier und Marktgeschrei. Die Geburt der Wissensgesellschaft*. Verlag Klaus Wagenbach, Berlin. 2001, p. 20ff., p. 96f.; Landes, D. S.: *The Wealth and Poverty of Nations: Why some are so rich and some so poor*. W. W. Norton, New York – London. 1999, p. 51f.

31 Burke, P.: *Die Explosion des Wissens: Von der Encyclopédie bis Wikipedia*. Verlag Klaus Wagenbach, Berlin. 2014

32 Androsch, H. / Gadner, J.: *Die Entfesselung des Prometheus und ihre Folgen*. APA Science, Vienna. 2015

venting"[33] resulted in the industrial revolution and as a consequence of that humanity was freed from its dependence on nature and muscle power.[34] With the use of fossil energy sources – first coal, later oil and gas – muscle power was gradually replaced by machine power.[35] That in turn changed people's lives fundamentally and in ways that were previously unknown. The economic effects as well as the social upheavals that resulted from the invention of steam engines, from increasing mechanization of all production processes, from the enabling of mass production in factories, from the increased transportation of goods by rail, as well as from electrification are uniquely dramatic in human history and can best be compared with the radical changes in living conditions following the Neolithic revolution.[36]

An essentially new organization of research at the beginning of the 19th century incorporated these developments and led to the new thinking, which was obligated to progress and thoroughly convinced that certainty could not be obtained by belief but rather only by reason and systematic experimentation, firmly establishing itself in the universities.[37] Although the universities played no significant role in the emergence of the scientific and industrial revolutions, they now formed the innovative tips of European societies and made decisive contributions to the ultimate establishment of this new world view.[38] The change in paradigm was expressed above all in the creation of new structures attached to the universities whose purpose was the systematic and rational production of knowledge.[39] In addition, that knowledge was organized in new ways. Universities and libraries began to organize their collections according to secular topics; fields such as mathematics and geography moved into the foreground, whereas theology was increasingly marginalized. At the beginning of the emergence of universities, theology was the queen of scholarly disciplines; today, it is barely tolerated in some places – the formerly Christian university culture was pushed to the

---

33 Landes, D. S.: *The Wealth and Poverty of Nations: Why some are so rich and some so poor*. W. W. Norton, New York – London. 1999, p. 45

34 Landes, D. S.: *Der entfesselte Prometheus. Technologischer Wandel und industrielle Entwicklung in Westeuropa*. Verlag Kiepenheuer & Witsch, Cologne. 1986

35 Braun, E.: *From Need to Greed. The Changing Role of Technology in Society*. Verlag der Österreichischen Akademie der Wissenschaften, Vienna. 2010, p. 63.

36 Landes, D. S.: *The Wealth and Poverty of Nations: Why some are so rich and some so poor*. W. W. Norton, New York and London. 1999, p. 186ff.; Hobsbawm, E.: *The Age of Revolution: 1789-1848*. Vintage Books, New York. 1996. p. 38ff.

37 Fara, P.: *4000 Jahre Wissenschaft*. Spektrum Akademischer Verlag, Heidelberg. 2010, p. 225ff.; Fischer, E. P.: *Die andere Bildung. Was man von den Naturwissenschaften wissen sollte*. Ullstein, Munich. 2001, p. 48ff.

38 Burke, P.: *Papier und Marktgeschrei. Die Geburt der Wissensgesellschaft*. Verlag Klaus Wagenbach, Berlin. 2001, p. 64; Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band II: Von der Reformation bis zur Französischen Revolution 1500 – 1800*. Verlag C.H. Beck, Munich 1996, p. 439.

39 Harari, Y. N.: *Eine kurze Geschichte der Menschheit*. Schriftenreihe der Bundeszentrale für Politische Bildung, Volume 1392, Bonn. 2001, p. 299ff.; Fara, P.: *4000 Jahre Wissenschaft*. Spektrum Akademischer Verlag, Heidelberg. 2010, p. 165ff.; Burke, P.: *Papier und Marktgeschrei. Die Geburt der Wissensgesellschaft*. Verlag Klaus Wagenbach, Berlin. 2001, p. 45ff.

margins by a scientific one.[40] The university's original type of scholar was ultimately replaced by a researcher.[41]

Roughly 200 years ago, the Prussian education and political reformer Wilhelm von Humboldt formulated an ideal of a university characterized by the guiding principles of academic freedom and independence, the unity of research and teaching, as well as autonomous self-government of the university. Humboldt also developed a succinct formulation for what was necessary at the new and ideal university, namely "Science as something that is not yet entirely found and never entirely findable."[42] That not only established the "imperative of research"[43] but it also started a general development that changed not only the conception of the sciences and how to treat them but also reset the tasks of the universities. The *modern* university came into being, one conceived as a place the research-based generation and/or production of new knowledge that was simultaneously an educational institution that organizes knowledge, preserves it and transmits it.[44] The Prussian ideal of a university based on academic freedom in both research and teaching opened the doors, over the long term, for a modern research university.[45]

As a result the university became "one of, indeed, the European institution par excellence: as a community of teachers and students, provided with special rights of self-government, of selecting and implementing courses of academic study as well as research goals, and of awarding legally recognized academic titles. [. . .] No other European institution has acquired the kind of universal recognition that the European university, with its traditional structures and its scientific achievements, has managed."[46] Supported by Humboldt's ideas, the university experienced a massive upswing in the 19th century, and not only in Europe. With impressive durability and speed the Prussian model of the University of Berlin was adopted among Germany's neighbors, in the European colonies, in the United States, even in Asia, and it was implemented more or less completely.[47] Thus the university is incontrovertibly "one

40 Watson, P.: *Ideen. Eine Kulturgeschichte von der Entdeckung des Feuers bis zur Moderne*. C. Bertelsmann Verlag, Munich. 2006, 784f.

41 Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band II: Von der Reformation bis zur Französischen Revolution 1500 – 1800*. Verlag C.H. Beck, Munich 1996, p. 501

42 Fisch, S.: *Geschichte der europäischen Universität. Von Bologna nach Bologna*. Verlag C.H. Beck, Munich. 2015, p. 54.

43 Fisch, S.: *Geschichte der europäischen Universität. Von Bologna nach Bologna*. Verlag C.H. Beck, Munich. 2015, p. 56f.

44 Osterhammel, J.: *Die Verwandlung der Welt. Eine Geschichte des 19. Jahrhunderts*. Bundeszentrale für politische Bildung, Bonn. 2010, p. 1133.

45 Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band III: Vom 19. Jahr-hundert zum Zweiten Weltkrieg 1800 – 1945*. Verlag C.H. Beck, Munich. 2004, p. 17f.

46 Rüegg, W. (Hg.): *Geschichte der Universität in Europa. Band I: Mittelalter*. Verlag C.H. Beck, Munich. 1993, p. 13.

47 Fisch, S.: *Geschichte der europäischen Universität. Von Bologna nach Bologna*. Verlag C.H. Beck, Munich. 2015, p. 62ff.; Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band III: Vom 19. Jahr-hundert zum Zweiten Weltkrieg 1800 – 1945*. Verlag C.H. Beck, Munich. 2004, p. 145ff.; Weber, W.: *Geschichte der europäischen Universität*. Verlag W. Kohlhammer, Stuttgart. 2002, p. 157ff.

of the most important socio-cultural powers that enabled Europe's formation, rise and high position in the world."[48]

Today, universities form the backbone of the modern world, but they could only fully develop their role in cooperation with industry, business, the military, the government, and the health system.[49] The relations between science and its application in medicine and technology have as a result become constantly closer; new institutional forms of gaining and disseminating knowledge have arisen, above all the research university and the laboratory, which have manifested themselves in the renewal of infrastructure and construction.[50] As a result of industrialization, which itself is a child of the scientific revolution and of a plethora of innovations (the invention of the steam engine foremost among them), not only the large companies that arose at the time but also increasingly political powers began to take a growing interest in science and the opportunities for technical applications that sprang from it – not least to gain military advantage in the competition among nations.[51] This combination of modern science, capitalist economic structures, and imperialist power struggles laid the cornerstone for the rise of the West, which was first dominated by Europe and then from the middle of the 20th century by the United States of America.[52] The feedback among science, capitalist economic structures and political regimes remains a key driver of this development even unto the present day.[53]

In contrast to the renewal experienced by European thought with the Renaissance, the Enlightenment and the scientific and industrial revolutions, the formerly innovative societies in the Orient, or Chinese culture, which was technologically ahead of Europe until the early modern era, stagnated visibly. In the Ottoman Empire, printing in Arabic was forbidden from 1483 for religious reasons. Only in 1727 were the first printing presses with Arabic letters approved. Through 1741, these presses had printed only 17 titles, in small runs of a few hundred copies, all secular works. Printing religious works remained prohibited under pain of death until the late 19th century.[54] Thus the Islamic world lacked one of the basic elements of the reproduction and dissemination of knowledge, one that in Europe had led not only to the scientific revolution but also to a debate over new interpretations of the Bible – key phrases:

48 Weber, W.: *Geschichte der europäischen Universität*. Verlag W. Kohlhammer, Stuttgart. 2002, p. 9.

49 Fara, P.: *4000 Jahre Wissenschaft*. Spektrum Akademischer Verlag, Heidelberg. 2010, p. 165.

50 Rüegg, W. (Ed.): *Geschichte der Universität in Europa. Band III: Vom 19. Jahr-hundert zum Zweiten Weltkrieg 1800 – 1945*. Verlag C.H. Beck, Munich. 2004, p. 97ff.

51 Harari, Y. N.: *Eine kurze Geschichte der Menschheit*. Schriftenreihe der Bundeszentrale für Politische Bildung, Volume 1392, Bonn. 2001, p. 330ff.

52 Harari, Y. N.: *Eine kurze Geschichte der Menschheit*. Schriftenreihe der Bundeszentrale für Politische Bildung, Volume 1392, Bonn. 2001, p. 340ff.; Morris, I.: *Why the West rules – for now*. Profile Books, London. 2010; Ferguson, N.: *Civilization. The West and the Rest*. Allen Lane, London. 2011

53 Harari, Y. N.: *Eine kurze Geschichte der Menschheit*. Schriftenreihe der Bundeszentrale für Politische Bildung, Volume 1392, Bonn. 2001, p. 334.

54 Elger, R. and Stolleis, F. (Ed.): *Kleines Islam-Lexikon. Geschichte – Alltag – Kultur*. C.H. Beck, Munich. 2008: Buchdruck.

Luther's Bible, Reformation[55] – and thus led to the creation of a public, one reason that a process comparable to the European Enlightenment or an "Islamic modernization" largely remained undone.[56]

Although movable type printing was originally a Chinese invention and had been widespread there since the 11th century, it did not contribute to an explosion of knowledge the way it did later in Europe. The main reasons for that are the Confucian tradition and the state bureaucracy that was based on it, which strangled all tendencies toward renewal or enlightenment at birth.[57] In addition, an increasingly isolationist and backward-looking policy took hold in China at the same time Europe was undergoing its scientific and industrial revolutions. That led not only to the forgetting of a large number of Chinese innovations, but also to cultural and technological exchange with other countries succumbing, which produced a general de-coupling from technological innovation outside of the Middle Kingdom.[58]

The lack of key ingredients for the emergence of innovation – openness, variety, creativity, social exchange as well as discursive disputation – led to a modernization deficit in the moribund cultures of the Ottoman Empire and China. While Europe had since the Enlightenment established future-oriented systems of thought and modern institutions for scientific research and learning, corresponding institutions were largely absent in the Ottoman Empire and China. Instead, the traditional educational systems, which were backward-looking and based either on the Koran or Confucian teachings, hindered the development of innovation. And whereas in Europe a general belief in human progress and a better life in the future improved by technical innovations became widespread, Ottoman and Chinese intellectuals sought answers in traditional lore and ancient texts. Ultimately, scholars in Istanbul or Peking did not create a scientific system of knowledge that was comparable with Europe's, in which discoveries or technological innovations were systematically documented and disseminated in order to develop a further round of discoveries and technological innovations on that basis.[59]

---

55 Kaufmann, T.: *Erlöste und Verdammte. Eine Geschichte der Reformation*. C.H. Beck, Munich. 2017, p. 11 f, p. 72ff.

56 Schulze, R.: *Geschichte der islamischen Welt von 1900 bis zur Gegenwart*. Verlag C.H. Beck, Munich. 2016, p. 13ff.

57 Pliny, K.: Das asiatische Jahrhundert. China und Japan auf dem Weg zur neuen Weltmacht. Campus Verlag, Frankfurt / New York. 2005, p. 48.

58 Maddison, A.: *Chinese Economic Performance in the Long Run*. OECD Publishing, Paris. 2007; Morris, 2010, p. 476ff.; Landes, D. S.: *The Wealth and Poverty of Nations: Why some are so rich and some so poor*. W. W. Norton, New York und London. 1999, p. 335ff.; Diamond, G.: *Guns, Germs, and Steel: The Fates of Human Societies*. W. W. Norton, New York – London. 1997, p. 411ff.

59 Fara, P.: *4000 Jahre Wissenschaft*. Spektrum Akademischer Verlag, Heidelberg. 2010, p. 227ff.; Morris, I.: *Why the West rules – for now*. Profile Books, London. 2010, p. 481; Maddison, A.: *Chinese Economic Performance in the Long Run*. OECD Publishing, Paris. 2007, p. 17, p. 27; Fischer, E. P.: *Die andere Bildung. Was man von den Naturwissenschaften wissen sollte*. Ullstein, Munich. 2001, p. 48ff.; Landes, D. S.: *The Wealth and Poverty of Nations: Why some are so rich and some so poor*. W. W. Norton, New York und London. 1999, p. 343.

From the explosion of knowledge to Big Data

Meanwhile in Europe there was an "explosion of knowledge," that can largely be attributed to the intensification of research and publication activities in the universities and other institutions of higher education.[60] The explosion of knowledge began in the 19th century and reached its first climax in the early 20th century. As early as 1944, the librarian Fremont Rider had postulated the regular doubling of information published in books on an average of every 10 to 20 years, which corresponds to annual growth of approximately 3.5 percent.[61] Derek de Solla Price, a historian of science and a scientific research, as well as the founder of scientometrics, described this law of doubling for science as a whole. According to his calculations, since the middle of the 17th century knowledge had grown exponentially with a doubling period of approximately 15 years.[62] In 2015, the sociologist of science Lutz Bornmann and higher-education researcher Rüdiger Mutz calculated the increase of scientific output based on bibliometric data since the middle of the 16th century. They based their calculation on the number of publications per year and the number of cited references. They came to the conclusion that the average rate of growth of scientific publications up to the middle of the 18th century was approximately 1 percent annually, which rose between 1750 and 1945 to about 3 percent, and afterward through 2012 climbed to roughly 9 percent annually. That corresponds to a doubling of scientific output within eight or nine years. For just 2012, nearly 1.86 million scientific publications were counted.[63]

Worldwide, more than 2 million scientific articles are currently published each year. That means that a scientific article is published roughly every 15 seconds. Today's national and university libraries all house millions of articles, books and manuscripts. In this flood of data, it has become impossible to have even the roughest overview of all scientific discoveries, even in areas of specialization. Nevertheless, it is this abundance of information and digital transfer of information that makes the rapid progress in research and development possible. Information networks and at least theoretically borderless communication, as well as trans-disciplinary cooperation, are the keys to progress.

While the amount of knowledge in the form of published information is growing exponentially, an increasing advance in use of technology in knowledge has been taking place. The enormous flood of knowledge and information would not have been possible without digitalization, a development for which the research results from universities and the transfer of these results has always been crucial. Let us consider the development of e-mail and the internet. From the very beginning, universities

60 Burke, P.: *Die Explosion des Wissens: Von der Encyclopédie bis Wikipedia*. Verlag Klaus Wagenbach, Berlin. 2014.

61 Rider, F.: *The scholar and the future of the research library, a problem and its solution*. Hadham Press, New York 1944, p. 8.

62 de Solla Price, D. J.: *Little Science, Big Science*. Suhrkamp, 1974, p. 17.

63 Bornmann, L. / Mutz, R.: "Growth rates of modern science: A bibliometric analysis based on the number of publications and cited references." In: *Journal of the Association for Information Science & Technology*, 2015, vol. 66, issue 11, pages 2215-2222.

and their mainframe computers played a crucial role in building an inter-university communications infrastructure. The basis for this infrastructure was first developed in the United States in the late 1960s. In the beginning, experiments were undertaken in methods of electronic data transfer, called “packet switching,” and networks of mailboxes; the technology, however, remained limited to a small circle of experts.[64]

Based on these structures, the ARPANET was created in the late 1960ies, out of which the internet grew.[65] It arose in the USA as well, out of a consortium of a number of universities and a technology-oriented research center. Its goal was to ease scientific exchange. That effort evolved into a country-wide communications network among universities that enabled all of the researchers, doctoral candidate and other students with accounts to send, contribute to, or comment on research notes and articles. Over the course of time, universities on all of the continents started to participate, including those that to a certain extent had their own infrastructures for electronic communication. In 1990, the National Science Foundation in the USA decided to open the internet and make it available to the public outside of the universities. The universities continued to provide the key nodes of the network that processed electronic communication via e-mail.[66] In Germany, the first piece of internet e-mail was received in 1984 by the Technical University of Karlsruhe. Since then, e-mail has massively shrunk the time necessary to exchange information and simplified the paths that it takes. Today, it is the preferred information and communication system for the whole world.

The real breakthrough for the digital networking of the world took place in 1991 with the publication of the foundations of the World Wide Web at the large European research institution CERN.[67] The intention was to make research results available, around the world and in an easy-to-use form, to all of the researchers participating in CERN projects. That was achieved with a document structure that included hypertext elements, so that research results on various servers at different universities and research institutes could be linked to each other.[68] From its inception, it was conceived as a free realm that any person could have access to. With this free access and the possibility of exchanging information over the World Wide Web, the number of internet users grew rapidly – also outside of universities and research institutes. In 1997, roughly 121 million people around the world used the internet.[69] In the years since, that number has grown to 3.6 billion.[70] Out of those, roughly 2.6 billion users are connected to the internet via mobile devices, and that trend is rising sharply.

64 Abbate, J.: *Inventing the Internet*. MIT Press, Cambridge. 1999, p. 7ff.

65 Hafner, K. / Lyon, M.: *ARPA Kadabra oder die Anfänge des Internet.* dpunkt.verlag, Heidelberg. 2008

66 Hafner, K. / Lyon, M.: *ARPA Kadabra oder Die Anfänge des Internet.* dpunkt.verlag, Heidelberg. 2008, p. 166f., p. 224.

67 Berners-Lee, T.: *WorldWideWeb: Executive Summary. Message posted to alt.hypertext news group announcing the World Wide Web*. 6 August 1991.

68 Berners-Lee, T.: *Der Web-Report*. Econ Verlag, Munich. 1999, p. 11.

69 Statista, https://de.statista.com/statistik/daten/studie/186370/umfrage/anzahl-der-internetnutzer-weltweit-zeitreihe/ accessed on 14 March 2017.

70 http://www.internetlivestats.com/

The new information networks that arose in the universities enable trans-disciplinary communication and cooperation that until recently was only possible in a limited form. Today, online publication archives, scientific forums and blogs or social networks such as Facebook, Twitter and others drive scientific collaboration forward exponentially. The opportunities in communications and information technology make the genealogy of research and development significantly shorter. Disruptive changes can be unexpectedly unleashed, in part from distant or dissimilar fields of technology, which means we are experiencing co-evolution of scientific disciplines. The universities, particularly the technology-driven disciplines, naturally form a point of connection in this co-evolution. Tied into social networks as they are, they make this global exchange of knowledge possible. Universities and research centers – one can correctly claim – are the nuclei of the digital revolution. In the future, they will need to extend their capabilities for society and the economy even further.

With the increase of knowledge and with digitization, the amount of global traffic has also increased. Today 1.16 billion web sites exist, and five new ones go online every second. Further, every second 42.8 gigabytes of data are moved on the internet, 59,000 Google searches undertaken, 68,000 YouTube videos are watched and 2.5 million e-mails sent. Per day, that amounts to the frankly unimaginable amount of roughly 3.7 petabytes of data. By 2020, the volume of data traffic will rise to 40 zettabytes (a number with 21 zeroes).[71] The total volume of data that is collected in this process doubles roughly every two years. In other words, in the next two years as much data will be generated as in all of time before.[72]

In light of Big Data, it is clear that digitalization has become one of the most important drivers of innovation and change in society and the economy. Technological change is racing forward with uncanny speed. The technologies that will in the (near) future change our lives and work the most include, among others: self-driving vehicles, virtual reality, chatbots, speech recognition and humanoid robots. The systems that are being applied are increasingly able to learn and to react on their own to external conditions. Artificial intelligence (AI) and machine learning will thus be integrated into the devices that people use daily. The internet of things and industry 4.0 are taking clearer shape. To this are added an increasing fusion of human and machine. In research, so-called "brain gates," implants in the brain, have already been in human testing for some time. These make it possible for the stimulus of electrical impulses, "read" from neurons to be translated into computer commands and thus, for example, to guide movements. Applications of these neuron-steered functions are already used in numerous forms of regenerative medicine.[73]

---

71 Wirtschaftswoche (4.4.2017): Weltweite Datenmengen verzehnfachen sich bis zum Jahr 2025 gegenüber heute; Mayer-Schönberger, V.: *Big Data. Die Revolution, die unser Leben verändern wird*. Redline-Verlag, Munich. 2013

72 EMC (Ed.): *New Digital Universe Study Reveals Big Data Gap: Less Than 1% of World's Data is Analyzed; Less Than 20% is Protected*. Press release of 11 December 2012, available online at http://www.emc.com/about/news/press/2012/20121211-01.htm

73 *Süddeutsche Zeitung*: "Maschine lernt denken." 21 September 2017, p. 13; Eberl, U.: *Smarte*

Research has been and will be inspired by digitalization and Big Data not only in medicine and the natural sciences. The digital revolution, and with it the availability of enormous amounts of data are affecting research *per se*, and are leading to fundamental changes in all scholarly disciplines. As far back as 2001 Pieter Drenth, president of the *All European Academies* (ALLEA), deduced that all branches of scholarship would greatly profit from the opportunities presented by the developments in modern electronics and computer technology.[74]

Today, knowledge if shared with the public on a scale that was never before possible. Open-access initiatives and open data – that is, publications and data in repositories that are open to the public, as well as openness even at publishers – are increasingly required and are progressively establishing themselves. The possibilities and capacities for storing and manipulating data are, in turn, being continuously expanded. Data banks allow systematic and automatable access to specific results of research as well as underlying data. Further, in the near future, researchers will not longer (have to) seek out data that are relevant to them; instead, they will automatically receive information that is relevant to them based on individualized research and career profiles. Specialized algorithms and AI, like the ones that have subtly slipped into our daily lives in the form of customized product, travel, movie and book recommendations, could similarly filter the vast amount of publications, data and other information, making it useful for individual researchers. Thus the enormous amounts of raw data that are generated every second will, in the future, be more readily accessible and more applicable for scholarly purposes.

THE DIGITAL REVOLUTION: OPPORTUNITIES AND RISKS FOR UNIVERSITIES AND HIGHER EDUCATION INSTITUTIONS

Digitalization is already reaching deeply into our societal structures. Universities, as key social institutions, are thus involved in these transformative processes in many ways around the world. They are both drivers and affected. Since the scientific revolution, universities have been central nodes in global networks of knowledge. With the technical possibilities and advancing digitalization, that is even more so today. The term "university 4.0" is a synonym for the digital transformation in the tertiary education sector. It embraces the areas of research, teaching and administration in equal measure. The transformation holds many challenges that higher education and research institutions will have to come to terms with as a result of digitalization. However, it also holds great potential and opportunities.

Maschinen: Wie künstliche Intelligenz unser Leben verändert. Carl Hanser Verlag, Munich. 2016, p. 212ff.; Harari, Y.: *Homo Deus. A Short History of Tomorrow.* Harvill Secker, London. 21 September 2017, p. 13, p. 307ff.; *The Economist*: "Artificial intelligence: From not working to neural networking." Print Edition, Special Report, 25 June 2016; *Neue Zürcher Zeitung*: "Das Flüstern der Dinge: Im Internet der Zukunft kommuniziert alles mit allem." 27 April 2016, p. 21.

74 Drenth, P. 2001; "Die digitale Revolution in den Wissenschaften: ein "mixed blessing". Festvortrag anlässlich der Verleihung des Lautenschläger-Forschungspreises der Universität Heidelberg.

Digital technologies, Big Data, and new communications and information technologies have brought about revolutionary changes in scholarly research. The global exchange of information makes it possible to call up and compare data, results and scholarly publications in, so to speak, a matter of seconds. Open access, open data, open source, social media platforms, open evaluations, and open research are the key for ever-shorter development cycles in research and innovation.[75] Globally networked structures in scientific projects are on the agenda nearly everywhere. The research process as a whole is being revolutionized by the easy availability of research data and the global transfer of research results.

That has also strongly affected the business models of specialized scholarly journals. The scholarly currency of "publication" is thus undergoing a certain reorganization and/or reformation. In 2009, the term "nanopublication" was already in use, referring to the smallest unit of publishable information.[76] It contains precisely one proposition that can be uniquely identified and can be traced back to the author. Nanopublications are usually open access (available to all) and are published in a machine-readable format so that they can be automatically processed.[77]

The enormous number of academic publications further requires particular attention to the quality of the publications, which does not always keep up with the quantity. The German Council of Science and Humanities called attention to this aspect in a position paper.[78] Not only the sheer number of publications, but also practices in citations, intransparent authorship, and publishing practices that influence the scholarship were all critically scrutinized. The Council called for a return to more scholarly probity and less pressure for academic output. Alongside these demands were premises for new formats for the production and publication of scholarly work, for new peer-review processes, and for evaluation methods, all of which should be developed in parallel.

In light of the speed of technological possibilities and the dynamic changes in scholarly means of production and (publication) structures, one may presume that the ways that data and research results are today generated, collected, organized, documented, published, and applied will continue to be fundamentally changed. The crucial point in all of these developments must be to maintain high academic quality.

The key characteristic of all continental European universities – the unity of teaching and research – is under visible tension. There are great challenges in digital teaching within a context of research results that are generated at an ever more rapid pace. Developments concerning differentiation within the system of higher education attempt to use new structures to address this tension, but in taking up the topic they

---

75 OECD: *Stimulating digital innovation for growth and inclusiveness*. OECD Publishing, Paris. 2016, p. 32.

76 Mons, B. / Velterop, J.: *Nano-Publication in the e-science era* (2009). https://www.researchgate.net/publication/228675568_Nano-Publication_in_the_e-science_era

77 http://www.w3.org/TR/PR-rdf-syntax/ "Resource Description Framework (RDF) Model and Syntax Specification"

78 Deutscher Wissenschaftsrat: *Positionspapier. Empfehlungen zu wissenschaftlicher Integrität* (Drs. 4609-15). Bonn, 2015.

open up discussions about the fundamental tasks of universities and other institutions of higher education. Many would like to compare themselves to American universities. In basic terms, the structure of a university according to Humboldt's definition has, since the late 19th century, been the model in the USA and Asia. A direct comparison with the more than 1000 universities in the United States is, however, not easy to make, and the Humboldt model is not the reality at all American universities, not by a long shot. Only about 15 percent of all students in the USA have matriculated at research universities, and approximately 2 percent complete their studies with a doctoral degree.

By comparison, in Austria roughly 80 percent of students are at a research university, and approximately 8 percent complete their studies with a doctoral degree. On the other hand, the three-step degree architecture introduced by the Bologna Process – comprised of Bachelor, Master, and PhD – is not completely congruent with the structure in the American system of higher education. Differentiation into research and teaching universities, as has traditionally and successfully been practiced in the English-speaking world, can thus not be fully imported as a model for continental European universities. A discourse about differentiation in the European sector of higher education should thus develop its own dynamics.

One of the drivers of this discussion is increasing "massification" in higher education. An improvement in the overall conditions and structural changes in the higher-education sector are parts of the reform efforts. The increasing availability of digital technologies is also a part of the solution, not only in teaching but also in administration. In contrast to science, where the use of digital technologies has been obvious for longer, and where the application of digital technologies is now an integral element of research, innovative changes in the forms of teaching still uncommon. One reason for this might be that teaching, regardless of its quality, generally does not lead to an improved reputation – neither for the individual teachers nor for the universities as a whole. Achievements in research are primarily what is relevant for a career or for a university's renown. Achievements in teaching are seldom rewarded. Under these conditions, new formats for learning and the use of digital media are spreading rather slowly, and the use of innovative approaches to transmitting knowledge remains, as before, a matter of baby steps. Although MOOCs (massive open online courses) effected an innovative leap in the dissemination and preparation of digital courses as far back as 2011 – Sebastian Thrun, a professor at Stanford University, former head of research at Google and co-founder of the online academy Udacity[79] is considered the "inventor" of MOOCs – at most institutions of higher education, at least in the German-speaking countries, these have to date played only a secondary role.[80]

As quality further improves, this medium will most probably gain in importance. In the meantime, a large number of mainly American universities offer MOOCs, which offer millions of users the opportunity to complete a university program online.

---

79 www.udacity.com

80 Schmid, U. / Goertz, L. / Radomski, S. / Thom, S. / Behrens, J.: *Monitor Digitale Bildung: Die Hochschulen im digitalen Zeitalter*. Bertelsmann-Stiftung, Gütersloh. 2007.

A concurrent factor of this development is the ability to call up contents independent of time or location. The course of studies can, so to speak, be pursued from anywhere in the world and at any arbitrary time. The added value of digital technologies is, however, increasingly in the application of didactic options that can contribute to qualitative improvement in teaching. Blended learning, virtual classrooms, mobile apps, simulations and social networks are just a few of the (learning) formats that are newly arisen and which are being steadily further developed. At the moment, they are in most cases just pilot projects in which digital technologies are recognized and put to use as innovative instruments. Excessive expectations with regard to improvements in our cognitive abilities are out of place here, but the sensible use of these tools will change both learning and our interaction with information and data.

But the future needs more than just technical solutions. In particular, the speed with which technologies change poses questions about which contents, in addition to profound subject knowledge, students in the individual disciplines must be offered, which skills should be more clearly focused on in higher education, and how today's students can be supported so that they can have the best preparation possible for dealing with new technologies and future challenges.

The requirements for that reach far beyond electronic storage of learning materials. With the possibilities of web 2.0, that is, the combination of digital media and the internet as a platform for social interaction, the type of communication has changed dramatically.[81] In particular for self-organized learning many students count on social media: 42 percent use chat services, 41 percent forums and blogs, and 29 percent use social media for learning.[82] Contents can thus be made available independent not only of time and location, but users now have the ability to become producers of content themselves, at any time, and not just passive consumers.[83]

We are thus in the midst of a dynamic process for the advancing development of new possibilities in learning and education. There is no shortage of idea about how knowledge could be transmitted in the future. More and more teaching materials are being made freely available by universities. One outstanding project is OpenCourseWare, which is supported by the Massachusetts Institute of Technology (MIT). Every month, roughly 2 million users visit this platform and use its contents. It thus makes a significant contribution to the democratization of higher education. Experiments are also being undertaken with "peer-to-peer learning" (P2P) and with "gamification," whereby new spaces for learning and experimenting are created in combination with social networks. These and other developments will shape and change the tasks of the university even more in the future than today. The universities are at the center of all of these developments, and must be put into a position to anticipate global changes,

---

81 O'Reilly, T.: "What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software." In: *International Journal of Digital Economics* No. 65, March 2007: pp. 17–37; Elkana, Y. / Klöpper, H.: *Die Universität im 21. Jahrhundert.* Körber-Stiftung, Hamburg 2012, p. 419.

82 Schmid, U. / Goertz, L. / Radomski, S. / Thom, S. / Behrens, J.: *Monitor Digitale Bildung: Die Hochschulen im digitalen Zeitalter*. Bertelsmann-Stiftung, Gütersloh. 2007.

83 Elkana, Y. / Klöpper, H.: *Die Universität im 21. Jahrhundert.* Körber-Stiftung, Hamburg 2012.

proactively react to the Grand Challenges, and consequently create and co-determine new trends in teaching and research.

FINAL REMARKS

Digitalisation, Big Data, artificial intelligence, the internet of things, web 5.0 – the digital transformation will further change the world. Education and research will decide what we make of it. And the universities will play a crucial role in this process. More than ever before, today's universities function as global knowledge network hubs, as central nodes in the world-wide knowledge networks of the modern academic landscape. As a result, universities are particularly challenged to address the consequences of the digital revolution and technological transformation that they themselves have brought into being, to take a position on the new circumstances, and to seize the new opportunities. New forms of scientific research and cooperation will be unavoidable in this task, because the new challenges will not be solved solely within the STEM disciplines.

Even more strongly distinct interdisciplinary cooperation will be necessary. Ultimately, it will also be a matter of addressing philosophical, ethical, moral, economic, legal, social, political, and other questions that the digital world will confront us with. Demands are being made not only on researchers and universities – the support for research and thus research and innovation policy must react to the coming changes by creating the conditions that make this constructive cooperation possible. Above all, it will be necessary to allow for more risk so as to support ideas that today may still seem crazy and impracticable, but may tomorrow change our lives.

The physicist and Nobel laureate Niels Bohr is reputed to have once said that predictions are difficult, especially about the future. Bohr was certainly correct in this assessment. Naturally, we cannot now what the future will actually look like. But we can make arrangements and create conditions that allow us to react flexibly to future developments. And we can work to shape our futures ourselves – just as universities have done again and again since the scientific and industrial revolutions. It may be inappropriate to demand a new Renaissance from the universities. But if it is possible to combine with each other grounded experience, unrestrained curiosity and open thinking so that new things may arise that make a contribution to solving the grand challenges of our time, that in itself is a considerable achievement.

Short Biographies

HANNES ANDROSCH, born 1938 in Vienna, former Vice Chancellor and Federal Minister of Finance of the Republic of Austria, former Director General of the Creditanstalt, is today an industrialist. He holds several honorary doctorates and is regarded as Elder Statesman in Austria. Hannes Androsch is author and editor of numerous publications. In his self-understanding as a citoyen, he is committed to social, economic and scientific policy. Among other things, he is initiator of a petition for a referendum on education, President of the Supervisory Board of Austrian Institute of Technology (AIT) and Chairman of the Austrian Council for Research and Technology Development (www.androsch.com).

JOHANNES GADNER is Deputy Managing Director of the Austrian Council for Research and Technology Development. Since 2011, he is managing the preparation of the annual Report on Austria‘s Scientific and Technological Performance Capability. As a scientific advisor, he supported the Federal Chancellery's RTI Secretariat in 2010 in the development of the federal government's RTI strategy. Prior to this, he worked in the field of social science research at the University of Vienna, the University of Innsbruck and the University College London (UCL), and as a political advisor for research and innovation politics of the Green Party faction in the Austrian Parliament.

ANTON GRASCHOPF is scientific advisor of the Austrian Council for Research and Technology Development since 2009. His fields of activity cover the university development and university policy, life sciences, the promotion of basic research funding and open access strategies. Anton Graschopf holds a PhD degree in molecular biology. As a postdoctoral fellow, he was principal investigator in several research projects at the Research Center Max F. Perutz Laboratories (MFPL) of the University of Vienna and the Medical University of Vienna, between 1999 and 2009.

This report is originally published in German and has been translated into English.

15.

A EUROPEAN DILEMMA? THE DISINTEGRATION OF EDUCATION, RESEARCH AND COLLABORATION

Mats BENNER & Sylvia SCHWAAG SERGER

Lund University and KTH Royal Institute of Technology

ABSTRACT

European countries founded the modern (research-based) university, but are currently at risk of obsolescence. Underfunded educational functions disarticulated from a research function, and fragmented conceptions of societal interaction are the main expressions of this. We build this text on the evolution of Swedish universities in the period from 1930s onwards – a move from a relatively stable interaction between education, research and interaction to a much more fragmented and complex layering of tasks in an uncoordinated manner. We view universities as complex bundles of activities, whose integration depend on integrative mechanisms at the level of governance, funding and practice – if such alignments are not orchestrated they will not be achieved. Orchestration mechanisms, however, may vary – they can be embodied and based on informal coordination, or they can be achieved via organization and leadership. Sweden, and many other European countries also, do not have either of these and may want to look to mechanisms that can foster task integration at various levels – if they take the challenge of articulating education, research and collaboration seriously. We argue that universities that thrive in a globally comparable and integrated market for attention and leverage are constituted by the powerful interplay between these three – and that academic and academic environments are critically dependent on task integration for their further development.

INTRODUCTION

European universities formed the template for the “second academic revolution” in the late 19th century, by establishing universities as the primary site for knowledge production in addition to places of learning and social interaction (as the first academic revolution in Paris and Bologna in the 11th century). European universities also developed and evolved in parallel with the rise of modern bureaucracies and market economies, which set a specific imprint on how science was being done, how educational programs emerged and how policies and practices were shaped (Wagner, Wittrock & Whitley 1991, Fourcade 2010). The postwar period has witnessed the gradual demise of European dominance in global university development. North

American universities were historically hampered by a mixture of lax educational standards, weak employment relations and flawed financial underpinnings for research (Lucas 2006). A combination of social forces and institutional mechanisms reignited the North American university model in the postwar period. This included enhanced societal articulation via state funding (especially pertaining to defense and energy), the transmission of governance models from the private sector to universities, the expansion and widening of educational remits in the 1950s and 1960s and the parallel professionalization of training programs, the elaborated division of labor between public and private universities and between universities of different status tiers, and the concomitant stabilization of academic work and academic identities via the introduction and institutionalization of tenure track employment (Augier & March 2007, Lucas 2006, Douglass 2000, Altbach 2016). This mixture of forces and institutions did not evolve according to a preconceived plan, but altogether it created a durable and self largely self-sustaining university species (Martin & Etzkowitz 2000, Cole 2010). The forces were also successfully molded and shaped by academic leaders who created niches and models for universities to thrive and take on specific roles and forms of engagement within their different tasks. This species, successfully setting a global standard for universities (Marginson 2006), is in itself fraught with potential contradictions, some of which are the declining reach of the same tenure track model and the rise of unregulated employment – research-only, teaching only, excessive managerialism, financial excesses and withdrawal of state responsibilities for public universities, and so on. The US system is therefore also susceptible to contradictory tendencies.

Along other lines, the Asian university species is currently representing another contender for global dominance. It too offers a specific take on the intersection of education, research and collaboration, based on the mixed private-public funding of education, state-supported research (largely tied to national initiatives and programs with social and/or economic articulation), and broad-based experimentation in alignment with entrepreneurship and marketization in addition to the tightly knit networks with the national modernization programs and a close policy alignment, at least among elite institutions. Additional elements are stringent managerial techniques to propel international visibility and a growing focus on international recruitment – not least through repatriation from Europe and North America (Marginson, Kaur and Sawir 2011). Asia is certainly not homogeneous – the above holds more for China, South Korea, Hong Kong, and Singapore than, say, Japan or India. Also the Asian university model, in its all variation, is susceptible to internal antinomies: while it has successfully harnessed the combined forces of a traditional reverence of teaching, state-led economic modernization plans channeled through large scale research programs, and aggressive recruitment, it may overstate the long-term impact of centralized program support, and put an overly strong emphasis on only a few select universities instead of building an academic ecosystem (Schwaag Serger, Li and Benner 2014).

The European university has been challenged in waves. The primacy of research is no longer a specialty of European universities. Judging from the available statistics, European universities – with the exception of a few outliers – do not excel when it comes to high impact sciences: The top 10 global universities as measured in scientific impact (top 10 per cent) are all from the USA (Leiden ranking 2016; http://www.leidenranking.com). Of the top 100 global universities measured the same way, a third are European (ibid.). Asian research organizations, while yet modestly impactful at the institutional level, show mounting influence at the level of individuals and specific areas of investigation. In fast-moving fields (primarily in engineering and natural sciences) like neuroscience and materials science, institutions in Singapore, China, South Korea have rapidly risen to global excellence.

At the same time as the global university landscape is being reshaped, international competition for talent and knowledge and innovation resources is increasing. Companies' research operations and networks are becoming more mobile and more global (Athreye and Cantwell 2016). Students, particularly from Asia, shop the world for the 'best' academic organizations.

If Europe's research supremacy has been – temporarily or permanently – lost to the US, might Europe instead be a hotbed for educational development and reform? After all, European countries are among the few to offer education at no or only minimal tuition fees (with the notable exception of the UK). European university systems tend to operate with unitary – non-divided – systems of educational offerings, meaning that academic education is offered widely and often under strict national regulation, and with a broad coverage ranging from the classical academic subjects to professional education.

However, European universities seem to lag behind also here, though we lack well-established comparative performance indicators. The overarching picture that evolves from the myriad of studies of European higher education (cf. Regini 2011) is nonetheless one of underfunded, overregulated systems and with increasing disarticulation with research – as European countries have increasingly (and yet unsuccessfully) channeled growing resources to research to meet the North American and Asian challenges while keeping expenditure of education stable (and infusing new mandates and expectations on it). And even the hallmark of European higher education, access, seems to be failing as increased financial stringency has led to narrowed recruitment patterns which undermines social mobility (van Vught 2009). Despite the mounting engagement with employability of European students, the articulation with labor markets seems not to have been enhanced, although this might partially be explained by labor market regulation and lacking economic dynamism more generally. European universities are also struggling with addressing the challenge of adjusting curricula, learning and teaching methods to a changing society, technological and global context. Some of these issues European countries share with other continents, as evidenced for instance in the stagnating social mobility for US students, and the weak relationship between employment and higher education degrees in, for example, China.

Collaboration, then? European universities are located in the complex terrain of European societies – with expensive welfare systems, densely regulated labor markets, large public sectors, and in addition a complex layer of regional supranational collaboration (Crouch 2016). Many of the European countries have developed their research systems in parallel with societal modernization. A case in point is Germany, which is often portrayed as the exemplar of intra-academic virtues becoming institutionalized (the Humboldtian model). This historical account leaves out the articulation between German universities and the dynamics of industrialization and state-creation in Germany in the 19th century, which gave rise to techno-scientific areas such as organic chemistry, and created a model for research-intensive and socially embedded universities for pioneering institutions in the US (Clark 2007).

On this dimension as well, Europe seems to linger in comparison with the US in particular, but also with many Asian countries. European universities were "civic universities" and stood strong in their articulation with state interest as long as states functioned as their exclusive patron. With the growing complexity of the European higher education landscape and the ensuing declining capacity (and willingness) of governments to fully fund and support the civic model, many European universities have been enticed and incentivized to seek new sources of revenue and legitimation beyond the dyadic relation with the state. The evidence so far shows that this entrepreneurial turn has not been fully institutionalized (e.g. King 2013, Palfreyman & Tapper 2014, Stensaker and Benner 2013). Meanwhile, US universities continue to develop dense networks and exchanges with their environments, aligning their operations with those of societal partners (cf. Lowen 1997, see Mirowski 2012 for a more critical reading). Originating partially in the tradition of civil service examinations, Chinese universities continue to be characterized by a strong orientation to the needs of the state. This is to some extent explained by the government's tendency to organize and fund a significant part of research at universities in 'major state projects', but also by what Hayhoe (2011) calls "the scholar's sense of social direct responsibility" (p. 17), a historical "orientation towards the primacy of applied social knowledge" (Zha 2011, p. 23) and a strong tradition of "intellectual authority" and "intellectual freedom" which Hayhoe (2011) distinguishes from 'academic freedom' which defines as the following:

> [It]... is rooted in an epistemology quite different from that of European rationalism. It requires that knowledge be demonstrated first and foremost through action for the public good, also that knowledge be seen as holistic and inter-connected, rather than organized into narrowly defined separate disciplines. Chinese scholars find it difficult to limit their criticisms to theoretical debates, but feel called upon to demonstrate them in action, and many have paid a high price for this (p. 17).

How can this pattern of relative decline among European universities be explained, and the obvious dilemma – that European universities (unlike North American and Asian) fail to leverage on the basis of their societal location – be understood? In this paper, we locate four underlying dynamics which underpin dynamism in universities: funding, governance, professional identity, and mobility.

The first pertains to their funding: largely funded by government appropriations, state funding to universities comes in different portions for different purposes. Second, the leadership of universities in Europe is widely dispersed and distributed – no overarching direction but rather a fragmented response to different steering signals.

Thirdly, the concomitant hollowing out of a unified professional identity as the different tasks of university teachers are compartmentalized and governed in separate streams. Fourth, there is, despite the plurality of European societies, limited mobility, between academic institutions, between academia and society at large, and between academic identities.

Admittedly, these dynamics to some extent reflect our conception of what universities are and what they should be; they also reflect a particular historical conjuncture, the rise of the Anglo-American university model, with a quite distinct funding base, leadership model, professional identity, and pattern of mobility (Marginson 2008). This model is certainly not without flaws or internal contradictions – some of which will be outlined below – and the European dilemma is in itself a reflection of forces that lie beyond the constricted area of university governance (Crouch 2016).

Understanding university dynamics

In his *The Higher Education System* (1983), Burton Clark outlined a triangle-shaped typology of university governance, where the state, the profession, and the market form three ideal-typical positions. This afforded a malleable context of university governance, where professional dominance, market dominance or state dominance emerged as distinct ways to govern higher education and research. In some countries, state regulation played the upper hand in the shaping of education and research profiles (Sweden was Clark's ideal-typical example), while the US, with its lack of a policy center and quasi-market for students and faculty showcased a market-oriented model; Germany and Italy were examples of higher education systems primarily organized around the professional autonomy of its faculty.

While the pattern was blurred already at the time of formulation (for some of the contradictions in Sweden, see below), the ideal-typical positions have been shaken as elements of marketization have penetrated also systems of state dominance, while the role of state regulation has challenged professional autonomy; in market-infused system like the North American, professional self-organization has been supplemented by a growing bureaucratic layer of regulations.

The positions identified by Clark within the state-market-profession triangle reflected the policy configurations at that time, and has since been subjected to a series of interrelated pressures: regulatory convergence (ethical vetting, employment conditions, etc.), international standardization of educational curricula and research communications, and the relative decline of the "strong state" and the concomitant rise of governance and interest orchestration also among states of social democratic observance. This notwithstanding, Clark's model still holds as it outlines the forces that shape the governance of higher education, research, and collaboration. It needs, however, to be complemented by a task centered approach, where education, research and collaboration are understood as intertwined but differentiated tasks operating within the triangle of states, markets and professions. We thus need to integrate how the tasks are defined, governed, and funded at different levels, ranging from government to academic departments in order to understand how they are aligned (for a historical account of the university mission and academic identities see Rothblatt 1985, Clark 2007). We might theoretically infer different articulations between the tasks, ranging from hegemonic relations (dominance by either of the tasks) over dyadic relations (intertwining of two tasks and marginalization of the third), over to triadic interdependence and mutually reinforcing relations. Such variations in “systemic integration” (Mouzelis 1997) reflect many underlying forces, but one is the national regulation of universities – including how funding is allocated, how employment and promotion systems operate, and how universities are governed.

Theoretical elaborations will lead us some way in understanding task alignment, but the dynamics in the intersection of the three tasks call for a historical perspective where we outline how they have been constituted over time. We draw on the Swedish experience but end with some constricted comparisons with other systems as well and the forces behind task separation and integration there.

SWEDISH UNIVERSITIES FROM STATE-CENTRISM TO SELF-ORGANIZATION

In this section, we look at the dynamics of education, research and collaboration, as separated but interrelated, activities in the postwar period. Our argument is that the three formed a relatively coherent whole until circa 1970, and that they have since developed in relative separation to one another.

The Swedish educational system developed in a similar manner to most European countries, serving three purposes: supporting the state and the municipalities with an educated workforce (judges, doctors, clergymen), catering to private interests (in particular engineering and business), and finally providing general education in the arts and sciences (Svensson 1987). Within these broad confines, professional autonomy was considerable, and individual professors in practice controlled their respective fields in terms of the educational content (Björck 2008).

The educational model often enabled the interplay between educational programs, research, and societal collaboration as these professors spanned the three in their practices (if not necessarily by design). At the engineering schools, which Björck (2008) has analyzed, professors bridged industrial and academic interests and often had a background in industry and sometimes continued their corporate commitments within the academic positions. Even in more traditional areas like physics, universities functioned as a clearing house between academia and society at large, and the main role of academic physics departments was in practice to supply the Swedish school system with qualified teachers (Kaiserfeld 1997).

Research was interwoven with other activities as professorships were mostly incepted to meet and match demand for education; only exceptionally were professorship established only to cater to research interests. Professors enjoyed singular autonomy in their everyday activities, with unconditional tenure and large financial leeway (including the right to accept PhD students); chronicles of Swedish academic environments are replete with narratives of "professorial autocracy" (Frängsmyr 2004). Some institutional examples also showcase a degree of research-drift: for instance, Stockholm University was incepted to foster research, while the education provided at Stockholm was examined at the two older universities, Uppsala and Lund (Widmalm 2001). Seven research councils were established in the 1940s to enable professors to expand their research activities, and to reduce their often quite strenuous responsibilities for tutoring and examining students (Weibull 1968). The overall picture is more mixed though, showcasing not only that research served as an underpinning of education but also that it often intersected with societal interaction of various sorts – and that the academic environments were more often than not infused with external contacts to expand and modernize their research activities. As a case in point, the first chairperson of the Natural Science Research Council, Arne Tiselius (Nobel laureate in chemistry 1948) was instrumental in shaping an ecosystem of corporate spin-offs around the Department of Biochemistry at Uppsala University – a partnership that lasted for several decades with an intense two-way traffic between academic and industrial activities involving exchange and sharing of staff, instruments, and materials (Widmalm 2014). The transformation of Swedish economic policymaking in the 1930s emerged in parallel with advanced theories and methodologies for the determination of economic cycles, done within the so-called Stockholm School of economists based at Stockholm University. Many prominent economists migrated between the policy system and academia – for instance Dag Hammarskjöld (as state secretary at the Ministry of Finance), Erik Lundberg (as Director General of the National Institute of Economic Research) and Ingvar Svennilson and Gunnar Myrdal as experts for the United Nations and the Organisation for Economic Cooperation in Europe (Petersson 1987). Swedish medical researchers partook in the modernization of several clinical techniques at the time, including the development of pacemaker, the gamma knife for brain surgery, medical ultrasonography, and the artificial kidney. On a more practical level, clinical medical professors were appointed not merely to teach and conduct research but also to lead large clinical undertakings (Westling 2003). University cities like Lund and Uppsala often had leading academics in their governing bodies, seamlessly switching roles from academic to societal governance (Ottosson 2011). And, finally, Swedish universities already in the early 1900s offered complementary education to professions and to the "enlightened citizenry" (Sandholm, Fasth and Wallin 2012). The boundaries between academia and society were indeed fluid.

Collaboration and boundary-spanning were however not banners for Swedish universities in this period. At the level of organization and governance, Swedish universities displayed the typical pattern of academic oligarchy and stringent state regulation. Behind the stale and traditionalistic surface, societal embeddedness was a shaping force where collaboration formed the missions of universities in this period. More often than not, universities functioned as social hubs with tight and recurrent relations with adjacent interests, in industry and in government. This pattern is a reflection of tightly woven social and professional networks (where the top echelons of Swedish society were closely linked and networked), a rationalistic and goal oriented political culture and forces of national mobilization around certain modernization projects (state building, industrialization, bureaucratization). Hence, academic work was embedded in a productivist, network-based and informalized political culture (cf. Hermansson 2003). This lasted more or less unscathed until the late 1960s, also under the long-term social democratic rule which profited from the tightly interwoven networks in its reform programme rather than seeking to disband it (Therborn 1989).

Then something happened. In the early 1960s, the lenient and integrated model based on self-organization as outlined above was reaching its limits. The salient issues of the day were to meet growing educational demand, to integrate universities into the overall project of societal modernization in Sweden, and to align academic and industrial activities in expanding areas. Neither of these could be contained easily.

Educational expansion was initially intended to be met with a modernized recruitment system, based on a two-pronged approach: the educational responsibilities should be transferred from professors to a new group of teachers – university lecturers, holding a PhD but with only limited responsibilities for research. Professors on their side should be relieved from some of their educational responsibilities, and be recruited in a tenure track model for recruiting faculty with a larger share of research responsibilities. Other, more integrated recruitment models were discussed at the time (along the lines of the US tenure track model), but the overall opinion was that research risked being swamped by the growing education remit, and that a research-based "professorial tenure track" was necessary to protect the space for science. Education, on its side, was to be managed by cadres of university lecturers with no or only limited research opportunities. The solution seemed practical at the time, but in effect created a dual academic career structure were research and education were seen as separated activities, best pursued in relative isolation (Andrén 2013). It also installed a wedge between different conceptions of collaboration: for the research-oriented faculty, collaboration meant spin-offs and commercialization (or consulting), and for teaching-oriented faculty it meant articulation with existing labour market demand (Benner & Sörlin 2015). In this way, Sweden became somewhat of an outlier in Europe, where faculty continues to have integrated positions, blending educational responsibilities with guaranteed opportunities for research.

Even these slightly narrow plans for educational enlargement collapsed when the number of students at Swedish universities increased three times between 1960 and 1970, from 37.000 to 120.000. The segmented employment and recruitment system outlined above was sidestepped with a plethora of temporary positions to meet the mounting demand for education. The composition of the teaching staff changed dramatically in parallel; professors who had been the anchors of both teaching, research and administration (and, often enough, also in collaboration) were supplemented by not only the university lecturers but also by large groups of temporarily employed teachers, often with a basic degree only (SOU 1980:3). Not only did the composition of the higher education workforce change, but also its political sociology –professors were largely "freed" from educational responsibilities and saw their internal role and power position narrow (SOU 1981:29). In parallel, the governance of Swedish universities was completely overhauled, all the way from the micro-level to the macro-level. At the national level, a very lenient steering model with a university chancellor with a minimal administrative apparatus and only slight oversight of the university governance was gradually transformed into a full-blown planning apparatus (Neveus 1976). At the micro-level, professorial autocracy was turned on its head and Sweden became a precursor for widened participation in decision-making, with students and societal stakeholders taking place in educational and research planning matters (Andrén 2013). In addition, higher education was broadened significantly, when in the late 1970s professional education in areas like education, social work, performing arts, basic engineering, and caring were integrated into the higher education sector.

While the educational provision developed according to its specific logic (primarily an aggressive expansion and widening) in the 1960s and 1970s, research took on another path of expansion. The close alignment between university professors and research programmes (augmented by support from research councils) was complemented and overshadowed by a new layer of research saddled with a societal mandate. This was called programme or sectoral research, and covered areas such as work environment, technical development, substance abuse and building planning (Wittrock & Elzinga 1985). As we have seen above, such new funding streams had been creatively used to expand research activities also in the immediate postwar period – however expansion at this early stage was used to further it in informal tandem between university professors and patrons in government and industry. Programme or sectoral research instead cultivated environments working closely with state agencies – and their stakeholders – but with quite limited articulation with education and with the international research community (Ibid.). While research grew as an undertaking, it did so in disarticulation with education, and often in separated structures and with a bureaucratic mindset and orientation. It should be noted that this development cannot be attributed solely to the undermining effects of interventionist state bureaucracy. As mentioned above, university professors had been perceptive and receptive to societal changes in earlier periods, but they responded reluctantly to the surging interest in a widened societal role for research in the 1960s and 1970s (TCO 1970). Areas that caught the attention of policymakers and stakeholders – such as work environment and environmental degradation but also new techniques and methods with broad industrial ramifications such as molecular biology – were largely dismissed by the research councils and the academic oligarchy (Annerstedt 1972). The formerly so progressive Swedish research community had receded into comfortable positions and rejected change signals coming from within Swedish society or from international developments in science and technology.

Collaboration had been, as mentioned, an understated and seldom acknowledged feature of Swedish universities until the late 1960s when it was instead profiled as a new and explicit mandate for Swedish universities. The largely self-organized networking model mutated into a sectoral and corporatist model of collaboration planning. To some extent, the modus operandi was instigated to offset some of the effects of the rapid expansion of the Swedish university system – a system three time the size (between 1960 and 1970) could no longer rely solely on individual initiatives and informal relations. It also reflected the "primacy of politics" philosophy of the time (Berman 2011) where informal relations were to be substituted by formalized organizational arrangements under political oversight. The outcome of this first collaboration drive was mixed: while it fostered a large number of formal mechanisms, these often operated without clear missions and goals within their academic settings (SOU 1980:46). To make things even more complex, the new mechanisms for knowledge transfer (*forskningsinformation* was the term used) co-existed rather uneasily with the old regulation of intellectual property, *the professor's privilege*, retaining university teachers' ownership of inventions made in their work time.

Sweden moved rather quickly from the informal to the formal in the constitution of collaboration; it also to some extent loosened the interaction between the three missions: the massive growth in teaching commitment was matched with teaching-only position; research was expanded but largely in areas with only limited articulation with teaching; and collaboration was institutionalized as a separate activity rather than integral to teaching and research. It should be stressed that the renegotiation of the informal contract between academia and society was a reciprocal process. The growth of the public sector and the increasing complexity of private enterprise meant that relations were no longer personalized and entrenched in interdependent exchanges: Industry often acted opportunistically in its contacts with academia, while politics and the public sector pursued their interest, primarily dealing with fragile power balances and recurrent breakdowns in different societal sectors (Widmalm 2014). Medical clinics, industry, and the state apparatus were all in a flux, as was the formation of social capital of postwar Sweden, meaning that the very foundations of the informalized intersections of tasks and interests dissolved. Universities on their side were increasingly preoccupied with their internal organizational dynamics, with swelling administrative systems and intricate decision-making structures and power relations.

A RETURN TO THE COLLABORATIVE TRADITION?

In the 1990s, educational planning was largely dismantled and instead governed according to a mixture of individual choice and new public management (SOU 2015:70). In addition, education grew immensely, with another three doubling in the number of students, this time between 1990 and 2010. The overall direction of education has moved swiftly towards a market-based model, where government plays a subdued role, setting overarching targets for education and regulating the intake of a limited number of specific and critical professions, such as medical doctors, nurses and teachers. The universities themselves, in tandem with students expected to act as customers, are supposed to shape and mold educational offerings, offerings that are later – with long and uneven time intervals – evaluated, primarily to weed out substandard offerings (ibid). Teaching has expanded in quantitative terms but mostly in areas with scarce research resources – the social sciences and new universities in particular have carried the burden of meeting growing demand. And the educational offerings have been left largely to the universities themselves, which was intended to foster variation and pluralism, but seems to have been met with imitation and over-supply in popular areas and under-supply in others (ibid.). The governmental evaluation function has not functioned as a remedy here, targeting primarily the organizational framework for education rather than its articulation with societal interests or active research environments (and adamantly avoiding rewarding good performance).One indication of the malfunctioning of the current system is the retreat particularly by large, comprehensive universities from lifelong learning, a key prerequisite for societies in an age of rapid technological, social and economic change. Partially as a result of funding mechanisms, universities focus primarily on traditional programs educating young people (BA, MA and PhD), rather than on continued knowledge and competence development of adults throughout their professional career. This is all the more troubling as Sweden was actually a pioneer among European countries in affording lifelong learning, as we have seen above. The current educational model, however, allows little room for this vital societal function.

Research expenditure has, in the period from the mid 2000 and onwards increased rapidly with almost a fifty per cent increase in government appropriations between 2005 and 2017. The main bulk of this increase has been in the form of external, often project based funding, applied for by individual scientists or clusters of scholars. The funding system is also quite complex, with a large number of funders operating in parallel with mandates that sometimes overlap but often not, and with limited articulation and alignment (SOU 2008:30, Edqvist 2003). While this pattern may have stimulated pluralism and variety in the research system, it has not enhanced the articulation between research and education (or, for that matter, collaboration) as resources have largely ended up in environments with limited alignment with education. The connections with the public sector and industry also vary largely, and many of Sweden's best endowed research environments have neither corresponding educational commitments nor dense industrial or societal networks (SRC 2015). The composition of Sweden's leading research environments mostly reflect and mimic international trends and tendencies, which stands in some contrast to the profile of other small European countries like Denmark and the Netherlands, which set priorities that align their research profiles with those of adjacent industries and societal sectors (Öquist and Benner 2012). Hence, such countries have emulated Sweden's traditional template of alignment between university-based research and societal knowledge interests – and been richly rewarded for that, both in terms of scientific and societal impact (ibid.). Again, as in the case of lifelong learning, Sweden has abandoned its own traditions of integration between the missions, and in that process moved from a leading and inspiring position for other countries to an emulator of trends developed elsewhere.

Positions at Swedish universities have reflected the two-pronged resource expansion, where universities view teaching and research as activities that are based on student demand and funding market outcomes (SOU 2016:29). While this may again be seen as a pragmatic response to conditions set elsewhere, it has contributed to largely local and internal labour markets for academics, also for Sweden's most internationally oriented universities like the Karolinska institutet, and the universities at Uppsala and Lund (Bienenstock et al. 2014). In addition, it has cemented the Swedish tradition of compartmentalized academic careers: either in research or in education, but seldom in both.

The current governance of Swedish universities reflects a pragmatic ideal, even though continued devolution of responsibilities has been intended to foster stronger academic leadership. There is scant evidence of strengthened governance mechanisms at the level of universities – instead the pattern is one of weakened institutional identity work and directionality, leaving much of the responsibility for future developments with research groups (securing funding) and study directors (planning educational offerings), and with collaboration fulfilling a complementary but largely sidelined role (SOU 2015:92). A coherent academic identity, and a concomitant academic environment upholding an integrated academic ideal where the different tasks and missions interrelate, is quite distant even though many attempts are made in individual departments and among individual academics (Geschwind and Broström 2015).

The above patterns have also been accompanied by and led to two further centrifugal tendencies in universities. The first regards the interaction and cooperation across academic disciplines and faculties within universities, which can be argued to have been undermined by increasingly narrow education programs but also by external research funding that is organized according to academic disciplines. A further contributing factors has been a rather narrow view and practice of collaboration and impact that has been heavily focused on commercialization of knowledge or discoveries or advances in natural and engineering sciences, thus sidelining other academic subjects and distancing them from faculties in the former two disciplines. The other is the divide that has been created between national research and science policy and research policy for developing countries, the latter embodied in the research aid programs of the development agencies such as the Swedish Development Agency (SIDA). An OECD report from 1971 recommended that "problems relating to science, technology and underdevelopment be considered by Member countries as an integral part of their national science and technology policies" and advocated "formulating research programmes in favour of the developing countries in the laboratories of the advanced countries, as a part of science policy" (OECD 1971:106-107). However, the appeal to orient research in advanced countries more towards the needs of the developing world (e.g. regarding health, technology climate) was not heeded, and instead the de-articulation with societal needs on a global scale has continued (Edqvist 2009).

Collaboration was highlighted as a mission on par with education and research in the 1990s, and specific policies and policy measures have been devised to foster a growing awareness of the virtues of collaboration in general and the professionalization of collaboration governance more specifically – the underlying analysis being that Sweden is replete with good examples of nurturing collaboration but few institutional mechanisms for aligning education, research and collaboration (see for instance SOU 2005:95).

Collaboration has been addressed as a remedy and complement to the rapid rise in research incomes – there is a conception that collaboration, if properly addressed and profiled, will remind academicians of the need to harness forces outside academia to enhance their educational and scientific portfolios. University leadership, on their side, view collaboration policies as an infringement in their leadership, and they see their role as primarily nudging and mildly incentivizing staff to take on different tasks and roles (Svenska Dagbladet February 14 2017, "University vice-chancellors: government wrong to measure collaboration"). Hence, there is a collision, bound to grow in scope and scale over time, between different steering signals and governance ideals in the infusion of energy into academic work in Sweden – with universities safeguarding their organizational independence but without a clear understanding how that independence might be used, and government and government agencies searching for novel ways to steer universities into new work modes. The challenge is that neither have the capacity (or the will) to instigate change and to find measures that can contextualize the efficacy and performance of Swedish universities. The fact that Sweden is also somewhat of a European powerhouse for technology-based entrepreneurship may therefore seem paradoxical (http://knowledge.wharton.upenn.edu/article/how-stockholm-became-a-unicorn-factory/). Unlike in the US, or China for that matter, universities play only marginal roles in emerging innovation ecosystems; nor have they been particularly proactive in the global adaptation process of many of Sweden's traditional industrial powerhouses (telecommunications, engineering industries, automotive and truck production, etc.). Hence, the pattern of collaboration is another element of a dilemma – an unwillingness to compare, learn and emulate (or at least be influenced) by the experience of others but also to engage with issues in the immediate surrounding of the universities. This is all the more paradoxical as Sweden has a rich tradition of university-society interaction, a tradition that has been largely dissolved and forgotten.

SUMMARY

Swedish universities modernized as part of a second wave of nation-building – marked by hectic industrialization, the expansion of government, and the growth of public services in health care, education, defense and other fields. In the *longue duree* from 1900 to 1965, the roles of Swedish universities were multiple and their activities deeply intertwined with societal development more broadly. Universities and societies co-evolved with multiple linkages and interdependent driving forces. This co-evolution heritage has not been altogether lost but has been weakened over time, reflecting a growing complexity of society but also mounting boundaries between the three missions of universities. The three tasks of education, research and collaboration have become increasingly segmented, and their articulation does not guide academic organization, research funding, or government policy.

US and Asian universities currently shape the global landscape for universities, and they do so on the basis of an elaborated alignment of the three missions, where excellence in education, research and collaboration are seen as potentially interdependent and reinforcing. European universities, on their side, have developed parallel steering systems for the three missions. Here, we identify the European dilemma, as European universities have as good or even better conditions for task alignment than their North American and Asian counterparts: education is publicly funded with universal access as the main goal; the complexity of European societies offer universities rich opportunities to engage with multiple societal challenges, and the research systems in Europe have a deep tradition of pursuing groundbreaking research on the basis of societal tendencies. Instead we are faced with self-reflecting, inward-looking and often defensive systems with few elements to correct in more fundamental sense and with university systems that forgive themselves and settle for being comfortably numb rather than "excelling" and rising to the challenges they and their surrounding societies face.

REFERENCES

Altbach, P. G. (2016). *Global Perspectives on Higher Education*. Baltimore, MD: Johns Hopkins University Press.

Andrén, C.-G. (2013). *Visioner, vägval och verkligheter*. Lund: Nordic Academic Press.

Annerstedt, J. (1972). *Makten över forskningen*. Staffanstorp: Cavefors.

Athreye, S. and Cantwell, J. (2016). "A bigger bang for the buck: trends, causes and implications of the globalization of science and technology", in Cornell University, INSEAD and WIPO (2016). *The Global Innovation Index 2016: Winning with global innovation*. Fontainebleau and Geneva: WIPO.

Augier, M. & March, J. G. (2011). *The Roots, Rituals, and Rhetorics of Change*. Redwood City: Stanford University Press.

Benner, M. & Sörlin, S. (2015). Samverkansrollen i ett historiskt och institutionellt perspektiv. Stockholm: Vinnova.

Berman, S. (2006). *The Primacy of Politics*. Cambridge: Cambridge University Press.

Bienenstock, A. et al. (2014). *Combining Excellence in Education, Research and Impact*. Stockholm: SNS.

Björck, H. (2008). *Staten, Chalmers och vetenskapen*. Nora: Nya Doxa.

Clark, B. R. (1983). *The Higher Education System*. Berkeley, CA: University of California Press.

Clark, W. (2007). *Academic Charisma and the Origins of the Research University*. Chicago: University of Chicago Press.

Cole, S. (2010). *The Great American University*. New York: PublicAffairs.

Crouch, C. (2016). *Society and Social Change in 21st Century Europe*. London: Palgrave.

Douglass, J. A. (2000). *The California Idea and American Higher Education*. Redwood City: Stanford University Press.

Edqvist, O. (2009). *Gränslös forskning*. Nora: Nya Doxa.

Fourcade, M. (2010). *Economists and Societies*. Princeton University Press.

Frängsmyr. T. (2004). *Svensk idéhistoria – d.1-2*. Stockholm: Natur och Kultur.

Geschwind, L. & Broström, A. (2015). "Managing the teaching-research nexus: ideals and practice in research oriented universities", *Higher Education Research & Development*, Vol. 34(1), pp. 60-73.

Hayhoe, Ruth (2011). "Introduction and Acknowledgements", in R. Hayhoe et al. eds, *Chinese universities: in the move to mass higher education*, CERC Studies in Comparative Education. Berlin: Springer.

Hermansson, J. (2003). *Politik på upplysningens grund*. Malmö: Liber.

Kaiserfeld, T. (1997). *Vetenskap och karriär*. Lund: Arkiv.

King, R. (2013). *Everything for Sale?* London: Routledge.

Lowen, R. (1997). *Creating the Cold War University*. University of California Press.

Lucas, C. J. (2006). *American Higher Education*. New York: Palgrave Macmillan.
Marginson, S. (2006). "The Anglo-American University at its Global High Tide", *Minerva*, 44, 1, 65-87.
Marginson, S., Kaur, S. and Sawir, E., eds. (2011). *Higher Education in the Asia-Pacific*. Berlin: Springer.
Martin, B. R. & Etzkowitz, H. (2000). "The origin and evolution of the university species", *VEST*, 3-4, 9-34.
Mirowski, P. (2011). *Science-Mart*. Cambridge, MA: Harvard University Press.
Mouzelis, N. P. (1995). *Sociological Theory*. London: Routledge.
Neveus, T. 1976. *Vägen till UHÄ. Ett nytt ämbetsverks föregångare.* Stockholm: UHÄ.
OECD (1971). *Science, Growth and Society: a new perspective.* Paris: Organisation for Economic Co-operation and Development.
Öquist, G. and Benner, M. (2012). *Fostering Breakthrough Research*. Stockholm: Royal Swedish Academy of Sciences.
Ottosson, M.-O. (2011). *Uppsala universitet i sin lokala miljö*. Uppsala: Uppsala universitet.
Palfreyman, D. & Tapper, T. (2014). *Reshaping the University*. Oxford: Oxford University Press.
Petersson, J. (1987). *Erik Lindahl och Stockholmsskolans dynamiska metod*. Lund: Dialogos.
Regini, Mario, ed. (2011). *European Universities and the Challenge of the Market*. Cheltenham: Edward Elgar.
Rothblatt, S. (1985). "The notion of an open scientific community in historical perspective", in Gibbons, M. & B. Wittrock, eds., *Science as a Commodity*. London: Longman.
Sandholm, J., Fasth, G. and Wallin, U., eds. (2014). *Från kursverksamhet till folkuniversitet*. Lund: Folkuniversitetet.
Schwaag Serger, S. Liu, L. and Benner, M. (2014). "Chinese University Reforms", Science and Public Policy, 39, 2, 258-270.
SOU 1980:3 *Lärare i högskolan*.
SOU 1980:46 *Högskolor i FoU-samverkan*.
SOU 1981:29 *Forskningens framtid*.
SOU 2008:30 *Forskningsfinansiering*.
SOU 2015:70 *Högre utbildning under 20 år*.
SOU 2015:92 *Utvecklad ledning av universitet och högskolor*.
SOU 2016:29 *Trygghet och atraktivitet*.
SRC (Swedish Research Council) (2015). *Evaluation of the Strategic Research Area Initiative 2010-2014*. Stockholm: Swedish Research Council.
Stensaker, B. & Benner, M. (2013). "Doomed to be Entrepreneurial?". *Minerva*, 51, 4, 399-416.
Svensson, Lennart (1987). *Higher Education and the State in Swedish History*. Stockholm: Almqvist & Wiksell International.
TCO (1970). *Forskning och utveckling*. Stockholmn: Tjänstemännens Centralorganisation.
Therborn, G. (1989). *Borgarklass och byråkrati i Sverige*. Lund: Arkiv.
Van Vught, F. (2009). "The EU Innovation Agenda: Challenges for European Higher Education and Research", *Higher Education Management and Policy*, 21, 2, 1-22.
Wagner, P., Wittrock, B. & Whitely, R., eds. (1991). Discourses on Society. Springer.
Weibull, J. (1968). *Lunds universitets historia, del 4*. Lund: Lunds universitet.
Westling, H. (2003). Medicinska fakulteten vid Lunds universitet. Lund: Lunds universitet.
Widmalm, S. (2001). *Det öppna laboratoriet*. Stockholm: Atlantis.
Widmalm, S. (2014). "United in Separation, The Inventions of Gel Filtration and the Moral Economy of Research in Swedish Biochemistry, ca. 1950–1970". *Science in Context*, 27, 2, 249-272.
Wittrock, B. & Elzinga, A., eds. (1985). *The University Research System*. Stockholm: Almqvist & Wiksell International.
Zha, Q. (2011). "Understanding China's Move to Mass Higher Education from a Policy Perspective", in Hayhoe, R et al. eds (2011), *Chinese universities: in the move to mass higher education*. Berlin: Springer.

SHORT BIOGRAPHIES

SYLVIA SCHWAAG SERGER is Director at the Swedish Government Agency for Innovation (Vinnova) and adjunct professor at the University of Lund. She received an MA in International Relations from the Johns Hopkins School of Advanced International Studies (SAIS) and a PhD in economic history from the LSE. Her research focuses on research and innovation policy and governance and on China's economic and scientific development. She has been commissioned as expert by the European Commission, the World Bank and the OECD. Sylvia Schwaag Serger chairs the board of the Swedish Foundation for Internationalization of Higher Education and Research and is a member of the board of the University of Uppsala. In 2015-2016 she was a member of the Swedish Government Expert Commission on Research.

MATS BENNER holds a PhD in Sociology (Lund University) and is currently professor in science policy studies at Lund University School of Economics and Management, and a visiting professor at King's College, London. He has previously been affiliated with the University of Essex, Linköping University, and Uppsala University. He deals primarily with issues of research policy, university governance and state-industry relations.

16.

DIGITAL TEACHING AND LEARNING AT A TRADITIONAL UNIVERSITY

Martin WIRSING

LMU Munich

ABSTRACT

Digitalization is changing teaching and learning at universities around the world. New forms of teaching, such as blended learning, online curricula, and open opportunities such as massive open online courses and open educational resources are being tested at many universities and are establishing themselves alongside traditional instruction. Well-known universities in Europe, Asia and the USA have declared extension of their online teaching and online learning to be a strategic goal, to live up to the expectations of a new generation of "digital native" students and junior academics.

This text focuses on a traditional university such as the LMU Munich and discusses how it approaches six strategically important aspects of digitalization: objectives of digital teaching; digital techniques for research-oriented learning and teaching; the connection between digital and analog teaching; open digital courses; the online skills of students and instructors, as well as, briefly, online continuing education, individualization and diversity, including using digital technologies to support the transition from schooling to higher education, and from higher education into professional work.

1. INTRODUCTION

Digitalization has gained entry into universities around the world. Successful application of digital technology is among the declared strategic goals of some of the best universities in the USA and Asia. The goal is not computer-supported infrastructure – digital systems for the administration of students and curricula have by now become standard – but rather research and teaching.

New subjects such as computational chemistry, bioinformatics, digital humanities and computational physics are changing research and teaching in many classical disciplines. Methods from computer science, such as systematic structuring and algorithmic processing of information, as well as computer-supported simulation and analysis of scholarly data and situations lead to new research results and new contents in research-oriented teaching.

In all subjects, students by now have access to most teaching materials in digital form, either through an intranet or as open educational resources (OER) from the internet. The form of teaching is changing: in addition to traditional pure classroom instruction there are online teaching settings such as massive open online courses (MOOCs), blended learning courses, and classroom courses that are extended with digital teaching materials. Lectures are recorded, placed on the internet, and enriched with interactive learning assessments; video clips and e-tutorials are becoming standard teaching materials; interactive digital simulations, “serious games” and “augmented reality” extend the techniques of learning and teaching. Social media and web platforms enable new forms of cooperation in study groups, and the interaction between students and instructors.

Active learning with digital models supports research-oriented teaching, for example in life sciences with the help of simulation tools (see for example [Metzler16]). In the humanities, digitalization of sources and structuring them into text and image databases is opening up new opportunities for research (see for example [Kohle11] and [Krefeld14]). In the social sciences, the internet and digitalization have themselves become objects of research, as, for example, in [Haas15]. Mastery of digital technologies and methods thus also becomes part of instruction, because it is a prerequisite for further research and practice.

Decisions in the field of digitalization contribute to a university’s overall image, and are thus strategically important. In the following, I will use a focus on a traditional university such as the LMU Munich[1] to briefly discuss six important aspects of digitalization: objectives of digital teaching; digital techniques for research-oriented learning and teaching; the connection between digital and analog teaching; open digital courses; the online skills of students and instructors, as well as, briefly, online continuing education, individualization and diversity, including using digital technologies to support the transition from schooling to higher education, and from higher education into professional work.

2. Objectives of digital teaching

At many universities, online teaching is part of their current strategies. These can, depending on what each university emphasizes, turn out very differently. For example, Stanford University[2] wants “to use digital technology to leverage Stanford’s research and teaching beyond its own campus and make it accessible to a broad public and “to offer its own faculty and students a coordinated and sustainable approach for future-directed learning and teaching that accelerates innovation at Stanford University” [UStanVPTL]. The University of Edinburgh[3] offers “Knowledge Management and Information Service appropriate for supporting and enabling learners, researchers and teachers in a world-class University” and aims to recruit new students by 2025 with “world-leading online distance learning” [UEdVision]. The Technical University of

1 http://www.uni-muenchen.de/
2 https://www.stanford.edu
3 www.ed.ac.uk

Munich[4] has an IT strategy since 2002 with the guiding theme of "digital institution of higher learning" [TUM_Strtg]. In 2016, the University of Zurich[5] published its MOOC strategy [UZhMOOC]. The LMU would like "to improve the quality of teaching with innovative digital techniques" and "to make the high quality of research and teaching at the LMU even better known nationally and internationally with free and open digital choices."

Organizations such as the German Rectors' Conference[6] and the League of European Research Universities[7] (LERU) are also recommending to institutions of higher learning that they should strategically position themselves with regard to the digitalization of teaching [LERU14, HRK14], with LERU particularly emphasizing research-oriented teaching.

Robert Ubell, Vice Dean for Online Learning at New York University[8], differentiates among more than a dozen possible goals for strategies of digital learning [Ubell17, chapter 7], including the extension of the traditional catchment area beyond a university's own region, the extension of the classroom to the entire world, making learning and teaching more temporally and spatially flexible, enabling distance learning for students who cannot come to campus, the extension of in-person courses, testing and introducing innovative forms of learning and teaching, supporting cooperative learning, enabling interaction and exchange with students from other regions and cultures, as well as the establishment of a secure additional income stream.

Today, taking a position on digitalization is a "must" for every institution of higher education. The decision about which goals and emphases to choose in developing digitalization will in the future be an even more important factor that contributes to an institution's public image.

3. Digital techniques for research-oriented learning and teaching

Modern, computer-supported research in fields such as digital humanities, computational journalism, computational biology or computational physics draws on techniques from computer science and will thus in the future change the research methods in many disciplines.

For example, Stanford University offers, among others, courses in computational biology, computational physics, master's and PhD programs in biomedical informatics, and, since 2015, a minor in digital humanities. At the University of Edinburgh there are master's programs in systems and synthetic biology, bioinformatics, and computational physics, as well as an online post-graduate certificate in computational

4 https://www.tum.de
5 http://www.uzh.ch/en
6 https://www.hrk.de/home
7 http://www.leru.org
8 https://www.nyu.edu

chemistry and modeling. In the field of digital humanities, there is a research group, but not yet a degree program.

The LMU offers a bachelor's minor in information science designed specifically for humanities scholars; a bachelor's minor in digital humanities – linguistics is under development and supported by the Bavarian Digitalization Initiative. For exchanges about research in digital humanities, the network dhmuc has been set up by researchers from LMU, Deutsches Museum, Bavarian Academy of Sciences, and Collegium Carolinum [dhmuc]. Research-oriented humanities courses such as geolinguistics [Krefeld16] make particular use of text and image databases to take up scholarly research agendas [LMU_DHL, Kohle11, Krefeld14]. In the natural sciences, both bachelor's and master's degrees in bioinformatics have been offered for 15 years in cooperation with the Technical University of Munich. Additional informatics-oriented courses include, for example, advanced computational physics and computational chemistry. These courses work with advanced numerical programming and analysis tools such as the Python extension SciPy [SciPy] for scientific computing or the chemistry computer software Gaussian [Gau09] and are close to current research.

The strategic question arises of how novel computer science and statistical methods that are important for research in individual scholarly disciplines can be anchored in teaching. For that, it is necessary to set up new, research-oriented courses on the uses that are specific to the discipline, courses on teaching knowledge from information science, about databases, and statistics, courses on applying computer-supported simulations concerning research questions specific to the discipline, as well as courses for testing and investigating new methods of human-computer interaction such as human computation [Bry16] and crowd research [CS16, play4science]. In those last two, volunteer users themselves produce data, analyze with the help of algorithms, or place their creative abilities in the service of research within the framework of digital games. In many cases, the establishment of such new courses will go hand in hand with restructuring or creating professorships in scholarly disciplines, such as systems biology or computational chemistry, or with new computer science and statistics professorships specializing in applications of computer science in the natural and social sciences, and in the humanities.

4. Connecting "digital" and "analog" teaching

Traditional "analog" teaching is characterized by lectures in auditoriums, direct interaction between students and university teachers in seminars, and practical experience in methods and techniques via internships and labs. Digital teaching and learning materials, as well as new forms of instruction such as blended learning and online courses change the methods of teaching and learning at traditional brick-and-mortar universities.

4.1 Digital teaching and learning materials

Teaching and learning materials such as scripts or scholarly articles are today mostly available to students in digital form.

At many universities, video and audio recordings are standard. At the LMU, the beginnings were already underway in the 1990s with recordings of lectures, production of teaching and training videos, e-tutorials, as well as recording student teaching hours in teacher education [LMU_UM]. Since the winter semester of 2010–11, when school reforms led to a one-off doubling of the number of entering students, large class sections have been systematically recorded, particularly in the faculties of law, business, economics and psychology, but also in physics and the social sciences [LMU_dAbi, LMU_UM]. In the intervening time, that has allowed the avoidance of bottlenecks resulting from lecture halls that were too full. E-tutorials and training videos are particularly well suited for learning how to use devices and computer systems, such as systems for working with texts and images; these systems can often be demonstrated and understood better with digital media than with in-person instruction.

The question of copyright in the use of digital media is problematic, and as yet no completely satisfactory solution has been found. In Germany, royalties on the rights administered by VG Wort can be due when these materials are used. As a result of the expiration of old agreements and an uncertain legal situation, at the end of 2016 a not insignificant share of teaching material was taken down from the university's servers. At the time of writing (spring 2017), no concrete contractual agreement between German universities and VG Wort has yet been reached.

Independent of this situation, the universities must decide whether in addition to making other teaching materials available courses will be systematically recorded. Should there be blanket recording of all lectures, or should that only apply to large introductory courses and special courses such as interdisciplinary workshops? One reasonable option is to record the large courses of each discipline, but to stretch out the recording over several semesters so that in each semester only a smaller number of courses in each subject is affected.

4.2 Blended learning and online courses in face-to-face teaching

There is a wide variety of tools, teaching approaches and forms of learning designed to support in-person teaching with digital media. Examples include the teaching materials mentioned above, digital presentation media, digital tutorials and exercises, audience response systems such as Backstage [BrPo14] for direct feedback from students in courses, simulations, and communications media such as discussion forums. Most universities are using such tools and have blended learning courses in their catalogues, i.e., courses in which digital media are combined with in-person instruction.

BLENDED LEARNING

The largest provider of blended learning in Germany is FernUniversität in Hagen[9], which has more than 20 bachelor's and master's programs. Courses there are comprised of course packets, digital media, classical online seminars, virtual lectures, net-supported forms of teaching and learning, as well as a few in-person meetings. At the LMU, as at many other universities, online courses like MOOCs are taught as "inverted classroom" courses; in this approach, students acquaint themselves with the digital course materials, and then discuss and reflect on them with faculty at the in-person class meetings.

If one compares in-person instruction with the digital course offerings, in-person instruction in labs, seminars and small lectures offers opportunities for direct communication and discussion between students and university teachers. By contrast, digital media are not tied to a particular place; they can be accessed from anywhere, and most can also be accessed at any time. They support not only asynchronous communication, in chats and discussion forums for example, but also synchronous communication via video and audio conferences. The data on the students' instructional interactions that are saved by the learning management systems form the basis of "learning analytics," a new approach to analyzing the process of learning. With this approach, the learning progress of individual students as well as complete student cohorts can be the subject of fine-grained analysis in a way that was previously impossible for in-person instruction.

In the academic literature, one finds many studies that compare online teaching with traditional teaching, with varying results; see for example [Bergstrd13; Lapsley08; Lin09; Phillips15; Rondon13]. Metastudies show that the use of digital media has a demonstrable positive effect on learning outcomes, even if this effect is often small [StF16]. For example, the effects of digital presentations are negligible, and those of animations are small. Medium-sized positive effects are shown by simulations and blended learning, if this is linked to cognitive activation as, for example, if the online phases are used to shift students into an active role. Simulations have been most closely examined in the field of medicine, for example in pediatrics or emergency medicine. They have particularly positive effects on learning skills and scientific thinking. Even stronger effects, that is medium-sized to large, have been shown in computer-supported developing and linking of concepts [StF16]. Similar (medium to strongly positive) effects on successful learning are seen with expert feedback, cooperative forms of learning, and formative evaluation, i.e., intermediate evaluation during the learning process [Hattie09; Roberts11; StF16].

PURE ONLINE LEARNING

Alongside blended learning, many universities now offer purely online courses, examinations that are supported by digital systems, and even online curricula. At the University of Edinburgh, there are more than 60 "Online Distance Learning" master's programs [UEdMaster], and at Arizona State University more than 100 online

[9] https://www.fernuni-hagen.de/english

bachelor's and master's programs [UArOnline]. One characteristic of these programs is that great value is placed on personal communications between the faculty and the students, which typical takes place via internet-based platforms such as Skype, Google Hangout, or Adobe Connect.

In Germany, the Bavarian Virtual University[10] (BVU) is probably the largest provider of online courses. BVU supports and coordinates the development and implementation of purely online courses for students at all Bavarian universities. It has a cross-university approach to media that is unique in Germany: at least two Bavarian universities are responsible for every course offered by the BVU. At present, the LMU offers more than 50 online courses at the BVU, primarily in the fields of medicine, law, humanities, and teaching. In the 2014–15 academic year more than 17,000 LMU students registered for BVU courses [vhbBeleg15]. In addition to the courses at the BVU, the LMU offers further purely online courses such as the Arabic Papyrus Webclass [ArabWeb]. All of these online courses have relatively high success rates. For example, at the BVU approximately 55% of all participants file to receive credit, although they are not required courses.

Metastudies on the effectiveness of purely online courses show that these have no or a small positive effect on learning. Learning outcomes are significantly better if cooperative forms of learning are systematically incorporated and guided [StF16]. The effectiveness of blended learning is greater than purely online learning [Means13] and is more effective, the more strongly active learning is supported by, for example, interactive videos, exercises with feedback, cooperative forms of learning, or simulations [Fischer15, Hattie09, Roberts11]. The positive effect will increase in the very near future when the next generation of "digital natives" enters universities as students and young scholars.

Strategic aspects

For a traditional, brick-and-mortar university blended learning with a large share of in-person instruction surely is the first choice at the moment, but the example of the University of Edinburgh shows that purely online programs offered by a traditional university can already be successful. In that respect, it seems sensible for the present for online programs to draw on existing in-person programs (e.g., [Ubell17, chapter 7]). Other questions include whether special forms of digitally supported learning, such as active learning, should be preferred, what infrastructure – learning platforms, communications media and groupware, simulation and serious game tools, testing and learning analysis tools – should be provided, as well as how the production of digital media should be supported and promoted.

Further extension of online and blended learning will also change how spaces are used for teaching. As is already standard at most universities in Asia, and is already available at the University of Göttingen in the form of a "learning building," for active learning in all universities fewer lecture halls and more and more classrooms will be

10 https://www.vhb.org/en/homepage

necessary for group discussions of the digital teaching materials and for collaborative project work.

5. OPEN DIGITAL COURSES

In addition to the instructional materials offered by their own universities, students and other learners today have access to materials that are offered for free on the internet. These include "massive open online courses" (MOOCs) and open educational resources (OERs). MOOCs are cost-free online courses available via the internet. Open educational resources are digital teaching materials that are published under an open license and are thus freely available to use in teaching.

5.1 MASSIVE OPEN ONLINE COURSES

The introduction of MOOCs at American universities has done more than anything else to bring online teaching to public attention. The first course at Stanford University in 2012 had more than 60,000 participants; since then, the platform Coursera[11] reports more than 18 million students, while the platform edX[12] speaks of 10 million [Coursera16, edX16]. Nearly two-thirds of the students use mobile devices to view videos and to do exercises; 25 percent of the students only use mobile devices [Coursera16]. The subject categories that are most in demand (at Coursera) are business, computer science, data science, social sciences, art, and humanities. The newest trend in MOOCs is in "specializations" and "micro-master," in which several courses plus a project in the subject are tied together in a package.

The two most globally popular courses (in February 2017) are from Stanford University and UC San Diego, and each have more than 1 million participants [MOOC16]. Altogether, Stanford University offers approximately 100 MOOCs [UStanOnline], and the University of Edinburgh offers more than 30 MOOCs, including one in Chinese. The LMU was the first German university to offer MOOCs. To date, it has eight English-language courses and two Chinese-language courses [LMU_mooc]. They have had more than 800,000 participants from more than 200 countries. Tobias Kretschmer's course on "Competitive Strategy" has to date more than 430,000 participants, placing it second on the all-Europe list and 23rd on the worldwide list of most popular courses [50_mooc16].

All over the world, demand for university education is increasing – as can be seen by the example of all of the MOOCs listed above, which have gained participants from all countries of the world. Experience at the LMU has shown that MOOCs generate requests for bachelor's and master's studies with the faculty who teach the MOOCs, and that the programs in question are requested by MOOC participants. Open courses and MOOCs can thus contribute to finding new students, and to making the quality of research and teaching at a university better known nationally and

11 https://www.coursera.org
12 https://www.edx.org

internationally. In addition, MOOCs open to people around the world new chances for education, and new opportunities for academic and professional continuing education.

Offering courses to the entire world is, however, tied to a high risk. A poorly made or poorly reviewed course can change the positive effect into a negative one and strongly damage the reputation of a university. For that reason, I consider it important to place great value on the quality of the online courses. Typically, there are constructive and analytical measures of quality. Constructive measures aim for quality in the planning and development of a MOOC and include, for example, the selection of appropriate course topics and above all suitable faculty, systematic planning of the course's teaching and exercise units, as well as qualified didactic and technical support during the production. Analytical measures are based on the evaluation of a MOOC after its conclusion and during its ongoing operation. In this regard, important elements include checking the learning progress of participants and, possibly, immediate improvement in the course. For example, it has been shown to be wise for a MOOC instructor to make a short additional video at the end of a week of lectures to answer the most common questions that participants posed about understanding the material. A high-quality MOOC also carries high costs for production and ongoing operations.

The strategic question thus arises of whether it makes sense for a university to develop MOOCs. The chance to gain new students and the greater visibility must be balanced against the risk of a "shitstorm" in the internet and high production and maintenance costs. An important question is also how MOOCs are tied to a university's approach to its own teaching and continuing education. It is wise to integrate MOOCs with in-person courses, for example as "flipped classroom" courses or even fully online but with participation limited to the university's matriculated students as a "small private online course" (SPOC). MOOCs, however, are primarily directed toward interested external persons. If examinations in the form of "verified certificates" are offered for MOOCs, the income that results from them can be used to cover the costs of MOOCs, and the MOOCs can be recognized as course equivalents and integrated into regular academic operations.

One possible next step would be to bundle several thematically related MOOCs and use that specialization or micro-master to create a comprehensive offering for continuing education or as an introduction to a bachelor's or master's program. That would also make it possible to award certificates for the successful completion of a specialization and to recognize these achievements for admission to a bachelor's or master's program, while counting them for a certain number of ECTS points. An further-reaching option is to offer a complete continuing education curriculum as SPOCs, similar to what UIUC has done with its MBA on the Coursera platform [iMBA]. For such a program, however, MOOCs alone are insufficient. It is necessary to define individual projects for students and to offer them individual supervision by tutors using digital communications media.

5.2 Open educational resources

One topic that is currently subject of much discussion is “open educational resources” (OER). They are digital materials for learning and teaching that instructors and students have made available under an open license [UN_oer13]. MOOCs can also be OERs; for example, since 2015 courses on Open edX have been published under the Creative Commons open license. The German Rectors’ Conference took a formal position on OER in early 2016 [HRK16], around the same time that the University of Edinburgh developed guidelines on the subject [UEd_oer]. The LMU has long participated in placing OERs free of cost on the internet. Since 2009, it has offered e-lectures, e-tutorials, and e-dissertations on the internet platform iTunesU under the Creative Commons license. With more than 21 million downloads to date, the LMU is one of the most popular European providers. In the first years, between 3 million and 5 million LMU documents were downloaded annually. With the boom of MOOCs that began in 2013, the number of downloads decreased to about 1 million annually; in the last two years, however, it has again begun to climb continuously.

The strategic questions are whether, and if yes, then to what extent, the publication and use of open educational resources should be supported, and whether MOOCs and recordings of lectures should be simultaneously supported under the rubric of open educational resources.

6. Support for student and faculty online skills

Given the extent that imparting and gaining knowledge via digital media is permeating learning and teaching at a university, faculty and students must be familiar with online-supported methods of teaching and learning, and they must possess the necessary skills in digital teaching and learning.

In a strategy paper [KMK16] from 2016, Germany’s Standing Conference of the Ministers of Education and Cultural Affairs defined the fundamental skills for handling digital media that schoolchildren should attain by the end of their mandatory schooling. These include, in addition to systematic internet searches, digital communication and cooperation, aspects of security, structured digital production and presentation of talks and homework, solving problems with digital media, analyzing and reflecting on digital media, as well as the responsible use of digital media. Based on these skills, university students should “be taught how to use new technologies independently, to make use of them sensibly, and to reflect on them critically” [KMK16].

School faculty should in addition possess informational, discipline-based, didactic and pedagogical-psychological media knowledge, as well as practical skills for the planning, realization, evaluation and reflection on teaching with digital media [DCB17]. Transferred to university teaching, this means not only that education majors must be taught the necessary skills for classroom teaching but also that university faculty should possess these skills so that they may properly incorporate digital media in their teaching.

An additional question is how the role of university faculty changes in a digital world. The wide range of freely available public materials for learning, including recorded lectures by excellent academics, practical video instruction, and good practice material mean that an instructor will only rarely create new contents, but rather will have the primary task of selecting the right material from the great mass that is available, and thus to fashion a well thought out and coherent narrative for the material [Dagstuhl14].

There is a strategic decision to be made about which opportunities should be offered to students and faculty to obtain the necessary media skills, and how to organize the professional education of faculty in media didactics and technology. For example, will that be organized centrally or by specific faculty; will it be done by peer leaders among the faculty or by staff from the media center or a mixture of all of the above? A second question is how instruction about the technical and discipline-specific media skills will be integrated in the university's overall teaching. Discipline-specific skills in information technology could, for example, be offered in a framework of courses with information technology as a minor, or in special workshops and training sessions. General media-related skills could, by contrast, be acquired in the framework of soft-skill courses.

7. Additional aspects: transition to the university and to employment, individualization, diversity, and continuing education

Additional areas for the use of digital techniques in higher education include the transitions on entering higher education and entering employment afterward, individualizing studies and making them more flexibility, supporting diversity in an institution of higher education, and continuing academic education in a profession.

7.1 Transitions into higher education and into employment

The selection of a study program, the transition from school to higher education, from a bachelor's program to a master's program, as well as the transition into employment are critical phases in a young person's life, often with far-reaching consequences.

Most people who drop out of higher education do so at an early point in time. They often do so as a result of choosing a program based on false impressions. In addition to many other means of support such as college guidance, "sample studies," bridge courses, preparatory courses or mentoring, digital means of support could be fruitfully implemented. Online-based self-assessment systems with low barriers to entry could help people who are interested in higher education to better evaluate their suitability for specific curricula, and thus to select the right major. Self-assessments could also be offered in the form of introductory MOOCs that provide important fundamental knowledge and prepare candidates for higher education in the subject. A good supplement to preparatory courses are learning platforms that impart the necessary basic skills in a subject and help to close knowledge gaps. One example here is the currently largest German initiative for open educational resources, the platform Serlo, which supports learning and practicing mathematics and biology [Serlo].

To prepare for a master's program, MOOCs could be used as they are, for example, the "MOOCs for Masters" at the TU Munich [TUM_ma] convey to bachelor's students the requirements of a master's program while simultaneously serving to recruit students. MOOCs are similarly suited to preparation for entry into working life. One example is Tobias Kretschmer's course, "Competitive Strategy." This course was recommended by several business publications as an additional qualification for company founders (e.g., [t3n_Kurse]).

There should be a strategic evaluation of whether digital support offered for the transitions into higher education and into employment is reasonable and necessary, whether it really improves the preparation and selection of new students, and whether and how it can be incorporated in the university's strategies for advertising among potential students, for student advising, or for building alumni links.

7.2 Supporting individualization and diversity with digital learning and teaching

Digital media are not tied to a particular location, and are generally not tied to a particular time; they can be accessed from anywhere, and mostly at any time. Online exams can, with appropriate identification checks and supervision, be taken individually at any given time. Digital media thus support the individualization of higher education; students can, to a great degree, determine the place and pace of their learning themselves.

If the regulations for barrier-free access are also taken into account (e.g., [LMU_BarF]), the needs of an increasingly diverse student body can also be met. Part-time students and students who, for reasons of illness, disability, or other special life circumstance, are not able to be present for in-person instruction can more readily participate in higher education through online teaching; in some cases, online teaching makes higher education possible for students who would otherwise have been excluded. Online courses also promote students' mobility with an ability to access their universities' teaching resources and participate in online courses during time in a foreign country.

The strategic question is which conditions for progress in studies must be defined. Is an arbitrary tempo allowed, or must exams be completed within a certain time frame? Are maximal lengths of higher education fixed, as is currently mandated by law in Germany?

7.3 Academic continuing professional education

Digital curricula and courses are particularly well suited for academic continuing professional education because they can be relatively simply combined with daily professional life. Programs in continuing education already work with concentrated schedules and digital learning materials; in the future they could be designed like the

UIUC online MBA [iMBA] as SPOCs and held completely online, or supplemented with a small number of concentrated periods of in-person instruction. One example is the University of Edinburgh, which already has more than 60 online distance learning master's programs in its continuing education portfolio, and approximately the same number of certificate programs.

In Germany, academic continuing education is one of the legally mandated tasks of public institutions of higher education. In contrast to teaching and research, academic continuing education is not supported by the state, but must finance itself from tuition. Despite great demand from industry and public administration, the significance of continuing education is thus rather limited at many universities. At the LMU there is a small number of master's programs that are offered on a part-time basis. Examples include a master's in international occupational safety and health, which is typically organized as blended learning.

Using SPOCs for continuing education is surely the way of the future. Because of the high production costs for high-quality MOOCs and SPOCs universities should choose carefully which subjects they offer continuing education certificates and programs in.

8. Summary and outlook

What will the university of the future look like? Will in-person instruction be overrun by digitalization, like many other aspects of society? I believe that despite all of the digital possibilities, students' learning habits will not change so quickly. It will remain important to offer very good in-person teaching and to integrate it with digital techniques.

Digitalization will, however, influence the contents of the courses. Computer-supported methods will find their way even more strongly into teaching and research, and new computer-oriented disciplines such as digital humanities will arise. Digital and analog techniques of teaching will merge in in-person instruction, while in the field of academic continuing education online approaches will strongly increase and the required in-person times will be pushed back to a minimum. The organization and timing of studies can be made more flexible; learning analytics will make it possible, on the one hand, for student support in learning to be more targeted, and on the other for weaknesses in courses to be more readily recognized and thus more easily improved. Well implemented digital offerings such as MOOCs can help to acquire students, to prepare them for education and even to extend universities' international visibility.

There will, however, also be new demands. For example, the role of faculty will be scrutinized and likely develop into an expert contact person and a moderator for bringing together appropriate materials and media for learning. It will not be just a matter of making the contents available in the appropriate media; rather, it will be important to investigate how best to use digital techniques to support students' critical thinking and their ability to learn and solve problems. The spatial requirements will change. Instead of lecture halls, more classrooms and group discussion spaces will be needed.

How an individual university addresses digitalization is already an important aspect of its reputation as an institution of higher education, and will become more important in the future.

REFERENCES

[ArabWeb] A. Kaplony: Arabic Papyrus Webclass, LMU Munich, http://www.naher-osten.uni-muenchen.de/forschung/papyrologie/apw/index.html, accessed 02.03.2017

[Bergstrd13] Kelly Bergstrand, Scott V. Savage: The Chalkboard Versus the Avatar: Comparing the Effectiveness of Online and In-class Courses, *Teaching Sociology* 41(3), 2013, 294–306

[BrPo14] François Bry, Alexander Pohl: "Backstage: A Social Medium for Large Classes." In F. Keuper, H. Arnold (Eds.): *Campus Transformation – Education, Qualification and Digitalization*, Berlin, Germany: Logos, 2014, 255–280

[Bry16] Human Computation and Analytics, LMU Munich 2016, http://www.pms.ifi.lmu.de/lehre/dshumancomp/16ws17/, accessed 28.02.2017

[Coursera16] Kurt Apen: Growing our learner base, Coursera Partners Conference, 20.03.2016, Den Haag, 2016

[CS16] Croudsourcing Lehrveranstaltung, TU Ilmenau 2016, https://www.tu-ilmenau.de/mkm/forschung/crowdsourcing-und-crowdfunding/, accessed 28.02.2017

[Dagstuhl14] Pierre Dillenbourg, Armando Fox, Claude Kirchner, John C. Mitchell, Martin Wirsing: Massive Open Online Courses: Current State and Perspectives (Dagstuhl Perspectives Workshop 14112). Dagstuhl Manifestos 4(1): 1-27 (2014)

[DCB17] Author group "Digitaler Campus Bayern": Kernkompetenzen von Lehrkräften für das Unterrichten in einer digitalen Welt. In preparation, 2017

[dhmuc] Digital Humanities Munich, https://dhmuc.hypotheses.org/, accessed 13.03.2017

[edX16] Justine Goulart: Our Year in review: edX in 2016. edX blog, http://blog.edx.org/year-review-edx-2016, accessed 13.03.2017

[edX_cc] Open edX creative Commons license, https://open.edx.org/blog/open-edx-releases-creative-commons-licensing, accessed 13.03.2017

[Fischer15] Frank Fischer, Christof Wecker, Karsten Stegmann: Auswirkungen digitaler Medien auf den Wissens- und Kompetenzerwerb in der Schule. Short report, MCLS der LMU, 2015, 6 pages

[Gau09] Gaussian 09, http://www.gaussian.com/, accessed 13.03.2017

[MOOC16] The 50 Most Popular MOOCs of All Time, http://www.onlinecoursereport.com/the-50-most-popular-moocs-of-all-time/, accessed 13.03.2017

[Haas15] Alexander Haas, Julian Unkel: Glaubwürdigkeit und Selektion von Suchergebnissen. Der Einfluss von Platzierung, Reputation, Neutralität und sozialen Empfehlungen bei der Nutzung von Suchmaschinen.
Medien & Kommunikationswissenschaft 63, 2015, 363-382

[Hattie09] J.A.C. Hattie: *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge, 2009

[HRK14] 16. HRK-Positionspapier zu MOOCs im Kontext der digitalen Lehre. Beschluss des 127. Senats der HRK, 24 June 2014, Bonn

[HRK16] Senatsbeschluss Open Educational Resources. Beschluss des 132. Senats der HRK, 15 March 2016, Berlin

[iMBA] University of Illinois iMBA, https://onlinemba.illinois.edu/, accessed 06.05.2016

[KMK16] Bildung in der digitalen Welt, Strategie der Kultusministerkonferenz, Beschluss der Kultusministerkonferenz vom 08.12.2016, https://www.kmk.org/fileadmin/Dateien/pdf/PresseUndAktuelles/2016/Bildung_digitale_Welt_Webversion.pdf, accessed 03.03.2017

[Krefeld14] Thomas Krefeld, Stephan Lücke: Quando l'etnolinguistica alpina va online: alcune esigenze metodologiche, Aoste: Région Autonome de la Vallée d'Aoste, in La géolinguistique dans les Alpes au XXIe siècle. Méthodes, défis et perspectives (= Actes de la conférence annuelle sur l'activité scientifique), 2014, 39-51

[Krefeld16] T. Krefeld: Geolinguistik in der Perspektive der 'digital humanities', Vorlesung SS 2016, LMU Munich.

[Kohle11] Hubertus Kohle, Kunstgeschichte goes Social Media. Laien optimieren eine Bilddatenbank – mit einem digitalen Spiel, in: Aviso. *Zeitschrift für Wissenschaft und Kunst in Bayern*, 3/2011, pp. 37-43

[Lapsley08] Ruth Lapsley, Brian Kulik, Rex Moody, J. B. Arbaugh: Is Identical Really Identical? An Investigation of Equivalency Theory and Online Learning, *The Journal of Educators Online*, Volume 5, Number 1, January 2008, 19 pages

[LERU14] S. Mapstone, S. Buitendijk, E. Wiberg: Online Learning at research-intensive universities. LERU Advice Paper, June 2014

[Lin09] Cheng-Yao Lin: A comparison study of web-based and traditional instruction on preservice teachers' knowledge of fractions. *Contemporary Issues in Technology and Teacher Education*, 9(3), 2009, 257-279

[LMU_dAbi] LMU Doppelter Abiturjahrgang, https://www.uni-muenchen.de/studium/studienangebot/studium_online/services/euniversity/doppelter_abiturjahrgang/, accessed 07.03.2017

[LMU_BarF] Barrierefreiheit im Web, LMU München, https://www.uni-muenchen.de/aktuelles/publikationen/cd/webstyleguide/barrierefreiheit/index.html, accessed 07.03.2017

[LMU_DHL] LMU Lehre in Digital Humanities, https://www.dh-lehre.gwi.uni-muenchen.de/, accessed 13.03.2017

[LMU_mooc] LMU MOOCs, http://www.en.uni-muenchen.de/students/moocs/index.html, accessed 13.03.2017

[LMU_UM] LMU UnterrichtsMitschau, http://mitschau.edu.lmu.de/, accessed 13.03.2017

[Means13] Barbara Means, Yukie Toyama, Robert Murphy, Marianne Baki: The Effectiveness of Online and Blended Learning: A Meta-Analysis of the Empirical Literature, Columbia University: *Teachers College Record* Volume 115, 030303, March 2013, 47 pages

[Metzler16] Dirk Metzler: Handout Computational Methods in Population Genetics, 2016, 83 pages, evol.bio.lmu.de/_statgen/compevol/ws1516/CMPG_handout.pdf, accessed 13.03.2017

[play4science] H. Kohle, F. Bry, T. Krefeld, C. Riepl, K. Schulz: Play4Science, DFG-Projekt, LMU München, http://www.play4science.uni-muenchen.de/projekt/index.html, accessed 02.03.2017

[Phillips15] J. Phillips: Replacing traditional live lectures with online learning modules: Effects on learning and student perceptions, *Currents in Pharmacy Teaching and Learning* Vol. 7, Issue 6, 2015, 738–744

[Roberts11] Robin M. Roberts. Best instructional practices for distance education: A meta-analysis. Dissertation, University of Nevada, Las Vegas, US, 2011

[Rondon13] Silmara Rondon, Fernanda C. Sassi, Claudia Furquim de Andrade: Computer game-based and traditional learning method: a comparison regarding students' knowledge retention BMC Medical Education 2013, 13:30, 8 pages

[SciPy] SciPy Software, https://www.scipy.org/, accessed 11.06.2016

[Serlo] Serlo – Die freie Lernplattform, https://de.serlo.org, accessed 03.03.2017

[StF16] Karsten Stegmann, Frank Fischer: Auswirkungen digitaler Medien auf den Wissens- und Kompetenzerwerb an der Hochschule. Munich Center for Learning Sciences, LMU Munich, February 2016

[t3n_Kurse] 11 Onlinekurse für Gründer und Entwickler, t3n Digital Pioneers, 17.06.2013, http://t3n.de/news/11-onlinekurse-grunder-entwickler-473950/, accessed 03.03.2017

[TUM_ma] MOOCs for Masters, http://www.mz.itsz.tum.de/elearning/moocs/moocs-for-masters/, accessed 03.03.2017

[TUM_Strtg] TUM IT-Strategie, https://www.it.tum.de/strategie/, accessed 11.06.2016

[UArOnline] University of Arizona online degrees, https://asuonline.asu.edu/online-degree-programs/graduate, accessed 13.03.2017

[Ubell17] Robert Ubell: *Going Online*. New York: Routledge, 2017

[UEdMaster] University of Edinburgh postgraduate degrees, http://www.ed.ac.uk/studying/postgraduate/degrees/index.php?r=site/online, accessed 13.03.2017

[UEd_oer] University of Edinburgh Open Educational Resources Policy, approved 27.01.2016, http://www.ed.ac.uk/files/atoms/files/openeducationalresourcespolicy.pdf, accessed 13.03.2017

[UEdSSB] University of Edinburgh MSc Systems and Synthetic Biology, http://www.ed.ac.uk/biology/postgraduate/taught-programmes/systems-synthetic-biology, accessed 13.03.2017

[UEdVision] University of Edinburgh Strategic Vision 2025; http://www.docs.sasg.ed.ac.uk/gasp/strategicplanning/Strategic-Vision_web2.pdf, accessed 03.03.2017

[UN_oer13] Deutsche UNESCO-Kommission, Open Educational Resources, http://www.unesco.de/bildung/open-educational-resources.html, accessed 03.03.2017

[UStanOnline] Stanford Online All Courses; http://online.stanford.edu/courses/allcourses, accessed 03.03.2017

[UStanVPTL] University of Stanford Vice Provost for Teaching and Learning, https://vptl.stanford.edu/about-vptl, accessed 03.03.2017

[UZhMOOC] MOOC-Committee der Universität Zürich: MOOC-Strategie, http://www.id.uzh.ch/publikationen/MOOC-StrategieUZH.pdf, accessed 03.03.2017

[vhbBeleg15] Belegungen der Hochschulen im Studienjahr 14-15, vhb-Mitgliederversammlung 18.01.2016

SHORT BIOGRAPHY

MARTIN WIRSING is vice president for teaching and studies of LMU Munich and full professor for Informatics. In 2016 he was awarded a degree of Doctor of Science (Honoris Causa) by Royal Holloway, University of London. He is co-author and editor of more than 20 books and has published more than 225 scientific papers in Computer Science. His current research interests comprise software engineering for autonomous self-aware systems, software development based on formal methods and digitalization of universities. Currently, he is a member of the scientific committees of the Institut Mines-Télécom, IMDEA Software Madrid, and the excellence initiatives of the University of Bordeaux and the University of Lorraine.

This report is originally published in German and has been translated into English.

17.

Higher Education Institutions Need Strategies for the Digital Age

Dr. Jörg DRÄGER, Julius-David FRIEDRICH, Lisa MORDHORST, Ulrich MÜLLER, Ronny RÖWERT

CHE Centre for Higher Education (Centrum für Hochschulentwicklung)

Abstract

Digitalization is changing our higher education institutions – a transition that needs to be shaped. Higher education teaching and learning would particularly benefit from comprehensive use of digitalization. Nevertheless, most German higher education institutions are far from adopting a strategic approach. It is now time for higher education leaders to assume responsibility for developing strategies for the digital age. To this end, we analyze two approaches. Digitalization can contribute to modernization, for example, by helping an institution to overcome existing challenges such as an increasingly heterogeneous student body. Going further, higher education institutions could also use digitalization to enhance their profiles and link it closely to a specific institutional identity. Using national and international case studies, we depict various options for enhancing one's profile, some of which are only made possible through digitalization.

Strategies of higher education institutions and digitalization

Digitalization is shaping society and higher education institutions

The CD collection? It has long since been replaced by music streaming services. Online shopping and online banking have likewise become routine for many people. Car-sharing services enable finding and booking nearby rental cars via mobile apps, and they can now be found in almost every large city. New opportunities are also being opened up within the field of medicine: in the past, doctors could only rely on their own knowledge and the corresponding scientific literature for diagnoses and decisions about treatment. Nowadays, thanks to artificial intelligence technology such as "Dr. Watson," it is possible to evaluate a wide range of research-based data to find the evidence-based information relevant for treatment. Digitalization involves changes in almost all aspects of society.

The formative effects of digitalization also become evident in higher education institutions. Digitalization is affecting higher education institutions as a whole, resulting in consequences for the three academic missions (teaching, research and "third mission"[1]) as well as for administration.

- *Teaching* can benefit considerably from digitalization: With digital technologies, learning paths and learning pace can be tailored to the individual needs and abilities of each student. Re-using content (e.g., in the form of videos) allows teachers to intensify the individual mentoring of students and to discuss the contents of the previously shared learning videos in lectures or seminars. The technology does not replace teachers; instead, it changes their role from conveyer of knowledge to mentor for learning.
  Additionally, online teamwork opens up new didactic possibilities. Online learning communities can collaborate independent of location and without additional teachers. Online teamwork makes it possible to facilitate learning in intercultural or transcultural groups, for example, for people who are not able to participate in an exchange program ("virtual mobility"). Furthermore, creative experimentation in multi-media laboratories allows for re-creation of real situations that would, for example, otherwise be very expensive to set up or even dangerous.
- In the field of academic *research*, new opportunities arise not only in research itself but also in the exchange between academics. Employing "big data" can fundamentally alter the approaches to research. In the past, research data was collected for a particular question and evaluated with the goal of answering that question. Using large data sets for research allows for a diametrical approach. Now, posing the question can in some cases follow a discovery. Data sets can be evaluated in their entirety, rather than just as statistical samples. Researchers can discover patterns that, due to their rough granularity, had previously remained undetected. Connections are being uncovered, and even without particular research questions correlations become visible.
  Furthermore, digitalization enables new forms of exchange. Digital communication technologies simplify networking among researchers around the world. Virtual research groups can work together using cloud services and video conferencing for quick exchanges, thus avoiding time-consuming business trips.
- In terms of the *third mission*, digital media can facilitate easy exchanges with external actors, for example, for the purpose of effective public dissemination of research results. Open educational resources and open access research databases can be used for wide-ranging public access to academic education and academic knowledge. Furthermore, higher education institutions help shape the change of society by digitalization as a part of their portfolio.

---

[1] "Third mission" entails those activities (including research findings and their consequences) of higher education institutions that have direct effects on society and the economy, as well as currents from society and the economy that, in turn, shape higher education institutions. Third mission is thus characterized by interaction and can also be described as "transfer of ideas, knowledge and technology" (Innovative Hochschule 2016). It requires recourse to research and/or teaching but goes beyond them. Ideally, third mission contributes to the development of society (E3M-Project 2012; Roessler, Duong & Hachmeister 2015; Henke, Pasternack & Schmid 2016).

- With regard to the *administration* of higher education institutions, the use of campus management systems, apps and databases simplifies administrative and service processes. Enrolment and renewal of matriculation can be done by students themselves via the campus management system; certified transcripts can be ordered independently. Using a mobile app, students can check the menu of the cafeteria or organize their library accounts. Digital systems for administering alumni relations and separate online platforms for alumni exchanges are increasingly in use. These software solutions simplify the administrative side of student support.

Higher education institutions should use digitalization strategically

Higher education institutions operate in a segment of society that is being lastingly shaped and changed by digitalization. They, themselves, are part of this change. However, these processes of change are not taking place strategically in many German higher education institutions, especially in the area of teaching. Higher education institutions could proactively make use of digitalization in exactly this core activity.

Digital learning formats are only selectively becoming part of teaching in German institutions of higher education. This was shown in the Centre for Higher Education (CHE) study “Students’ Perspectives on Learning with Digital Media” (“Lernen mit digitalen Medien aus Studierendenperspektive,” Persike & Friedrich 2016), which was prepared in the framework of the *Higher Education Forum on Digitalization*. Only one out of five students use the complete spectrum of digital media, such as learning games and social communications tools, for educational purposes. If digital media were an obligatory part of the learning process, it is more likely that they would actually be used (ibid.).

Currently, positive examples of the use of digital media in teaching scenarios can mostly be traced back to the engagement of individual instructors. Digitalization is seldom a part of a comprehensive and institutionalized strategy for higher education; it rarely truly shapes the everyday life of students. In this sense, digitalization of teaching continues to have a limited effect on German higher education institutions, and much potential remains unused. With the engagement of individual professors, partial enrichment of teaching by use of digital media is possible, but nothing more.

Management of higher education institutions must strategically embed digitalization

If digitalization is to be used for the development of higher education institutions, an overarching strategy is needed. If instructors adopt methods for using digital media individually and without centralized support, direction and coordination, the process of digitalizing higher education will become a laborious and disconnected endeavor. For that reason, a new approach is necessary. Higher education leadership must proactively shape the change process brought about by digitalization and ensure strategic orientation for the entire institution.

In terms of the origination and implementation of a higher education strategy for the digital age, it is not only a matter of building an appropriate digital infrastructure (e.g., institutional networks with sufficient server capacities and comprehensive access to Wi-Fi[2]), but also a matter of shaping the profiles of the three missions (teaching, research and third mission), of adapting the organizational structure and culture – including comprehensive professional education for staff, and of "carving" strategic decisions "in stone" (for example, if the teaching method of "inverted classrooms"[3] becomes a common practice, large lecture halls will become less important.)

Of course, higher education institutions depend on engaged professors – but decentralized activities that are part of a bigger picture that interlinks activities and defines both common goals and an agreed-upon approach, have a very different effect compared with the detached initiatives of some individuals. Higher education leaders need to put digitalization in the service of the overall institutional strategy as best as possible – that is, to think about how the individual parts fit together and how to set up a suitable framework to bring about an overall institutional structure. Such a process, like every change management process, can only succeed if all actors, higher education leaders, students, and staff alike work together constructively and with full participation.

Higher education leaders face the challenge of tying loosen threads apart to develop and implement a suitable overall approach. In short, a strategy for the digital age is needed, not just a digital strategy. A strategy of this sort must also meet the minimal standards at the process level, for instance, a systematic SWOT analysis as the foundation and objective grounding for such considerations is indispensable. The formation of the strategy and the definition of goals should also not be imposed top-down, as a lack of acceptance would certainly follow. Instead, a feedback process should be implemented, so that not only the expertise of the responsible vice president is noticed and taken into account, but also the know-how of experienced pioneers in the field of teaching, as well as the reticence of skeptics.

Implementation of the defined objectives also requires coordination of structures, processes and activities. A systematic implementation of the strategy must be built upon operational management, including incentive structures, for instance. Only by doing so will it be possible to bundle existing and planned individual measures and align them with the overall strategy that supports the institution's mission.

Fundamentally, higher education institutions can pursue two different paths in their strategic approach to digitalization. On the one hand, digitalization can be used for modernization. In this case, existing *challenges* will be addressed by adopting digital solution strategies. On the other hand, higher education institutions can deploy digitalization to shape their institutional profile – in this case, *institutional identity* will be directly linked to digital formats. In both cases the activities required for digitalization should be aligned with the institution's goals, even though the first approach

2 For additional information on digital infrastructure see Thuy (2016).

3 In this form of inverted learning, the transmission of information takes place outside of the lecture, for example, via videos that are made available for the students. Deepening that knowledge and exchanges about the material take place when students and teachers are physically present.

(modernization) is limited to systematic coordination and organization of digitalization's potential for solving problems. In the second case (shaping one's mission and profile), however, there is a close and prominent link between the institution's identity and digitalization. Digitalization contributes significantly to the implementation of the institution's mission; in part, it would not even be attainable without digitalization.

Addressing challenges: modernization via digitalization

The leadership level at many higher education institutions still sees digitalization itself as a challenge to be overcome. The opposite is the case. If properly integrated, the possibilities of digitalization can be used to master challenges that higher education institutions are confronted with anyway.

In concrete terms: A key challenge for higher education institutions is a student body that is continually increasing in size and is becoming ever more heterogeneous. In Germany, more than half of the cohort of a given birth year will enroll in higher education – it is becoming the normality (Dräger & Ziegele 2014). People who enroll are not only the traditional 19-year-old secondary school graduates but also persons with master craftsman certificates, single fathers, or female managers. A variety of educational biographies has replaced the "traditional" student. Higher education institutions have to adapt to this new diversity and adjust the system so that students who, for example, must cope with multiple burdens or who are first-generation students will be able to complete the course of study successfully. Among other measures, this requires low-threshold introductory classes and orientation courses, preventative measures aimed at reducing the drop-out rate, and early and effective vocational guidance. Digitalization opens up new opportunities in this area. There is considerable potential in personalizing courses of study, which can be simplified by digitalization. Personalized digital education options can be offered according to prior knowledge and personal needs, which either enables students to autonomously tailor an individual curriculum or allows institutions to provide guidance for students by creating pre-structured programs and learning units. The latter is particularly helpful for students who find it difficult to assess their own abilities or the requirements and the variety of offerings at higher education institutions. The problem of dropping out can partially be addressed if, instead of a single large examination at the end of the semester, digital means are used for continuous monitoring of learning progresses and direct feedback, consequently identifying knowledge gaps during the learning process and allowing for effective countermeasures in the course of the semester. Personalized learning or continuous assessments are unquestionably also possible in on-site teaching. However, as a result of the current large number of students, analog equivalents are hardly affordable. A professor can ensure personalized learning for a student group of 10, but this is impossible for 500 students. Methods such as the inverted classroom format can create opportunities for a more intensive exchange between professors and students.

Digital technologies are used in many fields, and they are not sparing higher education. As a result, it is not a matter of *whether* they will be applied, but rather *how* they can be applied sensibly for the benefit of all students. That means it is not an either-or question, digital or analog, but a matter of successful hybrid formats. It is long overdue that higher education institutions use the opportunities of digitalization purposefully and strategically to address current and future challenges proactively.

Digitalization can thus be understood and used as a means for modernizing teaching, research, third mission and higher education institutions' administration to successfully deal with the increasing heterogeneity of students, to manage the trend of academization and to provide individual support despite large numbers of students. Digitalization also contributes to modernization in terms of general technological measures such as infrastructure (Wi-Fi) that are (or should be) implemented in all higher education institutions as part of a "digital mainstreaming."

Focusing institutional identity: shaping one's mission and profile with digitalization

Digitalization can be used for modernization in the sense of (better) mastering existing challenges. Going beyond that, however, higher education institutions can gain competitive advantages by using digitalization to sharpen their missions and profiles. Appropriate strategies for the digital age tie the institution's identity directly to its digital offerings. If, for example, continuing education is an area the institution chooses to focus on, it can be enhanced by digital courses and increase its reach significantly. While modernization through digitalization is compulsory, developing an institutional identity through digitalization is optional.

Higher education institutions can and should use the opportunities presented by digitalization to attain their desired profile and the portfolio of offerings that they are aiming for. Thus they can better reach the intended target groups and achieve the strategic development goals they have defined. This potential can only be realized if higher education institutions link digitalization to their strategy – that is, the achievement of their overarching goals and the means to achieve them. Consequently, as noted earlier, it is essential for university leaders to act as a driving force.

The following German and international examples show some options of how higher education institutions can shape their mission and profile in the area of teaching. The examples illustrate how the technological possibilities of digitalization can support various strategic directions. They also highlight possible unique selling points. The examples demonstrate how the digital components shape or will shape each institution's identity. This can take place both on an overarching institutional level and on the level of sub-units, such as individual faculties – as sub-units also represent and enhance the image of the institution as a whole. Furthermore, mission shaping is also conceivable as an effort across multiple institutions, for example in associations of higher education institutions. In all three categories, higher education leaders are responsible for setting up the necessary framework, for ensuring that the activities related to digitalization are strategically embedded, and for ensuring the implementation of the institution's strategy by digitalization.

The options for shaping institutional identity overlap in part not only in the themes they address but also in how the technological means are used. Some courses of development, missions and profiles would simply not be possible without digitalization, while others are merely strengthened by digitalization. The list of strategic options is by no means exhaustive. The possibilities discussed are intended to serve as examples and as food for thought.[4]

Diversity-serving university

With nearly 42,000 students, the University of Duisburg-Essen is one of the ten largest universities in Germany. The university is situated in the middle of a region that is undergoing an immense structural change. The university's digitalization activities are linked to the goal of enabling "non-traditional" students to successfully complete their degrees. More than half of the students at the University in Duisburg-Essen are "educational climbers" – a higher share than at any other university in Germany (Universität Duisburg-Essen 2013). The young university defines itself as a higher education institution that serves diversity – including a Vice Rectorate for Diversity Management – and uses the technical possibilities of digitalization to meet these ends (ibid.).

Consequently, the university's development plan includes the target of implementing e-learning elements in each course of study by 2020 (Liebscher et al. 2015; Rektorat der Universität Duisburg-Essen 2015). The university's main approach is the development and establishment of blended-learning formats as a flexible solution for the key target group of students who, for non-academic reasons (e.g., family, profession) are not able to be present at all classroom meetings. By means of alternating phases of learning on-site and learning in digital learning environments, flexible formats are created to meet this demand while simultaneously reacting to the requirements that are relevant to the university's student body.

The financial support received from the *Qualitätspakt Lehre*[5] has been used to develop a technical infrastructure that enables the use of blended-learning approaches across the entire university (Universität Duisburg-Essen 2016). This includes, for example, the introduction of a system that allows for computer-assisted exercises and tests with direct evaluation of individually provided tasks as well as automated feedback (Goedicke 2016).

---

4 It should be noted that the examples have been selected based on the organizations' external portrayal. These are purely conceptual examples, which are not based on empirical investigation. To what extent the self-representations of the institutions reflect the reality is beyond the scope of this paper.

5 *Qualitätspakt Lehre* is a quality pact for teaching. This funding line by the German Federal Ministry of Education and Research, in cooperation with the states, aims to strengthen the role of teaching at universities and universities of applied science, as well as art and music colleges (BMBF 2017).

As part of an economics module, a lecture with more than 700 participants was extended by use of online tutorials, exercises and tests based on virtual feedback, as well as a Moodle course, enabling students to learn independent of place and time. The results of the project and the strategy process in general show that the use of e-learning formats can motivate students, promote successful courses of studies, and enhance the flexibility of studying (Berthold, Jorzik & Meyer-Guckel 2015).

Continuing-education university

The higher education consortium Virtual University of Applied Sciences (*Virtuelle Fachhochschule*) is a multi-state association of universities of applied sciences that offers accredited bachelor's and master's online study programs for professionals. The universities of applied sciences form a virtual network and have agreed upon common curricula, and examination and study regulations. Students can freely choose at which institution within the consortium they want to enroll and take their examinations. Online support and on-site seminars are both managed according to unified standards.

The virtual consortium offers flexible courses of study, particularly for the increasing group of professionals with limited time. In doing so, the increasing need for life-long learning in addition to a career is met alongside simultaneously enhanced demands ("industry 4.0", "knowledge society"). The universities participating in the program thus make the field of continuing education a more prominent part of their profile. Beyond the online study programs, the members of the consortium also offer their on-site students the opportunity to take modules from the range of online courses (idw 2001).

Open-admissions university

Arizona State University, with nearly 80,000 students and 300 study subjects, is the largest campus-based university in the United States. Its strategic goal, similar to the University of Duisburg-Essen, is to enable all students, including those from non-academic backgrounds, to complete their degree programs successfully. To meet its goal, Arizona State University starts at admissions. The university has introduced a far-reaching policy of openness: as part of its *Global Freshman Academy* any person anywhere in the world may participate in its introductory classes free of charge, with no admission tests or access restrictions. These classes are equivalent to the first year of college, and the credits are fully transferable to the regular courses of study. Final admission is determined by the students' achievement in the online courses. There is little risk for students; no tuition fees are due until after successful completion of the examinations, and the costs of less than $6,000 for the first year of study are moderate by American standards (Dräger & Müller-Eiselt 2015).

The University is not afraid of on-site studies being crowded out by the online offerings. Quite the contrary: the University expects the digital introductory year for everyone to be positive marketing and attract new target groups, particularly "non-traditional" and international students (ibid.).

THE GUIDANCE UNIVERSITY

The increasingly heterogeneous student body has varying needs concerning teaching and learning. Digitalization of teaching makes it possible for the contents to be tailored to meet individual styles, spaces and goals in learning, as well as to give immediate feedback or to systematically use peer-learning elements.

In addition to personalization at the level of the individual contents of learning, analysis of student data also offers the possibility of recommending courses, or of finding indicators that point toward whether or not a student will pass a course. This is the approach taken by Austin Peay State University in Clarksville, Tennessee (ibid.). With its "Degree Compass", the University has created a system for course recommendations that offers suggestions for courses best matching the student's ability based on the student's previous performance, as well as on the results of fellow students in previous years. In this manner, the system recommends courses that the student is most likely to pass, and thus makes successful graduation more probable. This is both an opportunity and a risk. On the one hand, the risk of dropping out is minimized, but on the other hand, there is a risk that students will blindly rely on the recommendations and no longer follow their own interests.

Using appropriate systems allows for identification of students who are most likely to fail several courses and who are therefore at greater risk of dropping out. These at-risk students can, for example, benefit from student counselling to identify their individual difficulties and prevent dropping out at a later stage. Personalization as a means of shaping university's identity always entails the difficulty of maintaining a balance between protecting an individual's opportunities for personal development on the one hand and using the possibilities of big-data analysis to improve the probability of successfully completing a course of study on the other. At the same time, it is important to find means of utilizing student data that fit appropriately with the idea of data sovereignty[6].

WORKING WITHIN UNIVERSITY CONSORTIA

While the collective action of the Virtual University of Applied Sciences (see CONTINUING-EDUCATION UNIVERSITY, above) primarily uses online study programs to create a flexible educational model, the Bavarian Virtual University (*Virtuelle Hochschule Bayern*), a consortium of Bavarian universities and universities of applied sciences, is taking a different approach. The multi-university platform enables on-site students enrolled at a Bavarian university to take part in the high-quality

6 For a possible multi-dimensional approach to the subject, see "Rethinking Privacy Self-Management and Data Sovereignty in the Age of Big Data. Considerations for Future Policy Regimes in the United States and the European Union" (De Mooy 2017).

online courses offered by other universities free of charge and to have the credits transferred to their home institution. The development of courses is done collaboratively within the consortium. Following a two-step process, all universities within the consortium are invited to propose new courses. After the members have contractually agreed to recognize these courses, the consortium then decides which course production will be supported. With this approach, cross-university division of labor in terms of enlarging and extending the offerings of in-person courses is sensibly supported by digitalization. The appeal of higher education is also improved by course formats that are spatially and temporally flexible (Hochschulforum Digitalisierung 2016).

Online teaching consortia can also help to retain niche subjects, since not all courses have to take place at a particular university; instead, online courses can also be used by other universities.

The socially-oriented university

In order to enable public access to academic knowledge, the cross-university initiative Hamburg Open Online University develops online learning formats that are open to everyone. With this approach, the state's institutions of higher education are meeting the demand for open educational resources. Simultaneously, the initiative offers interested citizens the opportunity to take part in interdisciplinary project teams and contribute to the conception and creation of publications. Hamburg's six public higher education institutions aim to strengthen their profile as regionally networked actors. Simultaneously, they position themselves in the field of opening up higher education for new target groups. The initiative also strengthens the city of Hamburg in its role as a center of science and digitalization (Hamburger Zentrum für Universitäres Lehren und Lernen 2016). Such an initiative can also be connected to the third mission.

The credentialing university

An extreme case, for which there is not yet a comprehensive example in reality but which could nevertheless become possible with digital approaches, would be a purely credentialing university. An institution of this type would specialize in auditing skills gained informally online and transforming these into university credits, or to compile credits that were collected in online seminars of other universities to form a recognized university degree. Such an institution could develop flexible models that enable students to convert ECTS points which they already obtained, to accumulate them, or to gain credit for tested skills and bundle these into a university degree.

Such institutions of higher education would require neither their own professors nor their own campus. However, with this altered model of a university, personal interaction as a key element in the processes of learning and development would be lost. For that reason, it would likely be a niche model, which could only be used for particular target groups. For the majority of first-generation students this model of a purely credentialing university would not really be an option, because this target group, in particular, benefits greatly from intensive personal, and in-person interactions with teachers and advisors on their path to successfully completing their degree.

This type of institution does not yet exist in Germany. Given the current state of German regulation of higher education, it would also not be realizable. However in other countries, it would be possible. In the United States, Western Governors University offers a mixture of credentialing and teaching skills. Existing skills can be recognized by examination. The additional skills needed for a degree can be gained in online courses (WGU 2016; Dräger & Müller Eiselt 2015).

A university specializing in digital teaching support

In addition shaping one's mission and profile via study programs, entirely new possibilities open up for a higher education institution to make a name for itself in offering support structures for digital teaching and learning. Teachers need technical and didactic support to implement digital teaching, and not all higher education institutions provide this kind of assistance and support. Organizations offering help with the production and pedagogical implementation of digital teaching could become another opportunity for shaping one's profile. A fully-owned subsidiary of the Lübeck University of Applied Sciences, "oncampus GmbH", has specialized in offering part-time online distance-learning study programs and online continuing education courses in Germany, as well as supporting instructors in creating these courses. In addition, the organization has introduced the opportunity for interested instructors to create MOOCs, which are then offered on the platform "mooin." At the end of some courses, it is possible to take an examination at partner institutions, meaning students can obtain ECTS points for these MOOCs (on campus 2016).

Conclusion

In a diverse higher education system, not all institutions will rely on digitalization to the same extent or in the same way – but in the medium term no higher education institution will be able to manage without them. Digitalization is changing higher education institutions. It enables them to handle existing challenges – and to find entirely new ways of reaching their development goals. While modernization by digitalization is certainly necessary, it is up to higher education institutions to go further and link digitalization closely to their institutional identity and use it to enhance their mission and profile.

Higher education institutions that understand more quickly and more convincingly than others how to utilize digitalization to serve their general strategy have a great opportunity to use the benefits of digitalization for their overarching goals. However, it is inevitable that some institutions will run into dead ends during this innovation process.

In the long term, advantages will accrue to higher education institutions that actively shape the process of transformation instead of just observing it passively. In order to use digital media systematically and holistically, higher education institutions need strategies for the digital age. The conception and implementation of such a strategy cannot simply be delegated to special representatives for e-learning, to the directors of computing centers or to CIOs. Higher education leaders must promote the development and implementation of an adequate and stringent strategy, while cooperating with institutional stakeholders.

Last, but not least: The options for shaping one's institutional identity discussed above show a remarkable positive effect, when looked at as a whole. Through digitalization, teaching regains a place in the strategic focus of higher education institutions. The design of teaching was, for a long time, more the individual concern of professors and seldom consciously used as a means to shape the profile of higher education institutions. The reputation of an institution has mainly been determined by its research and in parts by the content of its course offerings, but not by its teaching methods. Higher education institutions such as Maastricht University with its problem-based learning, remain the exception (University Maastricht 2016). It is to be welcomed that digitalization and the related options to shape mission and profile contribute to a clear appreciation of teaching.

Table 1: Overview of options how to shape university's missions and profiles

Profile	Paraphrased key aspect of the profile	Example	Primary target group	Approach
Diversity-serving university	"We carefully consider students' backgrounds and needs."	University of Duisburg-Essen	"Non-traditional" students	Flexible formats for studies, blended-learning approach in the breadth of courses of studies.
Continuing-education university	"We enable flexibly scheduled coursework."	Virtual University of Applied Sciences	Professionals	Mainly online study programs, a higher-education association reaches critical mass.
Open-admissions university	"Potential students obtain access to higher education on a trial basis without an entrance examination."	Arizona State University	People from non-academic backgrounds who are interested in university studies	Digital introductory year without limitations in access: entry-level classes are available free of charge, credits for online courses count towards a university degree (examination fees)
The guidance university	"We prevent dropping out and ensure successful studies."	Austin Peay State University	Prospective students who are success-oriented or risk-averse	Analysis of data to enhance students' academic success and orientation

Profile	Paraphrased key aspect of the profile	Example	Primary target group	Approach
Working within university consortia	"Whoever comes to us has access to an extensive set of program offerings."	Bavarian Virtual University	Students at member universities	Production of online courses (cooperation among member institutions) with mutual guarantee of recognition
The socially-oriented university	"Students, instructors and citizens learn from researching together."	Hamburg Open Online University	Members of society with interest in academic issues	Open, collaborative learning platform for all public higher education institutions in Hamburg
The credentialing university	"We certify your knowledge and your skills."	To date, no example exists in Germany. In the USA, first efforts have been made, e.g., at Western Governors University.	Students who have gained knowledge and skills (e.g., via online courses) but have no certification or formal degree	1.) Online examinations of previously acquired knowledge and skills, conversion into certificates that are recognized at the higher education institution 2.) Bundling of online course offerings (e.g., MOOCs) into structured curricula and recognized degrees
A university specializing in digital teaching support	"We support professors in implementing online courses."	oncampus GmbH	Professors and other instructors	Support structures for digital teaching

Bibliography

Berthold, C., Jorzik, B., & Meyer-Guckel, V. (2015). *Handbuch Studienerfolg.* Accessed on 28 October 2016 from http://www.stifterverband.de/pdf/handbuch_studienerfolg.pdf

BMBF (Ed.) (2017). Qualitätspakt Lehre. Accessed on 05 May 2017 from http://www.qualitaetspakt-lehre.de/

BMBF (Ed.) (2016). *Innovative Hochschule.* Accessed on 15 August 2016 from https://www.bmbf.de/de/innovative-hochschule-2866.html

De Mooy, Michelle (2017). Rethinking Privacy Self-Management and Data Sovereignty in the Age of Big Data. Considerations for Future Policy Regimes in the United States and the European Union. Accessed on 26 April 2017 from http://www.bertelsmann-stiftung.de/de/publikationen/publikation/did/rethinking-privacy-self-management-and-data-sovereignty-in-the-age-of-big-data/?tx_rsmbstpublications_pi2%5Bpage%5D=1&cHash=f7b78f0fb56ebbc4cdccde884361a11c

Dräger, J., & Müller-Eiselt, R. (2015). *Die digitale Bildungsrevolution – Der radikale Wandel des Lernens und wie wir ihn gestalten können.* Munich: Deutsche Verlags-Anstalt.

Dräger, J. & Ziegele, F. (2014). *Hochschulbildung wird zum Normalfall – Ein gesellschaftlicher Wandel und seine Folgen.* Accessed on 10 August 2016 from http://www.che.de/downloads/Hochschulbildung_wird_zum_Normalfall_2014.pdf

E3M-Projekt (2012). *Green Paper-Forstering and Measuring "Third Mission" in Higher Education Institutions.* Accessed on 10 August 2016 from http://www.e3mproject.eu/docs/Green%20paper-p.pdf

Goedicke, M. (2016). JACK – Ein automatisches Übungs- und Prüfungssystem. Accessed on 28 October 2016 from http://www.s3.uni-duisburg-essen.de/jack/

Hamburg Open Online University (2016). *Wie lernen wir in Zukunft?* Accessed on 18 October 2016 from http://www.hoou.de/p/konzept-hamburg-open-online-university-hoou/

Hamburger Zentrum für Universitäres Lehren und Lernen (HUL) (2016). *Hamburg Open Online University (HOOU).* Accessed on 20 August 2016 from https://www.hul.uni-hamburg.de/schwerpunkte/digitalisierung-von-lehren-und-lernen/hoou.html

Henke, J., Pasternack, P., & Schmid, S. (2016). Third Mission von Hochschulen – Eine Definition. *Das Hochschulwesen*, pp. 16-22.

Hochschulforum Digitalisierung (2016). *"Auf Zusammenarbeit setzen!" – Paul Rühl von der Virtuellen Hochschule Bayern im Interview*. Accessed on 14 August 2016 from https://hochschulforumdigitalisierung.de/de/blog/paul-ruehl-virtuelle-hochschule-bayern-interview

idw (2001). *Hochschulverbund Virtuelle Fachhochschule (VFH)gegründet – Virtueller Campus für 28.000 Studierende*. Accessed on 29 July 2016 from https://idw-online.de/de/news33627

Liebscher, J., Petschenka, A., Gollan, H., Heinrich, S., Van Ackeren, I., & Schmid, S. (2015). E-Learning-Strategie an der Universität Duisburg-Essen – mehr als ein Artefakt? *ZFHE* (Vol. 10, Nr. 2), pp. 97-109.

on campus (2016). *Richtig studieren im Netz.* Accessed on 18 November 2016 from http://www.oncampus.de/partnerhochschulen.html

Persike, M., & Friedrich, J.-D. (2016). *Lernen mit digitalen Medien aus Studierendenperspektive. Sonderauswertungen aus dem CHE Hochschulranking für die deutschen Hochschulen.* Accessed on 27 October 2016 from http://www.che.de/downloads/HFD_AP_Nr_17_Lernen_mit_digitalen_Medien_aus_Studierendenperspektive.pdf

Rektorat der Universität Duisburg-Essen (Ed.). (2015). *Hochschulentwicklungsplan.* Accessed on 28 October 2016 von https://www.uni-due.de/imperia/md/content/webredaktion/2016/hochschulentwicklungsplan_2016-20.pdf

Roessler, I., Duong, S., & Hachmeister, C.-D. (2015). *Welche Missionen haben Hochschulen? Third Mission als Leistung der Fachhochschulen für die und mit der Gesellschaft.* Accessed on 10 August 2016 from http://www.che.de/downloads/CHE_AP_182_Third_Mission_an_Fachhochschulen.pdf

Thuy, P. (2016). *Finanzierung digitaler Lehre. Themengruppe "Governance & Policies" des Hochschulforums Digitalisierung.* Accessed on 27 October 2016 from https://hochschulforumdigitalisierung.de/sites/default/files/dateien/HFD_AP_Nr%2019_Finanzierung_digitaler_Lehre.pdf

Universität Duisburg-Essen (2013). *10 Jahre Universität Duisburg-Essen.* Duisburg: Der Rektor der Universität Duisburg-Essen. Accessed on 20 August 2016 from https://www.uni-due.de/imperia/md/content/webredaktion/2015/10-jahre-ude.pdf

Universität Duisburg-Essen (2016). *Diversity Management*. Accessed on 15 August 2016 from https://www.uni-due.de/de/universitaet/diversity_management.php

Universität Duisburg-Essen (2016). Ziele und Maßnahmen des Qualitätspakts-Lehre-Projekts. Accessed on 28 October 2016 from https://www.uni-due.de/bif/

University Maastricht (2016). Education. Small-scale and international. Accessed on 18 November 2016 from https://www.maastrichtuniversity.nl/education

Western Governors University (2016). A School Unlike Other Schools. Accessed on 27 December 2016 from http://www.wgu.edu/about_WGU/overview#

ZEIT (2015). *DIE ZEIT Nr. 48/2015, 26. November 2015*. Accessed on 15 August 2016 from http://www.zeit.de/2015/48/uni-duisburg-essen-ulrich-radtke-hochschulmanagement

Short Biographies

Jörg Dräger has been Executive Director of the Centre for Higher Education (CHE) since 2008; he is also a Member of the Executive Board of the Bertelsmann Stiftung. A PhD physicist, Dräger was Hamburg's (non-partisan) Senator for Science and Research from 2001 to 2008. His work focuses on education, integration and digitalization. At the CHE his chief interests have included higher education in the digital age, and university education becoming the norm.

Julius-David Friedrich leads the CHE project Higher Education Forum Digitalization 2020. Following his education in economics and the management of cultural and non-profit organizations at the University of Bielefeld and the Technical University of Kaiserslautern, he led the development of the Higher Education Forum Digitalization, together with the Stifterverband and the German Rectors' Conference. Key aspects of his work include higher education in the digital age and international rankings of institutions of higher education.

Lisa Mordhorst has been Advisor to the Executive Directors at CHE since 2016. She earned a B.A. in applied cultural studies and an M.A. in educational sciences, both from Leuphana University of Lüneburg. In addition to her work with the Executive Directors, she leads the project "Higher Education Manager of the Year". Key aspects of her work include higher education in the digital age and the development of higher education systems.

Ulrich Müller is Head of Policy Studies at CHE. He earned an M.A. in pedagogy, psychology and sociology at the University of Bonn. From 1998 to 2002 he worked on the staff of the Federal and State Commission for Educational Planning and Research Promotion in Bonn. Key aspects of his work include governing boards, student financing, student services, laws on higher education, and public management.

Ronny Röwert is an expert on the development of higher-education institutions, with special emphasis on questions of strategies for the digital age. In the Higher Education Forum Digitalization, which is supported by Germany's Federal Ministry for Education and Research, he directed the working group "Change Management and Organizational Development" for the CHE. Currently, he is responsible for German academic partnerships at Kiron Open Higher Education.

This report is originally published in German and has been translated into English.

18.

Reframing universities' global engagement for an open society[1]

Marijk van der Wende

Abstract

Globalization has strongly influenced higher education during the last decades. As in many other sectors, this has generated contradictory outcomes. Enhanced competition for reputation, talent, and resources was driven by the paradigm of the global knowledge economy and fueled by global rankings, dynamic research funding, and international mobility. At the same time and in response, strengthened cooperation occurred within networks, systems, and regions. System convergence could be observed in parallel to growing divergence and stratification of institutions. As a whole, higher education has opened up to the world and became more engaged at global level. But how will this process continue with the current backlash against globalization in Europe and the US and what will be the impact of other major geopolitical trends such as the rise of China?

Introduction

In times that walls are being pulled up and borders are being closed down, higher education is facing new challenges in its role towards the realization of an open, democratic and equitable society. Recent geopolitical events and intensified populist tendencies are promoting a turn away from internationalism and away from an open society. Support for open borders, multilateral trade and cooperation is being weakened, globalization is criticized, and nationalism is looming. Brexit, the prospect of a disintegrating Europe Union, and of the US turning its back on the world create waves of uncertainty in higher education regarding international cooperation, the free movement of students, academics, scientific knowledge and ideas. At the same time China is launching new global initiatives such as the One Belt One Road (or New Silk Road) project, which could potentially span and integrate major parts of the world across the Euro-Asian continents, but likely on new and different conditions, also for higher education. These changes require a critical review of our assumptions regarding globalization and the international development of higher education. Should we revise our

1 This chapter is based on the inaugural lecture "Opening up: higher education systems in global perspective", delivered by the author on 12 December 2016 at Utrecht University.

expectations? What can we learn from reviewing our previous scenarios in order to improve our understanding of what will determine the course these processes seem to be taking? And what could this imply for the European higher education landscape?

GLOBAL CHANGES: UNANTICIPATED CONSEQUENCES

Could we have imagined a decade ago, the Brexit, the closing of universities and obstruction of academic mobility after the failed coup in Turkey, pressure on the Central European University, (notably founded on Popper's concept of an Open Society), and the American University in Kabul being attacked by IS? These and other recent events caused a big shudder in the higher education community. An impression of the 2016 conference of the European Association for International Education (EAIE), was expressed as follows: *"What seems to have died is the European international education community's faith in the inevitability of the cosmopolitan project, in which national boundaries and ethnic loyalties would dissolve over time to allow greater openness, diversity and a sense of global citizenship."* (Ziguras, 2016).

Could we have imagined a decade ago the shocks going through the US higher education sector since the election of President Trump? Fears for at least a temporary end of American internationalism, or the beginning of the closing of the American [open] door, and the sheer certainty that this presidency will be a heavy blow to the internationalization of higher education were immediately voiced in the higher education press. The elections were followed immediately by student unrest across campuses and university leaders aimed to reassure their students' fear for their personal safety and their fear for the future. In their messages they emphasized the values of diversity and inclusion and their institution's mission towards an open society. "*As a community, we must use this moment to reaffirm our own values of respect and inclusion, while working together to preserve academic freedom, fearless inquiry, and diversity. Together we have both the will and the ability to rise above the rancor, to embody the best of what a free, open, and inclusive society should be.*" (Nicholas B. Dirks, Chancellor UC Berkeley, 9 Nov 2016). "*As a community and as a practical force for good we are delighted and energized by our diversity, with a meritocratic openness to talent, culture and ideas from anywhere*" (L. Rafael Reif, President MIT, 10 Nov 2016).

Could we have imagined a decade ago, not only the prospect of a disintegrating Europe Union, of the US turning its back on the world, but al of international institutions and organisations being under pressure, and multilateral agreements being cancelled? In other words; the possibility of a less interconnected and integrated world? Let's take step back and try to understand what may have happened.

The above quoted "faith in the inevitability of the cosmopolitan project" underlines what was indeed our belief. Definitions of globalization were inherently progressive, i.e. the widening, deepening, and speeding up of world-wide interconnectedness (Held et al, 1999), with growing interdependence and convergence between countries and regions. Some even claimed at some point that the "world was flat", suggesting a level-playing field with equal opportunity for all competitors, including individuals as the drivers of the 3.0 version of globalization (Friedman, 2005). But the world wasn't flat and serious warnings have been given all along the way, signaling notably the risks of inequality, of globalization not only generating winners, but also losers. Already around the turn of the millennium, Castells (2000) pointed out that globalization leads at the same time to development and to underdevelopment, to inclusion and to exclusion, risking global economic imbalances with detrimental effects on social cohesion. Stiglitz (2002) criticized globalization's discontents for developing countries as a result of imperfect global governance structures and practices. James (2001) stated that from an historical perspective, globalization is not irreversible and that it was at that moment weakened or at least stagnating. While Gray (2002) argued that globalization was already over and that in particular the global free market economy had been a utopian project, since its contradictions as testified by flows of asylum seekers and economic refugees had been too easily overlooked. And even earlier on, historian Paul Kennedy warned in 1993 against our lack of structures to deal with a global world, while political economist Dani Rodrik rung similar bells in 1997.

In fact, it was a decade ago, in the summer of 2006, that the impact of these tensions on the higher education sector was becoming unmistakably clear. A meeting of OECD ministers for higher education taking place in Athens was so seriously threatened by protesting students that it had to be dislocated to a safer nearby peninsula. The student demonstrations had strong anti-globalist features protesting against proposals of the Greek minister to regulate foreign providers active in the country, which was seen as deregulation and privatization of higher education. While these riots were going on in the streets of Athens – where so many more occurred during the following European economic and financial crises – the ministers were discussing four future scenarios for higher education (OECD, 2006). These were constructed along two main dimensions: the extent of globalization (global-local) and the amount of influence of (state) government (administration-market), and were shortly described as follows:

1. Open Networking
   In this scenario, the key driver of change is the further harmonization of higher education systems (expanding the impact of the Bologna process also beyond Europe), leading to an increased trust and understanding as a basis for easy recognition of degrees. Next to that, lower costs of communication and transportation and ICT greatly facilitate cooperation and mobility, and the civic society ideal of open knowledge (open source) allows sharing of knowledge and data resources.
2. Serving Local Communities
   This scenario is driven by a backlash against globalization and by growing skepticism to internationalization. The changing public opinion is because of terror attacks and wars, problems with immigration, outsourcing, and the perception of threatened national identity. Growing geo-strategic tensions lead to the launch of

more military research programs on which governments impose serious security classifications.
3. New Public Management
The main driving force in this case is the mounting budget pressures created by the aging society that have pushed in most countries to cost shifting and sharing. There is more use of new public management tools, including market forces, financial incentives (competitive funding), increased autonomy and accountability, deregulation, and so on.
4. Higher Education Inc.
This scenario is strongly driven by trade liberalization in education (through WTO or General Agreement on Trade in Services [GATS] or on the basis of bilateral free-trade agreements). Low transportation and communication costs, the increasing migration of people, and the rise of private funding and provision of higher education further facilitate the emerging international marketplace for higher education and academic research services.

As the then President of OECD's higher education programme (IMHE), I moderated this ministerial discussion and noted in a later analysis of it that: "the fourth scenario, which is most global and market driven, is for many the most likely scenario to occur, while at the same time not exactly the most desirable direction for most of them" (Van der Wende, 2007, p. 278). Globalization was thus perhaps not really positively embraced by these ministers, and probably even feared by some, yet by all acknowledged as the major driving force for the sector. At the same time, many were implementing national policies much in line with scenario 3 (New Public Management) within their countries, as a way of working towards scenario 1 (Open Networking) at international level, especially in Europe. However, scenario 2 (Serving Local Communities) was *not* much discussed or seen as a very likely direction for change.

Yet, a decade later it is exactly this backlash against globalization as described in scenario 2, caused by terror attacks, immigration, outsourcing, and the perception of threatened national identity, alongside heightened geo-political conflicts, that is unfolding today. And the launch of ambitious new military research programmes has been announced recently with a 5 billion euro EU fund to stimulate investment in defense-related R&D (Reuters, 30 Nov 2016).

Growing skepticism to internationalization can be heard in public and political debates on trade, open borders, migration or refugees, and is indeed also targeting higher education. Xenophobia and discrimination of foreign students has been reported longer in countries such as Australia, South Africa, and Russia. But more recently also in the UK (in relation to Brexit) and in the Netherlands, where parties at the extremes of the political spectrum (PVV and SP) regularly launch critical questions in parliament on the costs and benefits of international students and worry they would reduce opportunities and access for domestic students ("domestic students first"). Similar political pressure has been observed in for instance Denmark and Germany.

Skepticism to internationalization can also be heard inside academia. Some critical voices retaliate against internationalization as an elite cosmopolitan project, against the use of English as a second / foreign language for teaching and learning, against global rankings and the resulting global reputation race with its annual tables of losers and winners, against the recruitment of international students for institutional income, and other forms of "academic capitalism". Students took the streets to protest against European higher education policies (or "Bologna") already in the early 2000s and academics themselves may now list internationalization, among such trends as massification and underfunding, that cause higher education's current problems. Arguments that students are primarily to be trained for domestic labour markets anyhow are being heard, and the local and national mission and relevance of public higher education is being (re-)emphasized contrasting the strive for global reputation and impact. These voices are not representative of the dominant perspective and certainly not of the formal discourse. But would academia's internal debate perhaps be developing conservative traits that could result in tendencies towards "academic nationalism, protectionism, or indeed isolationism"?

In order to improve our understanding of these negative trends that seem to contest some of our prior scenarios and optimism and that contradict our beliefs and expectations, we first need to analyze what has been overlooked as to better understand what will determine the further course these processes may take.

THE GLOBAL KNOWLEDGE ECONOMY: GLOBAL FLOWS AND SHIFTING IMBALANCES

The knowledge economy paradigm builds on neo-classical economic and human capital theory, in which intellectual and human capital are key conditions for economic growth. (Higher) education is a producer of that human capital, in terms of "talent" and "skills". In the global knowledge economy, nations, corporations, and public organizations are competing across borders for talent, reputation and financial resources. And universities alike, fueled even more so by global rankings and the increasingly global flows of students, researchers and funding (Van der Wende, 2008; 2009; 2011).

On the world map of the highly ranked so-called "World-class Universities", the global flows of students and researchers confirm a geography in which these scientific powerhouses are strongly positioned as global magnets for academic talent (Van der Wende, 2015). Flows of students, post-docs and researchers indicate the largest flows from Asia to the USA and the second largest from Asia to Europe. Within Europe flows are increasing from south to the north; in the wake of the financial crisis and instead of intended more circular patterns. Smaller flows concern traditional patterns of south-north and some West-West mobility. More recently some West-East flows are emerging, partly related to the return of the diaspora to India and China (ADB, 2014; OECD, 2015; UNESCO, 2013; 2015). Most recently great uncertainties occurred regarding the flows to the UK and US, while at the same time this may make

China more successful in attracting talent, which it will certainly try to do (Van der Wende & Zhu, 2016).

Flows of people are indicative for the flows of funding, i.e. through international fee paying students and through dynamic funding mechanisms where "money follows people". For instance the European Research Council's (ERC) funding which has been criticized to contribute to the growing imbalances within Europe (Teixeira, 2013; Zecchina & Anfossi, 2015). Global mobility of researchers demonstrates important imbalances across countries and regions. For instance the USA, which is relying heavily on immigrants for its R&D and which aims to improve "stay rates" especially for degree holders in STEM (science, technology, engineering, mathematics) fields as it needs them for the US workforce. Experts underline in general the vulnerability of countries overly dependent on immigration for their R&D capacity (Auriol, 2010; Proudfoot & Hoffer, 2016). Critical questions have been raised whether this reduces job opportunities for US researchers and in 2015 the US Council on Foreign Policy published a report on "Balancing China", asking whether the US should continue to help build the competitive advantage of its main competitor, China, by training so many Chinese graduate students. Under the new US presidency a change of policy directions may occur.

Global imbalances are also reflected in international student mobility, which has more than doubled over the last decades to over 4 million today and these flows have always been clearly in favor of the OECD countries. This brain gain is especially situated at the most advanced levels; 24% of PhD students are international on average across OECD countries, against an average of 9% in all levels (OECD, 2016). The bulk of doctoral education is provided by relatively few institutions globally, notably in the USA and the UK which host together over 50% of all international doctoral students (UNESCO, 2015). The competition is particularly focused on STEM since these skills are considered most critical for innovation, technological progress, industrial performance, and thus economic growth (Auriol et al, 2013; Freeman et al, 2014; Gokhberg et al, 2016 Avvisati et al, 2014). The USA alone hosts nearly half of all international PhDs in these fields (UNESCO, 2015).

International students represent more than 40% of PhD enrolment in the UK, Switzerland, the Netherlands (with again strong concentrations in STEM). These three countries are also the world's top performing countries in research impact and quality and have the highest return on investment from ERC funding by attracting many ERC grantees from other countries. Two of these countries are facing serious uncertainties with respect to academic mobility and EU funding as a result of the 2014 referendum on immigration in Switzerland and the 2016 referendum on EU membership in the UK (Brexit)[2]. In the Netherlands several parties are seeking a quorum for initiating this type of referendum. Hence the warning mentioned before regarding the vulnerability, which seems to apply in particular to these very successful and very *open* systems!

2 In December 2016, the Swiss Parliament agreed on a 'light' immigration solution and is awaiting the EU's response to this proposal. Negotiations on Brexit have not started at the time of writing.

Meanwhile, the reach of the dynamic and internationally competitive funding mechanism such as the ERC is growing global. Agreements between the ERC and other major research funding councils in the US (NSF), South Korea, Japan (JSPS), and China (among other countries) we recently signed. The production of scientific knowledge is shifting to the international level; the proportion of publications involving international collaboration has nearly doubled since 1996, reaching close to 20% in 2013 (UNESCO, 2015).

The key players in this field; the leagues of research universities, such as the American Association of Universities, the League of European Research Universities, the China 9, and the Australian Group of 8, position themselves at the global scene. The first global agreement on the characteristics of these research universities was signed in October 2013 in Hefei, China.

China's rise

China's higher education system has developed at an unprecedented scale and pace and is now the largest in the world in terms of student enrolment. Although its investment in higher education and R&D as a percentage of GDP is still below OECD average, it is – because of its size – second in terms of its share in world expenditure on R&D (China's GERD is 19.6% compared to 19.1% for the EU and 28.1% for the US, putting it second in position for in the world's largest R&D budget in PPP) and for its world share of researchers (19.1%, compared to 22.2% for the EU and 16.7% for the USA). China's growth is greatly contributing to the increase in the number of researchers worldwide (21% since 2007 to 7,8 million in 2013), which is again mostly observed in STEM fields (all data for 2013 in UNESCO, 2015). China is ready to offer researchers very attractive packages if needed.

China is clearly re-balancing global inequality in higher education. However, it is doing so in a very particular, narrow, way. A significant share (43%) of China's R&D is dedicated to development and relatively little (4%) to basic research, and its R&D spending is (still) heavily oriented towards developing S&T infrastructure (OECD, 2015). This may be strategically motivated in relation to technological innovation, economic growth and geopolitical positioning (f.i. cyber security). This is reflected in the rather skewed development of its higher education system in which it is taking also very much a narrow STEM route; concentrating on fields such as engineering and computer sciences. Mainly in competition with the US (39 top engineering schools in Asia versus 42 in the US, and only 19 in Europe). China's top engineering schools now dominate those in its region and rank in the world's top 10 for engineering and top 25 for computer sciences (ARWU, 2015. This implies a potentially skewing effect on developments in the sector globally, i.e. driving the already strong competition in STEM fields even further.

China's progress in humanities and social sciences is much less convincing. And research quality and impact are still lagging behind, as seen in the fact that China has a much smaller size in terms of citations received from abroad than would be implied by its overall publication volume (OECD, 2015). This is probably why China is seeking more cooperation. Its new higher education policy (part of China's 13th 5-year plan) focuses on hubs to connect its best universities with the world top in the West. At the same time, China is still an important basis for talent recruitment by the US and Europe, it struggles with skills gaps, and has limited success in regaining its diaspora (Welch, 2015).

But the balance with the West may change with China's One Belt One Road (or New Silk Road) project. Recently a range of cooperation agreements on higher education and research have been signed with partners in Europe (THE, 2016). Questions around China's role in global higher education are becoming more prevalent: will China at some point balance the West; will it take a leading role in higher education? It is certainly time to view China not anymore only as a follower in global higher education (Van der Wende & Zhu, 2016).

GLOBALIZATION, INEQUALITY, AND HIGHER EDUCATION

Thanks to scholars such as Thomas Piketty (economics) (2014) and Branco Milanovic (sociology) (2016) our understanding of the paradoxical outcomes of globalization has developed, especially regarding the impact of globalization on inequality (as previously developed by for instance Stiglitz). They analyzed that while economic and social inequality has *decreased* at global level, mostly due to the growth of Asian economies, notably by China, it has *increased* within certain countries and regions. These patterns are to quite an extend reflected in higher education and research.

The previous section confirmed the re-balancing effect of China's rise on the global higher education and research scene. UNESCO (2015) signals the widespread growth in the number of researchers, which demonstrates that since 2011 China has overtaken the USA. The EU remains the world leader, while Japan's and Russia's shares have shrunk between 2007-2013 (from 10.7% to 8.5% and from 7.3% to 5.7% respectively). UNESCO more generally states that global imbalances are decreasing as the North–South divide in research and innovation is narrowing, with a large number of countries moving towards knowledge economies and cooperation increasing between the regions. Empirical research finds positive externalities of mobile researchers and suggest it is not necessarily a zero-sum game and thus don't necessarily come at the expense of the sending country. Mobile researchers are higher performers (OECD, 2015), the so-called "movers advantage". Migrant scientists are found to perform on average at higher level than domestic scientists. Findings of migration research suggest positive externalities; the benefits that accrue to the destination country do not necessarily come at expense of sending country. Brain migration is not a zero-sum gain (Scellato & Stephan, 2014).

However, these minds concentrate more and more in fewer hubs, also in Europe, thus creating bigger inequalities and contributing to the further stratification of its higher education landscape (Wende, M. C. van der (2015).

Global inequality also decreases as student numbers are exploding around the world, more than half of it in China and India alone, and will be expanding more globally. Those studying abroad expand even quicker, but as represent only 2%, this brain drain should generally not represent a threat to the development of national systems (UNESCO, 2015) However, public financial support for higher education is under pressure in many countries. Total spending across the OECD, went up over the last decade (from 1.3% of GDP in 2000 to 1.6% in 2013), but the public share of it (1.2% in 2013), traditionally strong in Europe (up to 1.7% in the Nordic countries), is more and more difficult to sustain and this gap is widening in Europe (mostly along the south-north axis) in the wake of the financial and economic crises (OECD, 2016).

The American model in which private contributions become more important is increasingly followed (in for instance the UK and the Netherlands), while it is being strongly criticized at its home base for issues of equity and decreasing value for money (Economist, 2015). Thus the meritocratic role of higher education is waning in Anglo-American societies with neo-liberal policies that became significantly more unequal in terms of income from labor and notably from capital. The importance of (higher) education in explaining income differences in such societies is reducing and family background and social connections may matter more, especially in societies that are already near to the upper limit of educational participation (Marginson, 2016; Milanovic, 2016). Moreover, the notion of a tertiary education premium is further being called into question as graduates' average debt is rising fast in these countries, substantial proportions of graduates take non-graduate jobs, and many of these are uncertain for the future because of robotization, artificial intelligence (see for instance: Susskind & Susskind, 2015).

A two-faceted pressure on higher education: global positioning and local commitment

Thus, while global inequalities in higher education tend to decrease, its potential to compensate for increasing inequalities in rich countries, i.e. its meritocratic role, is being called into question. The resulting pressure on the sector is two-faced: enhanced competition at global level and a growing critique on local commitment and delivery. Especially the pursuit of global positioning on rankings is being criticized for *jeopardizing universities' national mission and relevancy in the societies that give them life and purpose (Douglas, 2016)*. For creating a divide with local, regional, and national responsibilities (Hazelkorn, 2016 in the aftermath of Brexit). And for making universities become "footloose" from society "as an academic jetset of international [cosmopolitan] types who live in their own world" (Bovens, 2016). Such critique fits well into the critical discourse on "academic capitalism" that has been going on since the 1990s (Slaughter & Leslie, 1997; Slaughter & Taylor, 2016). And in the debates about world-class universities versus National Flagships (Douglas, 2016) and on world-class universities versus world-class systems (Van der Wende, 2014; Marginson, 2016)

REBALANCING GLOBALIZATION

So a decade ago, it was already clear that globalization was creating global economic imbalances with detrimental effects on social cohesion. That re-balancing globalization was needed and that this would have consequences for higher education institutions. In my view, it required them to broaden their missions for internationalization. Not only respond to the profitable side of globalization, but also address related problems such as migration and social exclusion. To be more open and inclusive, to balance economic and social responsiveness, to define their "social contract" in a globalized context. (Van der Wende, 2007). In the local context this means enhancing access for migrant and minority students, support the integration of student groups with different cultural, ethnical and religious backgrounds, and to embrace diversity as the key to success in a global knowledge society. To become true international and intercultural learning communities where young people can effectively develop the competences needed for this society and become real global citizens (Van der Wende, 2011). This is in line with Martha Nussbaum's argument that for education, economic growth isn't the only rationale, but that higher education institutions have to contribute to "a public response to the problems of pluralism, fear, and suspicion our societies face" (Nussbaum, 2012).

TODAY AND THE (SILK) ROUTES TO THE FUTURE

Today our societies are facing these problems indeed. More so than we could have imagined in our optimism during the high days of internationalization, following the fall of the Berlin Wall, the signing of the European Treaty (Maastricht 1992) and the expansion of the EU. And more so than we could have feared during the following years after the turn of the millennium with growing criticism on globalization and academic capitalism. And now, some even fear for the future. Thinking about what happened, but even more so about the way forward and the future, presents us thus with a pile-up of big questions. Where is the Europe Union going? What will be the role of the US and China? How will these developments affect the higher education landscape? In Austria and elsewhere in Europe?

Multiple scenarios for Europe are being discussed at the moment. From muddling through to leap-frogging to a more and stronger Union, from disintegration to cooperation at different pace(s), and (why not) a European Republic of the cities. There is agreement that its current construction, as a compromise model with a veto for all is defect. The problem was recently illustrated by President van der Bellen: "We have seven very autonomous Länder, do you think Austria would exist if they would all have a veto over everything?" (quoted by De Gruyter, 2017).

Phrases like "we have created Europe and now we have to create Europeans", which were first heard after the rejection of the EU Constitution in 2005 by the Netherlands and France, are being repeated. Higher education's role in this could be questioned. Did we fail to develop European identity and citizenship – goal of the Erasmus programme – in our students? Should we expect to hear more from the more than three million (former) Erasmus students, in defense of Europe, or have they all become the now criticized cosmopolitan elite? Did we fail to educate them as critical thinkers, towards social responsibility, democratic citizenship, and civic engagement in support of an open society? The hope is that more young people will participate in the upcoming elections in a number of European countries (the Netherlands, France, Germany, and perhaps Italy) this year, than they did in the UK over the Brexit referendum. Hopeful are small grassroots student initiatives such as Are We Europe (aiming to learn from Europe's mistakes), Dare to be Grey (aiming to de-polarize the social and political debate) and Operation Libero, that recently ensured a positive vote in Switzerland to ease the naturalization of third-generation immigrants[3]. As educators we should be hopeful and always remember that "optimism is a moral duty", as we learned from Karl Popper, the great defender of an open society. We will need to build on our strongest values and courage to educate our students for an uncertain future. Helga Nowotny sets out the fundamental challenge for universities of how to accept uncertainty and reminds us that: "The mission of a good university is to train students for certainty and to educate them for uncertainty." (Nowotny, 2016a-b). We will also need to take responsibility in addressing the growing inequality between the winners and losers of globalization. By all means, not by treating internationalization and diversity as two separate themes, as has been done in higher education over the last decades. But by making internationalization inclusive, i.e. embracing diversity in all its dimensions.

The European higher education landscape is changing as a result of both internal and external forces. Concentration in fewer but larger research hubs, especially is STEM fields, leads to stratification and puts the classical model of the comprehensive European research university under pressure. Will economically weaker regions and countries be able to sustain this model of the university, or will they have to choose more specialized profiles, i.e. in less capital-intensive fields in the social sciences and the humanities? What does this imply for the meaning of the university in its social-cultural context and how will this affect the European (Humboldtian) values around the teaching-research nexus in the various disciplines? Will we still be able to guarantee the important bridges between the (natural and life) sciences and the humanities and social sciences? An important basis also for the successful re-emergence of liberal arts and sciences programmes and colleges in Europe (Kirby & Van der Wende, 2016).

Liberal arts education is also increasingly popular in China, but in a more and more illiberal context. Central directions infringing academic freedom, i.e. the discussion of "Western values" in classrooms, have recently been sharpened. China's impact on the global higher education landscape is growing and cooperation with Europe is sought through global research hubs and bi- and multilateral agreements. Yet, recently 29 top universities in China were put under tighter control by the CPCC.

---

3 urlhttps://www.areweeurope.com/confrontation-editorial/ http://dtbg.nl/ https://www.operation-libero.ch/de

China is willing to take the lead in economic globalisation, especially now the new US administration is turning away from it. It is determined to restore its central place in the world by building its New Silk Route that will integrate the Euro-Asian continents and carry more than consumption goods alone. People, ideas and knowledge will travel along and – like in previous historical periods – this will be of [mutual] influence. But how and on which conditions? Will it follow the way China is trying to influence the working of the Internet, as a "pure and safe" Internet (banning the NYT)? Will China's values also impact the way we develop and disseminate knowledge and do we actually understand these values at all? How can we prepare our students for safe travels on these new [silk] roads towards the future? Another major challenge for internationalization: to enrich our vision and understanding of the world, to widen our focus from being predominantly or even exclusively Western, to open it towards a new history (Frankopan, 2015).

REFERENCES

ARWU (2015). *Discovering World-Class. Academic Ranking of World Universities 2015.*

Asian Development Bank (2014). Labor Migration, Skills & Student Mobility in Asia (Tokyo: Asian Development Bank Institute).

Auriol, L. (2010). *Careers of Doctorate Holders: Employment and Mobility Patterns*. STI Working Paper 2010/4. Statistical Analysis of Science, Technology and Industry (Paris France: OECD Publishing).

Auriol, L., M. Misu and R. Freeman (2013) *Careers of Doctorate Holders: Analysis of Labour Market and Mobility Indicators.* OECD Science, Technology and Industry Indicators Working Papers, No. 2013/04 (Paris, France: OECD Publishing).

Avvisati, F., Jacotin, G., & Vincent-Lancrin, S. (2014). Educating higher education students for innovative economies: what international data tell us. *Tuning Journal for Higher Education, 1* (1), 223-240.

Bovens, M. *'Er is een gevaar dat universiteiten zich loszingen van de rest van de samenleving'*. In DUB (8 November 2016).

Castells, M. (2000). *The rise of the network society* (2nd ed.). Oxford, UK: Blackwell.

Douglass, J. A. (Ed.). (2016). *The New Flagship University: Changing the Paradigm from Global Ranking to National Relevancy*. Springer.

Frankopan, P. (2015). *The silk roads: a new history of the world*. Bloomsbury Publishing.

Freeman, B., Marginson, S., & Tytler, R. (2014). *The age of STEM: educational policy and practice across the world in science, technology, engineering and mathematics*. Routledge.

Friedman, T. L. (2005). *The world is flat: A brief history of the twenty-first century*. Macmillan.

Gokhberg, L., Shmatko, N., & Auriol, L. (Eds.). (2016). *The Science and Technology Labor Force: The Value of Doctorate Holders and Development of Professional Careers*. Springer.

Gray, J. (2002). *False dawn: The delusions of global capitalism*. London: Granta.

Gruyter, C. de. Geremek Lecture 2017 – The Future of Europe. Utrecht University, 17 February 2017.

Hazelkorn, E (2016). Lessons from Brexit. In University World News Oct 2016. Retrieved from: http://www.universityworldnews.com/article.php?story=20161011123810165

Held, D., McGrew, A., Goldblatt, D., & Perraton, J. (1999). *Global transformations: Politics, economics and culture.* Stanford, CA: Stanford University Press.

https://www.timeshighereducation.com/news/china-and-eu-aim-create-education-silk-road-future

James, H., & James, H. (2009). *The end of globalization: lessons from the Great Depression*. Harvard University Press.

Kennedy, P. (1993). *Preparing for the 21st-century, winners and losers.* 1. *New York Review of Books, 40* (4), 32-44.

Kirby, W. C., & van der Wende, M. C. (2016). A Global Dialogue on Liberal Arts and Sciences: Re-engagement, Re-imagination, and Experimentation. In *Experiences in Liberal Arts and Science Education from America, Europe, and Asia* (pp. 1-16). Palgrave Macmillan US.

Marginson, S. (2016). Global stratification in higher education. In *Higher Education, Stratification, and Workforce Development* (pp. 13-34). Springer International Publishing.

Milanovic, B. (2016). *Global inequality: A new approach for the age of globalization*. Harvard University Press.

Nowotny, H. (2016). *The Cunning of Uncertainty*. Polity Press.

Nowotny, H. (2016). The meaning of uncertainty for success and failure. Key note address, Utrecht University, 13 June 2016.

Nussbaum, Martha C. *Not for profit: Why democracy needs the humanities*. Princeton University Press, 2012.

OECD (2006). *Four futures scenarios for higher education*. Retrieved from https://www.oecd.org/edu/ceri/38073691.pdf

OECD (2015). *Science, Technology and Industry Scoreboard* (Paris: OECD Publishing).

OECD (2016). *Education at a Glance 2016. OECD Education Indicators* (Paris: OECD Publishing).

Piketty, T. (2014). *Capital in the 21st Century.*

Proudfoot, S., & Hoffer, T. B. (2016). Science and Engineering Labor Force in the US. In *The Science and Technology Labor Force* (pp. 77-119). Springer International Publishing.

Reuters (30 November 2016). Spurred by Trump and Brexit, EU plans five-billion-euro defense fund. Retrieved from http://www.reuters.com/article/us-eu-defence-idUSKBN13O2WU. Rodrik, D. (1997). Has globalization gone too far?. *California Management Review, 39* (3), 29-53.

Scellato, C. G. and P. Stephan (2014) The mover's advantage: the superior performance of migrant scientists. *Economics Letters*, 122(1), 89–93.

Slaughter, S. & B. J. Taylor (eds.) 2016). Higher Education, Stratification, and Workforce Development Competitive Advantage in Europe, the US, and Canada. Springer

Slaughter, S., & Leslie, L. L. (1997). *Academic capitalism: Politics, policies, and the entrepreneurial university*. The Johns Hopkins University Press

Stiglitz, J. E. (2002). *Globalization and its Discontents* (Vol. 500). Norton: New York.

Susskind, R., & Susskind, D. (2015). *The future of the professions: How technology will transform the work of human experts*. Oxford University Press, USA.

Teixeira, P. N. (2013). The tortuous ways of the market: looking at the European integration of Higher Education from an economic perspective. *LEQS Paper*, (56).

The Economist (28 March 2015). *Excellence v equity*. Special Report Universities

Times Higher Education (18 October 2016). China and EU aim to create 'education Silk Road to future'. Retrieved from: UNESCO (2013) The International Mobility of Students in Asia and the Pacific (Bangkok: UNESCO's Asia-Pacific regional bureau for education in Bangkok).

UNESCO (2015). UNESCO SCIENCE REPORT Towards 2030

Welch, A. (2015). A new epistemic silk road? The Chinese knowledge diaspora, and its implications for the Europe of knowledge. *European Review, 23* (S1), S95-S111.

Wende, M. C. van der (2014). On Mergers and Missions: Implications for Institutional Governance and Governmental Steering. In: Q. Wang, Y. Cheng, & N. Cai Liu (Eds.). *Global Outreach of World-Class Universities: How It is Affecting Higher Education Systems*. Centre for World-Class Universities. Jiao Tong University, Shanghai. Sense Publishers. Pp. 137-153.

Wende, M. C. van der & J. Zhu (2016). *China a Follower or Leader in Global Higher Education?* Research and Occasional Papers Series CSHE 3.16. University of California Berkeley: Centre for Studies in Higher Education.

Wende, M. C. van der & J. Zhu (2016). China's Higher Education in Global Perspective: Leader or Follower in the "World-Class" Movement? In: N. Cai Liu, Y. Cheng, & Q. Wang (eds.). *Matching Visibility and Performance: A Standing Challenge for World-Class Universities*. Sense Publishers. Pp. 119-137.

Wende, M. C. van der (2007). Internationalization of higher education in the OECD countries: Challenges and opportunities for the coming decade. *Journal of Studies in International Education, 11* (3-4), 274-289.

Wende, M. C. van der (2009). European Responses to Global Competitiveness in Higher Education. In: J. Douglass, J. King & I. Feller (eds.) *Globalization's Muse: Universities and Higher Education Systems in a Changing World*. Berkeley Public Policy Press, Institute of Governmental Studies, University of California Berkeley. Pp. 317-341.

Wende, M. C. van der (2011). Global Institutions: the Organisation for Economic Co-operation and Development. In: R. King, S. Marginson & R. Naidoo (eds). *Handbook on Globalization and Higher Education*. Edward Elgar. Pp. 95-114.

Wende, M. C. van der (2011). The Role of Higher Education Institutions in Globalization (key note address). In: *New Horizons for the International University.* DAAD, Bonn.

Wende, M. C. van der (2015). International Academic Mobility: Towards a Concentration of the Minds in Europe. In: *The European Review*. Cambridge University Press. Volume 23, issue S1, pp. S70-S88.

Wende, M. C. van der, (2008). Rankings and Classifications in Higher Education. A European perspective. In: J. C. Smart (ed.) Higher Education: *Handbook of Theory and Research,* Vol 23. Springer. Pp. 49-71.

Zecchina, A., & Anfossi, A. (2015). Mobility of Scientists across Europe: The Role Played by European Research Funding. *European Review, 23* (S1), S89-S94.

Ziguras, C. (2016) *The five stages of Brexit grief for universities*. University World News, 14 Oct 2016.

SHORT BIOGRAPHY

MARIJK VAN DER WENDE is dean of graduate studies and professor of higher education at Utrecht University and research associate with CSHE at UC Berkeley. She was a visiting scholar at Harvard University, Shanghai Jiao Tong University and Boston College. Her research focuses on the impact of globalisation and internationalization on higher education.

19.

A THIRD WAY FOR EUROPE'S HIGHER EDUCATION SYSTEM: BETWEEN AMERICAN AND ASIAN DREAMS AND REALITIES

Peter SCOTT

ABSTRACT

European universities have been both precursors and laggards – precursors because the concept of the university as an organisational and cultural form first evolved in medieval and early-modern Europe; and a laggard because both the modern research university and mass higher education systems were developed in the United States in the 20th century (and are now being dynamically extended in east Asia in countries with a 'post-Confucian' heritage during the first two decades of the new century). Nevertheless national reform programmes, and at European level the Bologna process, have led to far-reaching changes in European Higher Education. These reforms have been designed to make up for any deficits in the European university compared to its American and East Asian peers – and rivals. They may also allow Europe to offer an alternative model of 21st-century higher education that combines world-class research, innovation and enterprise with a continuing commitment to the 'social dimension', and the public values of the university.

INTRODUCTION

Europe has traditionally been regarded as the heartland of the university – with the foundations of universities in Bologna, Paris, Oxford and the rest between the 11th and the 16th centuries arrayed in a stately, almost Apostolic, succession. However, although true in a narrow historical sense, that traditional view is misleading. This imagined weight of history may have contributed to an unjustified sense of superiority, and even a spirit of complacency, in earlier years and now perhaps an equally unjustified sense of inferiority that, because of its great age, the European university is too sclerotic to compete with universities in other world regions, notably in north America and east Asia.

The traditional view is misleading in two different ways. First, what was novel about the medieval European university was its organisational form, which mirrored that of urban corporations, trade guilds and even the pre-Parliamentary 'Estates' characteristic of medieval society with its web of 'liberties' (Pedersen 1997, Gieysztor 1992). The scholasticism that was its dominant intellectual mode was derived from, and perhaps inferior to, the ideas circulating in the Moslem east (and west, because Cordoba has a decent claim to be regarded as the intellectual capital of Europe in the high Middle Ages) – or, indeed, to the ideas that had circulated in the court schools of the earlier Carolingian period (Makdisi 1990). Secondly, the contemporary European university cannot reasonably trace its origins, practical as opposed to nominal and rhetorical, back much further than the early 19th century. It is not an accident that the University of Berlin, founded in 1810 as part of a wider reform of the Prussian state, is generally taken to be its archetype. The development of the modern European university was aligned with the growth of the strong nation state, and its accompanying professional bureaucracy; of an industrial economy rooted in the advances of science and, especially, technology and new demands for a skilled workforce; and of a liberal and secular, and latterly democratic, society.

If the European university has a historical edge over universities in other world regions, it is a much slighter one than is commonly supposed. Indeed Harvard, founded in 1636, predates most European universities. European colonial powers were also quick to establish universities in their spreading empires. The University of Calcutta (now Kolkata) was founded in 1857 only 30 years after the establishment of University College London, England's oldest university apart from the medieval foundations of Oxford and Cambridge. It is also difficult to escape the conclusion, however uncomfortable, that the triumph of the European universities in the late 19th and early 20th centuries was inextricably linked with the climax of nationalism and empire. It may also have been linked, although more tangentially, with the extraordinary flourishing of European scientific and intellectual civilisation in the same period – even if Albert Einstein's final and firmest base was across the Atlantic in Princeton and Sigmund Freud died in lonely exile in London divorced from his cultural roots.

The disasters that civilisation endured between 1914 and 1945 inevitably eroded the moral standing (and, in key instances, scientific capacity) of Europe's universities, leading to what many regard as an irreversible shift in the world's academic centre of gravity westwards to the United States (although Britain also served as both stopping-off place and staging-post in that shift). More surprising perhaps was the relatively limited role played by universities, and higher education more generally, in the reconstruction of post-war Europe. The far-reaching social shifts in the United States triggered by the GI Bill in the 1940s and culminating in Clark Kerr's multiversity, and the emergence of a truly mass system of higher education, in the 1960s were more muted in Europe. France only attempted a serious reform of its universities, in 1968 when Edgar Faure was Minister of Education, when its *trente années glorieuses* were well under way. Only in Sweden perhaps were large-scale reforms of higher education undertaken. Europe lagged almost two decades behind the United States, and it was only after the fall of the Berlin Wall that truly mass higher education systems emerged in central and eastern Europe.

It was only perhaps with the initiation of the Bologna process just before the millennium that continental-scale reform began in Europe (Bologna Declaration 1999). Despite its initially mundane objectives, Bologna acted as a powerful catalyst for national reform projects. It provided not only a policy framework within which more detailed national reforms developed but also a compelling narrative. However, it also had important weaknesses. The first was that, although Bologna was initiated as an inter-governmental process (and the European Higher Education, and Research, Areas it was influential in establishing extended from the Baffin Strait between Greenland and Canada to the Sea of Japan in the Russian Far East), it became embroiled in the narrower European Union project of 'ever closer union' that has proved so problematic in the second decade of the 21st century. The second was that the rejuvenation of European higher education which it has symbolised if not inspired coincided with the rapid development of higher education in other words regions, notably countries in east Asia sometimes labelled 'post-Confucian'. This newly emergent and distinctively European model of higher education, rooted in the (mixed) historical experience of the European university but also the post-war (and contemporary) realities of welfare state / social market and European integration, therefore, has had to confront not only the comfortably understood 'American challenge' but new global challenges, from new potential rivals in east Asia as well as from the rejectionism, fundamentalism and turbulent instabilities that also characterise the current phase of globalisation.

The focus of this chapter, as its title suggests, is on whether this model of European higher education, despite significant diversity and even divergences in national reform processes, can sensibly be regarded as a third way between American and Asian models, themselves far from monolithic. After this brief historical sketch, it is divided into four main sections:

- The Bologna process itself, and its successive phases;
- Major features of national reform processes across Europe;
- Europe's supposed rivals, the American and 'post-Confucian' models of higher education;
- A concluding summary, and reflections on the distinctiveness of European higher education.

THE BOLOGNA PROCESS

The late-20th century and early 21st century have witnessed an extraordinary flowering of the European university, even if its significance has been obscured at times by the continuing global dominance of higher education in the United States (both in terms of its social penetration and its scientific productivity and creativity) and, latterly, the rise of universities in east Asia (although this rise is still to a substantial degree prospective and potential rather than actual). Despite a late start Europe has not only followed the US in creating a mass graduate society but also, in some key fields, matched its scientific achievements. The westwards flow of academic talent across the Atlantic, triggered by the near-collapse of European civilisation between 1914 and 1945 but continued in the postwar decades even after prosperity had returned to (western) Europe, has been stabilised if not reversed. In terms of its own history the European university has never enjoyed greater success – an important point to emphasise in the light of a still nagging sense of external threat and inferiority (intensified by the often perverse methodologies of global league tables).

There have been three strands in this revival of European higher education. The first is the accumulation, and acceleration, of national reform programmes and, in particular, the policy borrowings that have taken place between European countries, which will be discussed in the next section of this chapter. The second is the development of much stronger European institutions, of which the European Communities (now the European Union) is the most prominent even in its current post-Brexit state. This prominence has been directly expressed through student (and staff) exchange programmes, notably Erasmus, and successive Framework and now Horizon research programmes. The powerful presence of the EU, and especially its post-Maastricht strengthening and its enlargement to cover most central and eastern European countries after the collapse of Communism, has also encouraged the development of other Europe-wide organisations, such as the European University Association, its equivalent for non-university higher education institutions, and less formal groupings such as the League of European Universities.

The third, and perhaps most significant, strand has been the Bologna process, culminating in the establishment of the European Higher Education Area (EHEA). The European Research Area (ERA), although separate from the Bologna process and established earlier, was the product of the same broad policy momentum to promote greater coherence, and coordination, across Europe. In some countries, notably in central and eastern Europe, the Bologna process has played a dominant role in shaping national reform agendas; in others it has provided a broad and perhaps galvanising framework. In others again, notably the United Kingdom, national reforms have apparently owed little to the Bologna process – although UK universities have played an important role in exchange and, in particular, research programmes. Despite these differential responses, it is difficult to imagine most of the recent reforms of European higher education without reference to Bologna. Its direct and indirect effects, and responses and reactions to it, have shaped contemporary realities. The process itself can be divided into five main phases:

BEGINNINGS

The Bologna Declaration was signed by ministers from 27 European countries in the summer of 1999, although it can be argued that the groundwork had been laid the previous when minsters from just four countries – France, Germany, Italy and the UK – had signed the Sorbonne Declaration. Bologna was essentially a scaled-up version of Sorbonne. It grew out of three distinct agendas. The first was the already well established student (and staff) mobility. Without some degree of harmonisation of the architecture of courses the ambitious goals set for student mobility seemed unlikely to be achieved (European Commission 2013a). The second agenda was the also well established commitment to free movement, especially for the highly skilled with academic and professional qualifications. Again, a reasonable degree of harmonisation was needed to achieve this objective. The third agenda was a medley of different national agendas – to reduce course lengths in Germany, to help break down barriers between universities and grades écoles in France. A European-level initiative would help ease the path of these reforms. However, Bologna was deliberately designed as an inter-governmental rather than an EU process (although in practice European institutions eventually had to provide much of its organisational muscle). In negative terms this was intended to indicate a degree of distance between, even scepticism about, the drive towards 'ever closer union". In more positive terms it reflected the much wider geographical reach of the Bologna reforms, far beyond the frontiers of the EU.

A COMMON ARCHITECTURE

The Bologna Declaration had two immediate goals. The first was to produce a common architecture of courses and qualifications, based in the two-cycle bachelors-masters pattern familiar in the US (and in the UK, The Netherlands, Sweden and France, although there the two-cycle pattern was organised on a different basis) but unfamiliar in other major European countries notably Germany. Where countries had already embarked on significant national reform programmes such as Spain and across central and eastern Europe, the Bologna architecture offered a clear template. Elsewhere, especially when employers as well as universities remained attached to other patterns such as the *Diplom*, greater difficulties were encountered. However, across Europe as a whole adoption of the Bologna course architecture, at any rate in formal terms, proceeded more smoothly that many commentators had expected and critics had hoped. The second goal was to promote the development of a much stronger 'quality culture'. This presented greater difficulty initially because outside the UK, The Netherlands and Scandinavia quality assurance was a novel concept. However, the widespread move across Europe to increase the autonomy of universities by delegating to them greater administrative responsibility made it necessary to establish more formal arrangements for assessing quality outside state bureaucracies. So, once again, Bologna's emphasis on 'quality culture' was a welcome next-steps development, although important differences of emphasis remained – and remain – between top-down regimes designed to police quality and more collegial forms of quality enhancement.

EXTENDING BOLOGNA

In the third phase the Bologna process was extended in two ways. First, its scope was expanded to include third-level, or doctoral, programmes. This presented difficulties because in some European countries PhD candidates were firmly regarded as students while in others they were treated more as apprentice researchers. But this had the fortunate effect of opening up a wider debate about the future of doctoral programmes that embraced academic rather than merely structural and administrative issues. The incorporation of doctoral programmes within the Bologna process also opened up new links to research (Keeling 2006). Again, because research is such a central element in the missions of most European universities, the effect was to lodge the Bologna reforms at the heart of higher education. No longer simply administrative reforms, they now addressed core academic concerns. Secondly, Bologna became more outward oriented, and acquired a global reach. This new orientation was reflected in the development of new programmes like Erasmus Mundus designed to promote student exchanges between Europe and other world regions (European Commission 2013b). It also led to a renewal of confidence in the European model of higher education, encouraged by the interest in Bologna outside Europe (for example, in francophone Africa and Latin America) (Crosier and Parveva 2013, Muche 2005). The reform of European higher education, spearheaded by Bologna, ceased to be regarded as a remedial exercise designed to make good deficits in its belated modernisation compared with, predominantly, the US but also perhaps with the looming Asian challenge. Of course, this view of the (post-Bologna) European university as a 'third way', rooted in a fuzzy but powerful identification with the 'social dimension', did not go unchallenged. Critics continued to regard these reforms, especially those that appeared to encourage the growth of a more entrepreneurial culture, as an expression of a broadly neoliberal ideology.

European Higher Education Area (EHEA)

This new global reach was underlined by the establishment of the EHEA, mirroring the earlier establishment of the European Research Area (ERA) (European Commission 2012). The original 27 signatories had now grown to 43. The place for the most recent meeting of ministers, Yerevan in Armenia in 2015, emphasised this geographical extension – and perhaps also reflected a renewed confidence in the idea of a wider 'Europe' (despite the 2008 banking crisis, and subsequent recession, and stagnation in the Eurozone). The establishment of the EHEA had three main effects. First, it created an umbrella not only for specifically Bologna reforms but also many other European programmes and initiatives. It produced greater coherence. Secondly, it helped to consolidate the Bologna reforms by bringing together the policy instruments developed since 1999 and the political and administrative structures (governmental and non-governmental) designed to support these instruments into a more coherent whole. Thirdly, it made a statement about the role that the European university was now playing on the world stage (again?), bringing to a definitive end the lingering belief that Europe was playing catch-up. The Bucharest ministerial meeting in 2012 placed equal emphasis on 'social responsibility', reasserting (if only by strong implication) a strong commitment to public higher education, and 'global mobility', asserting Europe's positive engagement with there wider challenges of globalisation. These grander ambitions stand in marked contrast to the more modest goals set in the Bologna Declaration 13 years earlier.

On the defensive?

The fifth, and final, phase of the Bologna process is still in the process of unfolding. Clearly there has been a degree of high-level political disinvestment, with the potential (intended or otherwise) of pushing Bologna back into the techno-structural reform box from which this Europe-wide reform process has emerged since 1999. There has been a retreat from the high tide of post-millenarian optimism when the Lisbon council of ministers set the goal of making Europe the most dynamic and economically advanced world region by 2010, as other troubles have pressed in – economic stagnation, widening inequality, mass immigration, terrorism and fundamentalism, the re-emergence of 'Cold War' tensions, the rise of (right-wing) populism, now compounded by Brexit (and President Trump haranguing Europe from across the Atlantic). Universities and research now risk being associated with the 'expertocractic' elites that are the supposed target of popular mistrust. Their close links with globalisation and cosmopolitanism may now be liabilities. It is hardly surprising that the reform of higher education, and more so of reform on the European level, has taken a back seat. However, there is a danger that current troubles and turbulence will underestimate what has been achieved in terms of the modernisation of European higher education, and the degree to which it has become embedded and institutionalised. The Bologna process has been a key element in this modernisation (Scott 2012).

National higher education reforms

Clearly there are risks in giving the Bologna reforms, and other Europe-wide initiatives, pride-of-place in the reform of higher education systems across Europe. In an alternative narrative Bologna can be regarded as a subordinate, and even secondary, strand in the wider reform process. National higher education reform programmes pre-dated and have run alongside the Bologna process and other Europe-wide initiatives. As has been pointed out already, some of these national reforms have been designed essentially to implement the Bologna agenda, notably in terms of the recommended three-cycle bachelors-masters-doctors architecture and the development of a stronger 'quality culture'. But other national reforms appear to have had little direct relationship with the Bologna reforms. Some have been strongly driven by quasi-market agendas (whether to enable and encourage greater competition between institutions in the belief this will increase quality and enhance 'consumer' choice, to use competitive research funding to increase quality and productivity, or to enhance research and innovation systems to enable countries to compete more successfully on the global stage). Others again have been largely motivated by national political agendas focused on governance and funding reforms (often in a drive to promote greater efficiency), while drawing some inspiration, and political justification, from the Bologna process (Reichert and Tauch 2005).

In a recent synthesis report for the European Commission researchers at Ghent University suggested a broad typology of structural reforms in higher education (File and Huisman 2016). The focus of their report was on the evaluation of these reforms and, in particular, the identification of success factors. However, their suggested typology is a good starting point.

- The first type of reform they identify as designed to promote 'horizontal differentiation', by which they mean the development of a wider variety of types of higher education institution. Their examples include the introduction of universities of applied science in Austria in the 1990s and measures to strengthen the contribution of private institutions in Poland in the 2000s. To some extent these policies have been designed to resist, and possibly reverse, the (formal or informal) erosion of the distinction between traditional universities and other institutions of higher professional and vocational education that gave rise to accusations of 'academic drift'. But some have been attempts to develop new principles on which to base differentiation of institutional missions, and discourage the idea that the university is the standard, even ideal institutional type.
- The second type they characterise as 'vertical differentiation', of which the best example are policies designed to concentrate research in a limited number of universities. Several European countries have pursued 'vertical differentiation' – for example, the UK with successive Research Assessment (RAE) and now Research Excellence Framework (REF) exercises, Germany with the *Excellenz* initiative, Denmark where research funding concentration has been accompanied by institutional restructuring and mergers, France where institutions have been organised into powerful regional groupings to strengthen research and innovation capacity, and in several more countries. However, it is significant that in none of these cases has the concentration of research funding been pushed to the next logical stage, the formal designation of a fixed cadre of US-style research universities. Although not considered by the Ghent researchers, the growth of performance measures, based on new assessment systems, and also of league tables has produced new, and possibly more negative, forms of 'vertical differentiation' reflecting institutional reputations (and, of greater concern perhaps, quasi-market 'brands').
- The third type they describe as reforms designed to modify 'institutional relationships'. The best example of this type of reform are national policies to encourage, or force, institutions to merge. Such a policy has been pursued with vigour in Denmark where formerly independent research institutes have been merged with universities (the consequent expansion of Aarhus University is a striking example). Here the major focus has been on using institutional mergers alongside the concentration of research funding (in other words, to facilitate 'vertical differentiation'). In Ireland, in contrast, mergers of institutes of technology to create 'universities of technology' have been designed to promote 'horizontal differentiation' by establishing more effective counter-weights to the existing universities. In Wales mergers of small institutions have been principally driven by the more basic need to create viable institutions with sufficient critical mass in terms of budgets and organisational capacity. In Finland mergers have been driven by all three agendas. In many other countries reformed governance regimes and new funding systems have been used to encourage softer forms of institutional collaboration that stop short

of mergers, often in the context of regional development and focused on building strong skill and research bases.

The typology developed by the Ghent researchers, therefore, has limitations. Only rarely can national reform programmes be categorically allocated to one of the three types. In the majority of cases there are overlaps as two or all three types of reform are pursued simultaneously. Another limitation is that their focus is on structural reforms, which tends to underestimate the significance of reforms that have not been aimed at large-scale structural changes but focussed instead on issues of governance, management, quality or funding. The formal stratification of institutions into fixed classes with demarcated missions but within a coordinated system in which student transfer is routine, common in the US, has proved difficult to import into Europe, as a recent failed attempt in Romania to assign all higher education institutions into three categories demonstrated. Far-reaching reforms have sometimes been undertaken in the absence of significant structural change, notably in England between 2010 and 2015.

An alternative approach is to attempt to identify the major drivers of almost all national reforms. These are policies designed to build more effective innovation systems, mainly by focusing on basic research but also its translation into economic and social goods and on securing a better 'fit' between the production of graduates and the skill needs of an advanced economy; to promote institutional autonomy, while creating more developed systems of accountability; and to increase efficiency, whether to compensate for reductions in state budgets or to encourage more entrepreneurial activities.

Research and innovation

The ambition to make Europe the most economically and technologically dynamic world region by 2010, set out in the Lisbon Declaration but frustrated by the 2008 banking crisis and subsequent economic recession, was mirrored by similar ambitions in most individual European states (European Council 2000). It is not unreasonable to regard these ambitions as the major driver of higher education reforms, certainly in northern and western Europe – more important perhaps than meeting social demand. This linkage between higher education and the knowledge economy, in terms of jobs, skills and knowledge, overshadows the more familiar focus on the 'social dimension' of European higher education (Olsen and Maassen 2007).

Most national higher education reforms in this area share common features. These include: (1) the more selective funding of research, although this may take the form of concentrating general research funding in a more limited number of centres, institutes and universities (as in the UK) or of special initiatives which allocate funding through competitive bids (as in Germany); (2) the reform of doctoral programmes, to encourage successful completion, to inject (research and generic) skills training into these programmes and to open up multiple career pathways in addition to conventional university and research careers; and (3) the development of a range of mechanisms to improve links between universities, state bodies and commercial enterprises.

However, there are differences of emphasis between national reforms. Perhaps the most important is the balance to be struck between support for ‘world-class’ research universities, inevitably defined in the reductionist terms favoured by the compilers of global university rankings, and consequently the production of global economic elites, on the one hand and on the other a clearer focus on the better translation and application of research findings, and production of a more broadly based skills base. Although generalisations are difficult, larger countries with a reasonable expectation their universities will feature in global rankings, especially those pursuing market-oriented policies, are more drawn to the former, while smaller countries of necessity less focused on global fame, with political cultures more sympathetic to state action, are more likely to emphasise the latter course.

AUTONOMY – AND ACCOUNTABILITY

The second major driver is the devolution of responsibilities to universities and other institutions. Most of the responsibilities devolved from Ministries have been administrative, such as control of budgets, buildings and the employment of staff. But some have been academic, with universities being given greater discretion to design their programmes – and, in some cases, control over their academic awards.

Two main forces have been at work. First, many national governments (and regional governments with the primary responsibility for higher education, as in Belgium, Germany and the UK) have attempted to develop a more strategic relationship with higher education institutions, focusing more on broad policy directions rather than detailed bureaucratic controls. Another trend has been for the State to redefine its role as a regulator, acting to safeguard broader societal interests, ensure quality and standards and also to compel legal, and other, forms of compliance. However, it is not clear that as a result the State has become less dominant, or that the effective as opposed to formal autonomy of universities has been enhanced. Typically this relaxation of bureaucratic control has been accompanied by the imposition of new accountability regimes, informed by an expanded use of performance indicators and inspired more generally by what some have argued is a creeping culture of ‘perfomativity’ (Ball 2012). Secondly, a silent managerial revolution has taken place in many European universities, as more elaborate (and executive?) rectorates and senior management teams have been developed to cope with the new responsibilities that have been devolved to them. In a more active sense these new managerial structures have also been designed to strengthen the entrepreneurial capacity of universities to respond more flexibly to new demands in higher education and research.

However, there have been significant differences across Europe in the degree of devolution of responsibilities to universities. In some countries the traditional election of rectors and presidents, formally confirmed by Ministries, has been maintained. In others they are now chosen by university boards, which themselves have been reconstituted to resemble more closely corporate boards with limited membership and more extensive representation of external stake-holders (Engwall 2015). States have generally kept a tight grip of funding, although in different ways – arguably extending their power and influence when contractual forms of funding have been developed (as in France), by preventing universities from charging tuition fees (as in Germany, Scandinavia and Scotland) and, even when the balance of higher education funding has been shifted from state grants to student fees (as in England), funding loans to students and determining the conditions of eligibility.

Efficiency and enterprise

The third driver has been the promotion of greater efficiency in higher education. This has had several strands. One, closely linked to the devolution of administrative responsibilities, is the belief that traditional bureaucratic control regimes have not only directly imposed increased costs but indirectly inhibited more flexible ways of working, particularly in relation to the employment of academic and professional staff. Allowing managers to manage, a familiar mantra across public services, is seen as promoting greater efficiency. This also links to the growth of a more discrete 'managerial class' in many European universities, opposed to both state-bureaucratic and academic-collegial rule. A second strand has been the pressure on state budgets, as higher levels of personal and corporate taxation have become more difficult to sustain and the cost of other public services have escalated. Where charging students fees in politically unacceptable, as it still is in most of Europe, universities have been expected to cope with budget shortfalls by greater efficiency and productivity. This has not been easy, as the rising costs of higher education in the US (and many other countries) have demonstrated. Serious productivity gains based on radical shifts in patterns of delivery, powered by new technologies, still lie in the future. For the moment teaching in higher education and research remain artisanal activities. A major attraction of the Bologna process in many European countries, and motive for resistance, has been the prospect it held out of reducing the length of study programmes. A third strand, already mentioned, has been the desire to encourage the development of more entrepreneurial activities in higher education – in nearly every country to stimulate innovation and support regional and national development, and in some as an alternative income stream to state funding. In Europe too the discourse of the 'entrepreneurial university' is a powerful one (Clark 1998).

Although these three drivers appear to have provided the main elements in most national reforms across Europe, their dominance has been neither complete nor implemented in consistent ways. Other motivations have also been important, including an overwhelming desire after 1989 in central and eastern Europe to 'rejoin' the mainstream of European higher education (even if some intellectuals and university leaders in these countries initially deplored what they saw as the abandonment of the classical mission of the university in the face of demands for meeting social and economic demands, and later policy makers in the same countries have been attracted by more entrepreneurial US-style models of higher education). These three drivers – the innovation, devolution and efficiency agendas – have also played out in distinctive (even divergent) ways in different political cultures. For example, higher education reform has been pursued with greater vigour in Spain than Italy, while in the UK similar, if not identical, policy drivers have produced very different outcomes in England and in Scotland. The presence, or absence, of isomorphism is a perennial debate among higher education researchers. Consequently, despite the integrationist impulses represented by the Bologna process, care needs to be taken in talking of a European 'model' of higher education, rather than more-or-less shared characteristics, as opposed to other world 'models'.

AMERICAN AND 'POST-CONFUCIAN' MODELS

The use of the label 'model' in relation to the US higher education system and, now, to the so-called 'post-Confucian' systems that have developed in east Asia over the past two decades is equally problematic. The US does not have a 'system' of higher education but many 'systems', some of which are not at all systematic. Each State is responsible for higher education, although community colleges are often responsible to local governmental units. There is a bewildering variety of governance, funding and regulatory arrangements, embracing commissions, boards, trustees, regents. As a result generalisations are difficult even for these 'public' systems. In addition there is a substantial non-state sector; itself sharply divided between some of America's most famous universities, typically not-for-profit foundations with multi-million dollar endowments, and a growing number of for-profit institutions (exemplified by the University of Phoenix owned by the Apollo Group but also including the eponymous Trump University) (Scott 2015).

A similar variety can be observed in 'post-Confucian' systems. Some have been created by democratic states such as Japan, Taiwan and South Korea; others by authoritarian states subject to single-party dictatorships, notably the People's Republic of China (which represents by far the largest 'post-Confucian' system); others again by states that combine democratic practices with more authoritarian norms, such as Hong Kong, Singapore or Malaysia. There are many other dimensions of variety, including structural factors such as the presence of prestigious private universities (for example, in South Korea as a result of 19th-century and more recent American influences) or their absence but also cultural factors reflecting social, ethnic, religious and historical differences.

As a result care needs to be taken in conceiving of distinctive 'models' of higher education in different world regions if this is taken to imply the existence of coherent 'systems' within these regions. The variety that can be observed within Europe is present elsewhere. Distinctive strands also intermingle across continents. For example, the English emphasis on 'liberal education' shares some features in common with the American commitment to 'general education', although there are also significant divergences. The German Humboldtian tradition is clearly reflected in the development of the US research university, but again with important differences. Some US State systems place as just as great an emphasis on the 'social dimension', arguably more than, post-Bologna European higher education.

Rather than conceiving of the differences between higher education across the major world regions as a clash of 'models', it may be better to focus on the dominant points of reference. From the second quarter of the 20^{th} century to its end and beyond, the dominant reference point for European higher education has been the development of US higher education – as it had been the other way round in the 19^{th} century. This was the key relationship, much more synergistic than oppositional. In recent years the rapid development of higher education in east Asia, (over?) conceptualised as representing a 'post-Confucian' model, has extended what was essentially a two-way into a three-way dialogue, as a new reference point has been added.

To the extent that a US 'model' of higher education its key elements can be defined in historical and in structural terms (Bok 2013). The historical elements are its origins in the colonial college, a strand still represented by liberal-arts colleges (some of which, like Dartmouth, are both colonial foundations and very distinguished institutions in the 21^{st} century); the establishment of the land-grant universities in the 1860s, and their evolution into powerful research universities in succeeding decades; the rise of mass higher educations systems after 1945, and the rapid development of community colleges after 1960; and, most recently, the growth of a more free-wheeling for-profit sector. Its structural elements are a clearer separation between undergraduate education, organised in colleges of arts and sciences, and powerful graduate, and professional, schools; formal, often legally mandated, institutional stratification (especially in the shape of State-level 'master plans'); elaborate research structures, mobilising governmental, corporate, charitable and university resources; and an increasing reliance on tuition fee income, even in public universities (leading to public resentment and resistance to escalating levels of graduate debt); and, arguably, a high degree of politicisation (in terms of external interventions, on matters such as affirmative action or ethical constraints on research, but also internal conflict, for example on issues of 'identity').

Defining a set of characteristics that might constitute a post-Confucian 'model' presents greater difficulty, partly because this is a contrived label but partly because this describes work-in-progress (Marginson 2014). The 'post-Confucian' label itself may be a distraction, with its (confusing?) connotations with the neo-Confucianism that developed as a political, and philosophical, movement in post-Mao China from the 1980s onwards. One element, however, that has been drawn from that movement is the key role played by the State in the development of higher education, either State bureaucracies directly or closely affiliated corporate allies. That development, as a result, has been tightly aligned with the wider process of economic modernisation – reducing the 'civil society' space occupied by American and European universities (and leading perhaps to growing tensions about the legitimacy of the universities' role in harbouring political freedoms and even safeguarding more narrowly defined academic freedoms, with the recent experience of Hong Kong representing the most challenging example). Another feature perhaps has been the equally tight alignment between meeting economic (and collective) goals and realising individual and family ambitions, although cultural stereotyping is best avoided.

But post-Confucian systems have fewer structural features in common. As has already been pointed out the Japanese and Korean systems bear the imprint of American influences, notably the role their prestigious private universities play in elite formation; Singapore, Malaysia and Hong Kong retain structures based on British models. However, the dominant feature of the post-Confucian 'model' are neither cultural nor structural. It is the sheer dynamism of higher education and research systems in east Asia, expressed in essentially quantitative terms of the advance to high levels of participation that match and even exceed American and European levels and the accompanying explosion in research productivity. It is this growth and dynamism that have made the post-Confucian 'model' into an irresistible reference point for the development of 21st-century universities.

THE DISTINCTIVENESS OF EUROPEAN HIGHER EDUCATION

The claim that European higher education represents a 'third way' between US and 'post-Confucian' models has to be treated with care. There are two competing narratives. The first, and perhaps dominant, narrative stresses the continuing underdevelopment of European universities compared with their global peers, and rivals, and the urgent need for Europe to 'catch-up' and accept the need for root-and-branch reform (Ritzen 2009). In this narrative the European university has been slow to adapt and, despite national and Europe-level reforms, remains a laggard – still struggling in the wake of the more entrepreneurial American system and also being rapidly overtaken by the dynamic systems of east Asia. Hardly a strong platform on which to construct a claim that Europe represents a 'third way'.

The second narrative suggests that, after a period of (relative) decline in the middle years of the last century, the European university has experienced a strong revival since the 1990s that has been associated with, and accelerated by, the Bologna process. Any decline, of course, was relative not absolute; it was during this period that modern systems of higher education were developed in Europe and the research and scholarly achievements of the leading European universities were second only to those of American universities. In many disciplines the US and Europe were a common scientific / intellectual space, and institutional affiliations and structures were secondary phenomena.

The emphasis on the Bologna process can also be questioned. Bologna has undoubtedly had a transformative impact on the higher education systems emerging from decades of totalitarian rule, whether in the Iberian peninsula or central and eastern Europe, and, less certainly, a galvanising effect in some other countries by easing the path to national reform. But its impact in northern and western Europe, what might be called 'core' Europe, has been more muted. Scandinavian universities were already committed to a path of modernisation before Bologna, and the development of higher education in the UK (especially England) appears to owe little to wider European models and influences, despite the major contributions UK institutions have made in European research programmes. At the best, therefore, the case for the transformative effects of Bologna is non-proven. The Bologna process, and associated national reform agendas, may have offered some tantalising glimpses of a distinctive vision of the European university in the 21st century – but nothing more. Again an insecure platform on which to build a 'third way' claim.

Which of these narratives are to be preferred? The key questions are, first, what are the constituent elements of Europe's distinctiveness; and, secondly, to what extent can these distinctive elements combine to construct a dynamic future for higher education. Neither question is easy to answer in a definitive manner – the first, because crucial to the distinctiveness of European higher education is its diversity, arguably greater than in the US or even east Asia. The conventional account of three different traditions – the Humboldtian, the Anglo-Saxon and the 'Napoleonic' – obscures many subtler levels of difference (Gellert 1994)); and the second, because any definition of 'dynamism' presupposes a settled view of the likely trajectory of political, social, economic, cultural and technological change in the 21st century, which is more hazardous now in the age of multiple populisms and fundamentalisms. Who is to say who will be in the right side of history?

However, across Europe, it is possible to discern some broad features of higher education, even if identifying these features immediately suggests exceptions. The first is a commitment to the university in its classical form – with a spread of Faculties, and a commitment to research, scholarship (and celebration of the intellectual life in a broader public sense?) alongside teaching. The second, certainly compared with US and (most) east Asian systems, is a resistance to stratification, at any rate among universities (which perhaps has been accompanied by the weakening of older forms of structural differentiation between universities and higher professional and vocational schools, *grandes écoles* and their equivalent, and independent research institutions). But the third, and perhaps most distinctive, feature is summed up in that pregnant phrase, the 'social dimension', coupled with continuing emphasis on the 'public responsibility' of universities. Although critics have argued that European higher education has embraced the market-inclined agendas and neoliberal ideologies that have become established as the global 'standard' (and, indeed, that this is the drive behind Bologna-mediated reforms), the persistence of such language suggests a reluctance fully to embrace such a future.

The case for believing that Europe may offer a 'third way' rests in the belief that the European university has at least the potential to be more successful than other higher education systems in establishing a balance between the imperatives of modernisation, the drive to create more entrepreneurial and managerially robust institutions, and a reviving sense of how the ideals of 'public' higher education and a more traditional academic culture can be sustained even under these new conditions. It may be possible to discern the emergence of a new model of the university focused on democracy, human rights and social justice (extensions of the European commitment to protecting and enhancing the 'social dimension') and also characterised by a growing scepticism about the unalloyed benefits of consumption-led economic growth, a heightened awareness of the possible limitations, and perverse effects, of technology and new ecological concerns. Although European universities may perhaps be better placed to articulate such a model than American or east Asian universities, it would clearly be going too far to align such broad movements with the development of higher education in any particular world region. But one benefit of the European university's recovery may indeed be that it has produced a more open and balanced future for higher education, no longer constrained by a stifling belief in a 'single path' future.

However, it is necessary to end on a note of caution. The rising reputation of 'post-Confucian' higher education systems owes less to the distinctiveness of these systems, or the academic quality and scientific productivity of their universities, and more to the economic dynamism of the countries in this world region. China now rivals the US as an economic super-power, despite its repressive political culture. Countries like South Korea, Taiwan and Singapore, poor two generations ago, are now among the world's richest as measured by GNP per capita. Hong Kong is now a global city. Only Japan has had a long history of economic development, although paradoxically perhaps its lower growth in recent decades may be reflected in the more uncertain reputation of its universities. The results of this economic dynamism are apparent in very high levels of participation in higher education (Marginson 2016). Equally, it is perhaps not a historical accident that the Bologna process coincided with the high tide of optimism about the wider European project, however paradoxical it may appear to associate this closely guarded inter-government process with the drive to 'ever closer union'. Nor is it a historical accident that both Bologna and national higher education reforms were developed against a background of rapid growth, reflected in the over-ambitious Lisbon targets, before the 2008 banking crisis and economic recession. It is doubtful whether these Europe-wide and national reforms could have been implemented so successfully against a background of the economic troubles of the Eurozone, Brexit, the refugee crisis and the re-emergence of older (and uglier) forms of nationalism.

Of course, it would be quite wrong to adopt a determinist explanation, by arguing that successful higher education reform depend directly on economic dynamism (although all reforms, even those with economising aims, require investment that is more difficult to generate in troubled economic times). However, it may not be unreasonable to suggest that the credibility of claims that Europe can represent a 'third way' in the development of higher education and research systems in the 21st century may depend crucially on a recovery of hope, and renewal of momentum in the wider European project.

REFERENCES

Ball, Stephen (2012) 'Performativity, Commodification and Commitment: An I-Spy Guide to the Neoliberal University', *British Journal of Educational Studies* 60 (1): 17–28.

Bock, Derek (2013, revised edition) *Higher Education in America*, Princeton: Princeton University Press

Bologna Declaration (1999) *The European Higher Education Area: Joint Declaration of the European Ministers of Education*, Bologna: June 19, 1999

Clark, Burton (1998) *Creating Entrepreneurial Universities: Organizational Pathways of Transformation*, Oxford: Pergamon

Crosier, David and Teodora Parveva (2013) *The Bologna process: its impact on higher education development in Europe and beyond* Paris. UNESCO International Institute for Educational Planning

Engwall, Lars (2015) 'Corporations and Universities', *European Review*, 23.4, pp 501-510

European Commission (2011) *A New Agenda for the Modernisation of Europe's Higher Education Systems*, Brussels: European Commission

European Commission (2012) *The European Higher Education Area in 2012: Bologna Process implementation report*. Brussels. Statistical Office of the European Communities / Eurydice

European Commission (2013a) *The Erasmus Programme*, Brussels: European Commission, ec.europe.eu/lifelong-learning-programme/erasmus_en.htm

European Commission (2013b) *Erasmus Mundus*, Brussels: European Commission, e.europe.eu/lifelong-learning-programme/mundus_en.htm

European Council (2000) *Lisbon European Council: Presidency Conclusions,* Brussels: European Council, www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/00100-rl.en0.htm

Gellert, Claudius (1994) 'Structural and Functional Differentiation: Remarks of Changing Paradigms of Tertiary Education in Europe', in C Gellert *Higher Education in Europe*, London: Jessica Kingsley

Gieysztor, Aleksander (1992) 'Management and Resources', in H De Ridder-Symeons (ed.)*A History of the University in Europe: Volume 1 – Universities in the Middle Ages*, Cambridge: Cambridge University Press

Keeling, Ruth (2006) 'The Bologna Process and the Lisbon Research Agenda; The European Commission's Expanding Role in Higher Education Discourse,*European Journal of Education, Research, Development and Policy*, 41: 2, 203-223

Makdisi, George (1990) *The Rise of Humanism in Classical Islam and the Christian West*, Edinburgh: Edinburgh University Press

Marginson, Simon (2014) 'Emerging Higher Education in the Post-Confucian Heritage Zone', in Araya, Daniel and Peter Marber *Higher Education in the Global Age: Policies, Practices and Promise in Emerging Societies*, London: Routledge

Marginson, Simon (2016) 'High-Participation Systems in Higher Education', *The Journal of Higher Education*, Vol. 87, No. 2 (March/April 2016)

Muche, Franziska ed. (2005) *Opening up to the Wider World. The External Dimension of the Bologna Process*, Bonn: Lemmens

Olsen, Johan and Peter Maassen (2007) 'European Debates on the Knowledge Institution: The Modernization of the University at European Level', in P Maassen and J Olsen (eds.) *University Dynamics and European Integration*, Dordrecht: Springer

Pedersen, Olaf (1997) *The First Universities: Studium Generale and the Origins of University Education in Europe*, Cambridge: Cambridge University Press

Reichert, Sybille and Christian Tauch (2005) *Trends IV: European Universities Implementing Bologna*, Brussels: European University Association (www.eua.be)

Ritzen, Jo (2009) *A Chance for European Universities: Or, Avoiding the Looming University Crisis in Europe*, Amsterdam: Amsterdam University Press

Scott, W Richard (2015) 'Higher Education in America: Multiple Field Perspectives;, in Kurst, Michael and Mitchell Stevens *Remaking College: The Changing Ecology of Higher Education*, Stanford: Stanford University Press

Scott, Peter (2012) Going Beyond Bologna: Issues and Themes", in *European Higher Education at the Crossroads: Between the Bologna Process and National Reforms*, eds. Andrej Curaj, Peter Scott, Lazar Vlasceanu and Lesley Wilson, Dordrecht: Springer

SHORT BIOGRAPHY

PETER SCOTT is emeritus Professor of Higher Education Studies at the UCL Institute of Education in London. He is also the Commissioner for Fair Access (to higher education) for the Scottish Government. Between 1998 and 2010 he was Vice-Chancellor of Kingston University, and before that a Professor at the University of Leeds. His most recent book, with Jim Gallacher and Gareth Parry, is New Languages and Landscapes of Higher Education (Oxford University Press, 2016).

20.

What comes after the Americanization of the university?

Georg Winckler

Abstract

The excellence of the US university system stems from two key factors: the willingness to provide sufficient funding, both public and private (2.7% of GDP!), and the differentiation among institutions. This differentiation began in the 19^{th} century, as graduate schools with Humboldt-like PhD programs were set up above undergraduate colleges and alongside career-oriented professional schools for law, medicine and other fields of study. The USA currently has around 250 university PhD programs, with another 4000-5000 institutions offering a wide range of bachelor's and master's degrees. The 250 PhD-granting universities, in connection with their financial strength, attract the best talents in research and lead international rankings. This US system, with its broad educational range and career orientation, as well as its excellent top universities, has been emulated over the past two decades in Asia (China, South Korea), Europe (the Bologna Process, excellence initiatives) and South America. Because of weakened public funding for American universities since 2008, today universities in East Asia and certain European countries (e.g. NL, DK) are increasingly catching up in the research competition. "Open education," "open science" and "open innovation" are strengthening this catching-up process, leading to the development of an admittedly Americanized, yet multipolar academic world.

A historical perspective on models of a university

The university in the Middle Ages

Many universities today seek to match the top US institutions, such as Harvard, Stanford and MIT. In past centuries there were other role models, however.

Although the first university of Europe was founded in Bologna in around 1100, there was a considerable time lag until the next university appeared, around 1200. Despite this sluggish beginning, by the end of the Middle Ages there were around 80 universities, due to a wave of universities being established in the 14^{th} and 15^{th} centuries. By around 1500, a network of universities stretched across Europe, from Portugal (Coimbra) to Scotland (Aberdeen) and from Sweden (Uppsala) via Poland (Cracow) to Hungary (Pecs). The majority of the universities, some 20 each, were found in Italy and France.

At the time there were two competing models for constructing a university: (1) On the one hand, the University of Bologna served as a model. This was organized as a corporation of students, whose fees financed the university. Thus the students were the actual financers of the university, with professors having only the status of employees. (2) On the other hand, at the University of Paris (Sorbonne), the second university to be established, one hundred years after that in Bologna, the doctors and masters acted as particular members of the university. The funding was provided chiefly by church sinecures. In those universities where legal studies dominated, the Bologna model was the norm; where artists held sway, the Paris model ruled (see Uiblein, 1999, chapter 1, particularly pp. 20f).

The University of Vienna, founded in 1365, emulated the structure of the University of Paris, not only with regard to the organization of the four faculties, but also with regard to the financing, provided chiefly through foundation funding and sinecures.

In the late Middle Ages the competition for a superior reputation among universities reached across national borders. Thus Rexroth (2011) determined that in 1500, the University of Bologna was known to be the best for law, the University of Padua for medicine and the University of Paris for its seven "liberal arts" (Grammar, Rhetoric, Logic, Arithmetic, Geometry, Music and Astronomy/Astrology). Students even then preferred universities with good reputations and traveled to them for study. Many medieval universities were founded with the express aim of preventing the exodus of the brightest minds to universities in other lands.

Beginning in the 18th century, as a result of the strengthening of Europe's nation states, new models for universities began to develop. The British universities, particularly Oxford and Cambridge, nonetheless remained true to their medieval structure, which they maintain even today. They preserved their autonomy and their independent financial foundations, as well as the old tradition of teachers living together with their students. Their academic structure, which was adopted by the US universities which followed the British (or, to be more precise, Scottish) example, remained two-tiered: In its "colleges" the university offered bachelor's programs, which maintained the old tradition of the "artes liberales" (Liberal Arts). In the "schools" built upon these studies, there were master's programs initially in theology, law and medicine, and later also in business, as well as in other professional or career-oriented fields (e.g. Schools of Education and Journalism). The British universities had no PhD studies. Thus John Maynard Keynes, the most important economist of the 20th century and an instructor at the University of Cambridge, never earned a doctorate.

The use of scientific thinking to explain the world also gained great relevance at British universities. Human reason, not religious doctrine, should be the source of insight into the organization of individual and societal living conditions. Thus the modern path towards secular universities was forged also in England, despite its medieval structures.

Examples from the 19th century: Technical universities and the Humboldt University

The two deciding impulses towards a renewal of the university in the modern age occurred around 1800 in France and in Prussia.

With the establishment of "écoles spéciales" (today: grandes écoles), and the simultaneous closure of traditional universities, France was pursuing utilitarian goals for its government. The emerging nation-state needed scientifically educated and meritocratically organized cadres to enable the state to function more effectively. The most significant new institution to be founded in France was the École Polytechnique in 1794, which even in the 21st century continues to be run as a part of the Ministry of Defense as an expression of the militant nation-state of that time. The global triumph of the "Technical University" model in the 19th century can be traced back to the success of the École Polytechnique. This great Parisian example led to the founding of the TU Vienna, known then as the "k.k. Polytechnic Institute," in 1815, and that of the ETH Zurich, originally called the "Federal Polytechnic School," in 1855.

In response to this utilitarian French university policy in service to the state, Wilhelm von Humboldt and others managed to convince the king and the government in Prussia that with the establishment of a university in Berlin in 1810, research and instruction in universities could be freed from any need for immediate practical applications. The university's only aim would be to seek new scientific discoveries. Professors and students would concentrate on research, with universities thus offering only doctoral, not master's or bachelor's programs.

The teaching and research freedom of the professors was augmented by a simple governance structure in the faculties, which were organized as collegial councils of professors. These councils were the real backbone of the university, holding the de facto power to decide their own composition through appointments, *Habilitation* and awarding doctorates. The entire university served only as a support structure holding the individual faculties together. The rector was simply the representative of the university as a whole and had no power to influence decisions about academic matters. An enlightened state provided generous financing, controlled the allocation of resources and maintained only a supervisory role.

Despite the differing orientation in France and Prussia – the former concerned with practical state applications, the latter with an idealistic university constitution – the institutions of higher learning in both countries were perceived as pure state institutions. Their expenses were entirely covered by the state budget. Neither student fees nor third-party funding played a role in the university budgets. In both instances the institutions of higher learning are considered providers of public goods. Revenue from private sources would only hinder the education of state cadres or "dirty" the quest for scholarly truth.

The great research and teaching successes of the Humboldtian universities in the 19th century helped the emerging German state to generate knowledge that even today impacts Germany's industrial base (e.g. the chemical industry). This success in the second, henceforth "knowledge-based" (Mokyr, 1990) wave of industrialization made the idea of the Humboldtian university into a grand global example for the establishment of new institutions. Even the foundation of today's top universities in Tokyo and Kyoto in the late 19th century can be traced back to the Humboldtian university concept.

The model of the Humboldtian university was incorporated through Thun's reforms of 1849 into the Austrian university system. According to these, all studies in the three universities within the present-day territory of Austria – Vienna, Graz and Innsbruck – should no longer aim at providing training but rather general and subject-specific education. The distinctive "pre-school" character of the Philosophy Faculty, which until Thun's reforms was the counterpart of college in the British-American system, was abandoned. All faculties became more academic and rigorous, and the newly constituted professors' councils upheld the ideals of the new university and its scholarship. Technical higher education institutions such as special institutions for veterinary medicine, mining, agriculture or international trade were transformed only in the 20th century into universities of the Humboldtian type with the authority to grant doctoral degrees.

THE RISING INFLUENCE OF US UNIVERSITIES IN THE LAST ONE HUNDRED YEARS

GENERAL FACTORS

The road to success for North American universities began only about a hundred years ago. Today the US university system is distinguished by an inflow of public and private funding that lies far above the OECD average, for a diverse variety of higher education facilities, for its top universities, which have become international role models, and for its flexibility in the supply of public or private goods. The global attractiveness of the US university system has led to an influx of the brightest minds from the entire world.

This US success is due in the first place to general political and economic factors. The strong economic growth in the USA, coupled with the strong political preference of many US states for the establishment and development of universities (as in California, Minnesota, Illinois, Michigan and Virginia) brought strongly increasing expenditures in the higher education sector. The growth in public expenditures was paired with a substantial individual willingness to also privately pay large amounts to universities in the form of student fees, donations, etc.

As a result of this substantial increase in funds, expenditures on higher education in the USA today are at 2.7 percent of GDP. In Germany, France and the UK, in contrast, this amount is between 1.3 percent and 1.5 percent, according to OECD statistics. Since the GDP in the United States is around 20 percent more per capita than in these countries, more than twice as much money per student flows into the American university sector. Altogether the public expenditures on higher education, measured as a percentage of GDP, are the same in the USA as in European countries. But in Europe, as opposed to the USA, private expenditures are either marginal or make up only a few thousandths of a percentage point of GDP. In the USA, public spending is doubled by private spending.

In addition to the direct financing of universities, the support for research in general, and in particular for basic research, should be noted. Public funding for basic research is provided especially by the National Science Foundation (Budget 2016: $7.5 billion), the National Institutes of Health (Budget 2016: $32.2 billion) and other funding agencies, or through direct contracts with government departments (Departments of Defense, Health, Energy, etc.). Although the population in the USA is only about two-thirds of that of the EU, the USA spends around $150 billion more on research per year than the entire EU. Per capita and year, the research expenditures in the USA are around $1500-$1600; the EU, in contrast, spends only about $700-$750 (see OECD statistics).

A comparison of the research and teaching expenditures of American universities, measured per student, shows similar striking disparities. In Austria the university budget is $10,000-$15,000 per student per year; at the University of Vienna it is approximately $11,000-$12,000, although not all enrolled students, only those taking examinations (around 60% of the total number), are used as a basis for calculation. Top universities such as Harvard University or Princeton University, on the other hand, show expenditures on research and teaching of around $200,000 per student per year. For comparison: ETH Zurich, the best continental European university in the various rankings, and in the top 20 worldwide, spends $80,000 per student per year.

The rapidly growing university system in the USA in the 20th century profited in addition from the immigration of highly qualified academic scientists from Europe. After the First World War, many European academics decided to emigrate to America as a result of the political radicalization, high inflation and subsequent unemployment. The exodus of Jewish scientists from Nazi Germany and their incorporation into American universities was the highpoint of the expulsion of scientific reason from Europe and at the same time represented an enormous influx of intelligence ("brain gain") for the USA. The migration of scientists from Europe to the USA between the wars and also after the Second World War was thus not only a politically or economically motivated supply-side boost, but was a consequence of the strong pull of an increased demand for scientists in the rapidly growing university system of the USA.

The US system: Breadth and excellence

It were not only these general factors that determined the rise of American universities. Equally important was the development of a diversified university system, without government regulation, that was "democratic at the base" and "elite at the top" (Ward, 2002). A university system developed that was well financed and, so to speak, natural – one that was well placed to meet the challenges of the last one hundred years.

Continental European university systems, especially those in Germany and France, could manage neither of these qualities in the 20th century. The "democratic" requirement of broadening the student base and extending higher education to 40-50 percent of an age cohort (the "massification of higher education") could in general be achieved in continental Europe. In doing so, however, universities were often transformed into badly organized "mass universities" with overburdened academic staff and high drop-out rates among the students. In any case, the second, "elite" aspect was not achieved, namely the concentration of academic excellence at a few universities so that these could attract the brightest minds and thus prevent their departure for other countries.

It is the demand for equality among all national universities within each country which was and is the chief reason that politics in many European countries has allowed scarcely any differentiation among universities. The goal of equality is based on the Humboldtian principle that each university should comprise a "complete" university in the sense of an "universitas litterarum" – otherwise it would not be a "true" university. Thus each university should demonstrate a wide range of subjects with various faculties, offering doctorates in all subjects. Only in the last decade have excellence initiatives countered this requirement for equality, pushing for a differentiation in the continental European university system alongside the establishment of universities of applied sciences over the last 20-30 years. Without differentiation it is extremely difficult to form top-class institutions.

The differentiation in the US university system already took place in the last quarter of the 19th century. The determining factor was the establishment of new schools such as Johns Hopkins University (1876) in Baltimore or the University of Chicago (1890) in addition to those universities set up according to the British example. These new universities developed a hybrid structure: they offered a Humboldt-like PhD program with their own "graduate schools" above the traditional "undergraduate college" and alongside the "professional schools." In this way the liberal arts education at the colleges, as well as the career-oriented instruction in the professional schools, was combined with the research-intensive graduate schools.

This division into three branches has characterized the US university ever since. Only a few universities focus equally on all three areas. Many schools limit themselves to undergraduate education or to the provision of master's degrees in the professional schools. It is interesting to note that only at the beginning of the 20th century did the leading Ivy League universities, such as Harvard, Yale and Princeton (the latter had never had a professional school and was until that time purely a college) follow the example of Johns Hopkins University with an increased focus on research and the addition of PhD programs.

Good research is expensive. Moreover, the tough competition for the best graduate students requires that universities invest specifically in their profile, reputation and facilities. As a result, only some 250 US universities offer PhD programs, and not in every subject that the university teaches. Only a few of the 4000-5000 institutions of higher education in the USA are known for intensive research. Europe, without Russia, also has some 4000-5000 higher education establishments. But in this similarly sized university system in Europe, more than 1200 universities offer doctorate programs. Moreover, advisors are often barely or poorly connected with the research projects of their doctoral candidates. The concentration of PhD programs in just a few universities in the USA makes them particularly competitive with regard to research.

The entrepreneurial US university: Flexibility in offering public and private goods

There is much debate as to the extent to which universities should provide public or private goods. As a university education leads to a significantly higher lifetime income (in Anglo-American countries, the lifetime income more than doubles; in continental Europe it increases 50 percent to 100 percent) and because research results in universities can also be privately exploited, universities provide an economically relevant range of private goods. At the same time, the public goods that they provide modern societies are indispensible, not least in the case of "open research" (generally accessible published research results) or through the raising of the level of education.

It is difficult to determine the appropriate mix of private and public goods that is optimal for a university and that can contribute to its financing; this depends on specific factors such as societal preferences, the extent and structure of the surrounding knowledge-based economy, wage differentials based on educational levels, the tax system and other variables. What is indisputable is that modern universities need to provide both public and private goods in line with their mission, organization and financing. Another determining factor is who can best support the growing financial demands of the university. If savings measures mean that public budgets are no longer able to maintain university financing at previous levels, the willingness and ability of a university to obtain additional resources through the provision of private goods will determine its further development.

In the USA the growth of the university system in the last decades has been financed principally through increasing private revenues, especially tuition fees. Alongside the public universities and private, non-profit institutions of higher education, the sector has seen an increasing number of profit-oriented businesses such as DeVry, Strayer, Apollo or American Public Education, with disproportionately increasing numbers of students. As a result of the high number of loans taken out by students (2016: $1300 billion) and the threat of excessive indebtedness, a political discourse has arisen on the quality of studies offered at for-profit educational enterprises, as well as on the level of tuition fees in general. This bubbling spring of financing for universities over the last decades now seems to be drying up. Still, the newly appointed Secretary of Education in 2017, Betsy DeVos, has declared herself "an ardent advocate of for-profit educational management" (see National Center, 2017).

Continental European universities have widely missed this opportunity, since the Second World War, to define themselves in a dual fashion, as both public establishments and private service providers. For too long, today's institutions of higher education have seen themselves exclusively as part of the state. The part-public, part-private US university system has been able to react flexibly to changes in the level and structure of the demand for academic research and teaching. The US universities are better able to fulfill the task of responding quickly and sustainably to changes in the demand for research and teaching – or are at least more entrepreneurially oriented than those in Europe.

"Coherent heterogeneity" of the US university system

Axtell (2016) summarizes all of these points when he speaks of a "coherent heterogeneity" in the US university system. The broad liberal arts education in the numerous colleges that consider themselves to be "guardians of American idealism" (Johnston, 2010, p. 153) could be easily combined with a PhD from a top university which follows the research ethos of the Humboldtian university concept. The professional schools closely combine theory and practice. Thus the autonomy and entrepreneurship of the institutions led, without central planning, to a flexible adaptation to the teaching and research needs of a modern, differentiated, knowledge-based society. In the course of this development, a "coherent heterogeneity" (Axtell) arose.

The philosophical speculation of Humboldt and his supporters, such as Fichte or Schleiermacher, that knowledge builds spirit and character, that this applies to all students and all levels of study, and that there should thus be only one type of university, was left to the representatives of the German university system. In the USA, in contrast, it is believed that a bachelor's education, a professionally-oriented master's degree and a research-focused PhD – that is, the educational landscape since the 19th century – best serves the needs of a modern, knowledge-based society with a high proportion of university graduates in the labor force. In any case, there is no risk that the university system could produce "non-education". This risk is nonetheless readily asserted by today's proponents of the Humboldtian university concept, particularly when criticizing the Bologna academic structure in the field of European higher education, which has followed the example of the successful, by now globally adopted structure of the American system. This Americanization is presumed to lead to "non-education," as studies are too strongly focused on training and show an intensive teach-and-test character.

The attractiveness of the US university system

The strong rankings of the top US universities

University rankings such as the so-called Shanghai Ranking – more precisely the Academic Ranking of World Universities (ARWU) – or the Times Higher Education (THE) Ranking have captured the attention of the public and of higher education policy in many countries for some 15 years. Numerous excellence initiatives in Europe and on other continents have been created with the express purpose of improving the ranking of a county's universities.

It should be noted that it is no coincidence that the Shanghai Ranking, the first global ranking to be taken seriously by an international broader public, was developed in China. On the one hand, the Chinese university system has for years been among the most rapidly growing higher education systems in the world, as measured both by its rate of growth and absolute increase in funding. On the other hand, China's aim is and has been not only to increase and expand its range of courses both through newly established institutions as well as the expansion of existing higher education institutions, but also to become the best in the world with regard to academic excellence. Thus the six indicators of the Shanghai Ranking – namely (1) alumni and (2) faculty members who have won a Nobel Prize or a Fields Medal, (3) the most globally cited researchers, (4) publications in *Nature* and *Science*, (5) publications in citation-indexed journals and (6) a correction for the size of the institution – reveal how China understands academic excellence for a university, or rather its reputation. The criteria of the Shanghai Ranking thus define the path for Chinese universities to the top.

The Times Higher Education Ranking, on the other hand, expresses the British definition of excellence, whereby factors such as research in the humanities, the general reputation of a university and success in teaching are taken into account or weighted more highly than in the Shanghai Ranking. Despite the different methodologies, the results of the two rankings are strongly correlated and thus reinforce one another. In addition to such institutional rankings, subject rankings, such as lists of those whose citations have the highest "impact" ("most highly cited researchers") also play a role in discussions of quality. An evaluation of this increasing measurement of the university world and the way in which politics and society deal with such measurement is beyond the scope of this paper; for this see Uniko (2017). Three significant points should be briefly noted, however: (1) Where are the world's top universities located? (2) How important is critical mass for academic excellence? (3) Which factors explain the ranking?

The presence of US universities in the top spots of different rankings is impressive, as shown by the following statistic: according to the Shanghai Ranking of 2016, of the top 20 universities in the world, 15 are from the United States. Ten US universities, in the following order – Harvard, Stanford, UC-Berkeley, MIT, Princeton, California Institute of Technology, Columbia, Chicago, Yale and UC-Los Angeles – appear in the top 12, prevented only by Cambridge (No. 4) and Oxford (No. 7) from making an all-American sweep of the top ten. Of the top 100 universities worldwide, US universities still manage to take 50 spots, with 70 of the top 200 and 137 of the top 500. What is striking is the fact that, as the number of top universities increases, from top 20 to top 100 to top 200, the share of US universities sinks significantly. This results on the one hand from the limited total number of research, or PhD-granting, universities in the USA (only about 250), and on the other hand also from the fact that the USA, with a wide base to its university system, which also holds true at the highest level, has managed to concentrate particular excellence in a few universities even in a very highly competitive environment. These top universities deserve their reputation as role models for institutions throughout the world.

Not only institutional rankings but also rankings for particular fields and individual research achievements play a role in the determination of excellence. An examination of individual research achievements as determined by the ISI statistics on "highly cited researchers" reveals that also here the US universities manage to take the top places, though in a different order than in the institutional rankings (see Winckler, 2008). Of the top 20 most frequently cited mathematicians, 10 work in the USA (50 percent), 7 in continental Europe and 2 in Great Britain. Of the top 100 cited mathematicians, the share for the USA increases: 66 work in the USA (66 percent), 18 in continental Europe and 10 in Great Britain. The proportion for the USA rises slightly higher in the top 200: 136 work in the USA (68 percent), only 32 in continental Europe and 16 in Great Britain. Similar results can be found in the fields of molecular biology, physics and economics. In molecular biology, the USA has 65 percent of the top 20, 75 percent of the top 100 and 72 percent of the top 200. A similar increase in percentages occurs for physics, although Europe is relatively stronger here than in mathematics. In general one can conclude that the top US universities have managed not only to shine as institutions, but also, based on targeted, quality-oriented hiring policies for both new and older academics (non-tenured and tenured faculty), to build up a critical mass of top researchers in specific fields. As a result, the PhD programs at top US universities are markedly superior to those at European universities or elsewhere.

The extent to which US universities are able to attract the brightest minds is further demonstrated by the ISI statistics on most highly cited researchers. In mathematics – a field which requires no expensive infrastructure nor particular command of the English language, given the use of its own particular language of formulas – some two-thirds of the 200 most cited researchers teach at American institutions. Of these two-thirds, approximately half completed their undergraduate education outside the USA and only then, mostly as participants in PhD programs, migrated to the USA.

Regression analysis shows that for a university to achieve top rankings, the question of whether it is public or private is irrelevant. Four other factors are decisive, however. First is the degree of autonomy with regard to organization, personnel, curriculum and budget. The more autonomous, the better – which does not exclude the government establishment of minimum standards or other regulations. Second, the measure of annual university budget per student is a significant indicator of excellence. Third, a balance between external and internal recruitment of the leading staff seems to be important (see Aghion et al., 2008, p. 51). Fourth, there needs to be competition within a broader higher educational area, within which academics and students can move freely. The small-scale national fragmentation of the university system in Europe hinders the development of excellence. The creation of a European research and academic space works to counter this.

Has the attractiveness of the US university system diminished since the financial crisis of 2008?

In a comprehensive analysis, Hertig (2016) examined the question of whether there had been any changes in the rankings between 2004 and 2014. Precisely in the middle of this time period came the financial crisis of 2008, with its immediate consequences for university financing. For his analysis, Hertig used the list of top 200 universities of the Shanghai Ranking as well as that of the THE Ranking.

Overall there is a trend which seems to reflect the dynamics expected in the coming years (see Hertig, 2016, p. 49). Asian universities, in particular those from China, South Korea and Singapore, were big winners in the rankings: 11 Asian universities improved their rankings, while only 3, including the two largest Japanese universities of Tokyo and Kyoto, fell in both rankings. For seven other universities, the dynamics in the two rankings were contradictory.

In Europe, the picture is inconsistent. In 46 cases the movement in the two rankings was in opposite directions, in 19 cases there were improvements and in 17 cases the rankings worsened. National boundaries were a significant factor. Thus the Dutch university system showed increased strength, as did the Danish and German. Universities in the Netherlands pursued a successful program of developing profiles with particular emphases. In this way they significantly improved their ranking. In Germany the excellence initiatives, with new institutional strategies and corresponding increases in resources, produced results, also leading to improvements in the rankings. Universities in other countries, including Austria, fell in both rankings. In these countries it would be worth emulating the Dutch or German example.

The greatest loss in rank was experienced by US universities. Only a few – eleven – rose in the rankings, but twice as many (22) fell. Clearly the top universities in the first few places could scarcely improve. Harvard, as the number one university in the world, cannot improve its standing. Nonetheless, there are several prominent US institutions among those which fell in the rankings. These include mostly the state universities, such as those in the University of California system (e.g. UC-San Diego, UC-Santa Barbara), those of the State University of New York (Stony Brook), the University of Alabama at Birmingham and the University of Iowa. Also private universities, such as the University of Rochester in New York state, Brandeis University in Massachusetts or Case Western Reserve University in Ohio, lost ground. Particularly affected were the American research universities ranked in the range 80-200 among the world's top 200.

The causes of this downward trend for US universities are of a financial nature. Issues such as governance, a lack of international orientation, unattractive programs of study or other lack of quality scarcely played a role in the USA, unlike in Japan or Europe. It was cuts in funding, exacerbated by the financial crisis of 2008, particularly from state resources, as in California. These cuts were so drastic in some cases that state universities such as Ohio State University, which was in 79$^{\text{th}}$ place in the Shanghai Ranking in 2016, saw the share of their budget supplied by tax revenues fall to less than 10 percent. Administrators at publicly funded US universities now openly declare that they are no longer "state supported" but rather "state molested."

For some decades rising student fees were able to compensate for the stagnation or even the reduction in state or private resources. Still, tuition at some universities has reached more than $40,000 per year. After years of strongly rising student fees, a level now seems to have been reached that will no longer support further increases. Politicians, in particular, are urging a cap on tuition fees, not least because of the massive mountain of student debt – $1300 billion – burdening students and graduates, in particular student drop-outs. It remains unclear how this strongly politically charged discussion will continue and what effect it will have on budget developments at US universities (see Akers-Chingos, 2016).

Despite clearly limited revenues, costs at US universities continue to rise. Million-dollar salaries for university presidents and football coaches, bloated administrations and a difficult relationship with sponsors, who seek obvious political or economic goals with their sponsorship, compromise performance in both teaching and research. In comparison with Great Britain, the US university system is less productive, or in any case less efficient.

The universities which were best able to ride out the most recent financial crisis were the private, non-profit institutions with large endowments (e.g. the Ivy League universities Harvard, Yale and Princeton, as well as Stanford University). After heavy losses of assets in 2008, these top universities were able to recover rapidly. The differences in the level of assets are substantial. Harvard University, for example, has an endowment of over $38 billion – the previously mentioned SUNY Stony Brook only around $180 million. Such a difference explains, along with other financial factors, the differentiated effect of the financial crisis on US universities.

To sum up: Many of the world's best universities in the USA will continue to remain strong in research. Not few US research universities from the middle ranks, particularly those which are publicly financed, will continue to lose ground, in particular at the expense of (East-)Asian universities. This trend will continue for some time. The Trump administration will not do much to counteract it, as it has other political priorities. The currently expected restrictions on immigration from third countries and the corresponding decrease in the number of international students entering the USA is likely to consolidate this downward ranking trend for US universities.

WHAT WILL THE FUTURE BRING?

Examples from history show that the great models for universities in the past – the medieval university (Bologna or the Sorbonne), the École Polytechnique and its type of technical institute, the pure research university according to the Humboldtian model or the variation of Johns Hopkins University, with its practical mix of traditional and Humboldtian curricula – will most likely soon be replaced by new models. Thus the successful run of US universities, or the US university system, will probably also reach an end. But where will new developments come from?

One factor in the Americanization of Asian or European universities is evident even today: to the extent that Asian universities, in particular, are emulating American standards and European universities are diversifying through the development of excellence initiatives and different profiles, a globally Americanized university world will become multipolar. Americanized universities in China or South Korea might become the future centers for nanotechnology; Americanized universities in Singapore might specialize in new areas of knowledge such as in the development of "complexity analysis" or the management of "Big Data." Americanized European universities, in turn, could focus on technical subjects, now with significantly stronger links to basic science research, or on the humanities, though not limited to a continuing focus on narrow European traditions, but on research topics with a global reach. In this way the Americanization of the university world will ultimately lead to a situation in which the Americanized top universities are only partially based in the USA. The spread of satellite universities, or of teaching and research centers co-founded by universities, to continents beyond the home country will serve to further strengthen the multipolarity of an Americanized university world.

As likely as such developments may be, the decisive impulses for change in universities and in the university landscape as a whole will come from the digitization of knowledge. Charles M. Vest, the long-serving president of MIT from 1990 to 2004, spoke in the context of the digitization of university teaching and research about the development of a "meta university" (see Vest, 2008). This would replace the usual "residential university," with which he nonetheless remains, as he put it, "hopelessly in love" (p. 217). In his view, the first step in the direction of the "meta university" began with the development of web-based materials known as "OpenCourseWare," which he encouraged as president of MIT nearly 20 years ago. These offer course materials on an academically challenging level for teachers and students, and can be accessed globally at no cost to the user. OpenCourseWare was thus an important forerunner of the MOOCs, or Massive Open Online Courses, offered by many universities today. MIT's original development of OpenCourseWare was connected not only with the aim of boosting the institution's global reputation but also with the administration's intention not to leave the development and marketing of teaching materials to the initiative of individual professors. On the contrary, this issue demanded an institutional strategy. The use of course materials free of charge served as advertising for MIT.

Further steps towards a "meta university," according to Vest (2008) would be shared archives, data banks and virtual laboratories. On this basis, cross-border collaborations and the shared elaboration of research results from continent to continent would become possible. The advantages of mass production, i.e. economies of scale, would ensure that the larger the "meta university" became, the lower the costs. Thus the interest in the creation and maintenance of a "meta university" would be preserved. Ultimately, the "meta university" would be characterized by global openness, freedom of access, the existence of alternative teaching materials and cooperation in research. There would also be space for cultural diversity, as academics and students, wherever in the world they were working, would participate in those parts of the "meta university" compatible with their interests and values.

Even if Vest's vision of the "meta university" remains vague, his core thesis points in the right direction: the former borders of the "residential university" will increasingly disappear. A university will become more open through courses offered online or through inter-university research cooperation via the Internet. Teaching and research successes will increasingly be achieved not within a single "residential university" but will be attributable to many universities. The increasing significance of "lifelong learning" will intensify this trend, even if the geographical proximity between teachers and students continues to remain relevant, and forms of "blended learning," "flipped classrooms" and the like will determine the future.

"Open education," "open science" and "open innovation" make the borders of universities so permeable that in the future "crowd" activities will determine the teaching and research, which will be spontaneous and solution-oriented, cutting across universities and non-university institutions. Start-ups, founded by young researchers within or adjacent to universities, are already profiting from the existence of open-access, inexpensively obtained libraries and data banks on the web, whose information is only awaiting a scientific analysis. All of these tendencies will further accelerate the multipolarity of an Americanized university world.

REFERENCES

(1) Aghion, Philippe, Mathias Dewatripont, Caroline Hoxby, Andreu Mas-Colell and André Sapir (2008), Higher Aspirations: An agenda for reforming European universities. Bruegel Blueprint Series, Vol. 5, Brussels.

(2) Akers, Beth and Matthew M. Chingos (2016), Game of Loans: The Rhetoric and Reality of Student Debt. Princeton University Press, Princeton, N.J.

(3) Axtell, James (2016), Wisdom's Workshop: The Rise of the Modern University. Princeton University Press, Princeton, N.J.

(3) Hertig, Hans Peter (2016), Rankings and the Dynamics of Global Higher Education. Palgrave Macmillan, London 2016.

(4) Johnston, William M. (2010), How Higher Education in the US Challenges Universities in Europe and UK. In: Wolfgang Mantl (ed.), Phänomenologie des europäischen Wissenschaftssystems. Nomos, Baden-Baden, pp. 145-171.

(5) Mokyr, Joel (1990), The lever of riches: Technological creativity and economic progress. Oxford University Press, Oxford.

(6) National Center for the Study of Privatization in Education, Columbia University (2017), Mail v. 26.2.2017 (ncspe@columbia.edu).

(7) Rexroth, Frank (2011), cited in the article "Mach eine Statistik, damit ich dich sehe", Frankfurter Allgemeine Zeitung 9.2.2011, Nr. 33, p. N4.

(8) Uiblein, Paul (1999), Die Universität Wien im Mittelalter. WUV-Universitätsverlag, Wien.

(9) Uniko (2017), Internationale Hochschulrankings und ihre Bedeutung für die österreichischen Universitäten. Vademecum, Wien (http://www.universityrankings.at).

(10) Vest, Charles M. (2008), The Emerging Meta University. In: Luc E. Weber, James J. Duderstadt (eds.), The Globalization of Higher Education. Economica, London etc., pp. 217-225.

(11) Ward, David (2002), Closing speech by the President of the American Council on Education during the meeting of the European University Association (EUA) at the ETH Zurich, October 12th, 2002.

(12) Winckler, Georg (2008), Comprehensive Universities in Continental Europe: Falling Behind? In: Luc E. Weber, James J. Duderstadt (eds.), The Globalization of Higher Education. Economica, London etc., pp. 65-75.

Short Biography

Georg Winckler studied economics at Princeton University and the University of Vienna (PhD, 1968). In 1978 he was appointed Professor for Economic Theory and Policy at the University of Vienna, where he remained until he was made professor emeritus in 2011. He held guest professorships at the University of Graz (1977–78), University of Freiburg (Switzerland, 1977–78), University of Linz (1985–86 and 1992–93), Georgetown University (1995), and Comenius University of Bratislava (1998). In 1990–91 he was a guest researcher in the Research Department of the International Monetary Fund in Washington, DC. From 1999 to 2011 he was Rector of the University of Vienna. From 2001 to 2005 he was Vice President of the European University Association (EUA), and from 2005 to 2009 he was its President. From 2004 to 2012 he was a member of the European Commission's European Research Board. At present, he is Chairman of the Board of Trustees of the ERSTE Foundation and a member of the Board of Trustees of ETS in Princeton.

This report is originally published in German and has been translated into English.

IV.

DIFFERENTIATION AND DIVERSIFICATION

21.

Disciplines and Doubts

Sascha Spoun & Sebastian Weiner

Abstract

Academic reputation strongly depends on how well a discipline is mastered. By contrast, scientific progress is to a great extent a story of doubt, resistance, and revolution. Therefore, disciplines are not enough for scientific progress. But doubts are hostile to the rules of a discipline, and an individual's readiness for being undisciplined is bad for early academic reputation, which is very important nowadays. The current dogma of knowledge production seems to identify sciences with disciplines. By doing so, many discussions omit reflection on the importance of doubt and individuality for scientific progress.

Knowledge production and the discovery of truth

Science and research are concerned with knowledge. In the current debates on science, talk of "knowledge production" has become very popular. It might be traced back to Merton who already specified knowledge as a "cultural product" (for the phrase see Merton 1968, 510; for this reading see King 1971, 4–5). Also the Marxist Bernal talks of the product knowledge (Science in History, 5–7). However, their use of the word "product" can be considered as rather innocent. At that time, there was as yet no fundamental criticism of the scientific method. Things have changed since Latour/ Woolgar (1971) and Knorr-Cetina (1981) revealed a "construction of knowledge/manufacture of knowledge" in science. As their critical studies have shown, the process of scientific discovery has little to do with the ideal of an objective discovery of truth. When later authors promote a "new production of knowledge" (see Gibbons et al. 1994, Nowotny et al. 2001 and 2003) they omit discussing their concept of knowledge with respect to the critical approaches of Kuhn, Feyerabend, Toulmin, Latour/Woolgar and Knorr-Cetina.

As a consequence, the popular idea of knowledge production seems to overlook an epistemological problem. What is knowledge, if it is produced? Generally speaking, a production results in a product, i.e. an artifact. Products must belong to the realm of *technê* which traditionally is opposed to *physis*, nature. Since the discovery of truth is concerned with what the ancient Greeks called *physis*, any production of knowledge cannot pursue the discovery of truth, i.e. an understanding of reality. "Getting to know," in this sense, must be something different.

There is a close connection between truth and knowledge. One only can know what is true, and truth can hardly be produced since it is connected with reality. It only can be discovered.[1] What, then, does it mean to produce knowledge if this sort of getting to know cannot be a discovery of truth? A coincidence of produced knowledge and of knowing the truth (i.e., how things really are) must be accidental. Consequently, the idea that production of knowledge can aim at solving real-world problems must be an illusion. Produced knowledge says little about how things are.

In other words, the so-called "solutionism" (i.e. the idea that science ought to aim at problem solving, see Strohschneider 2014) appears be some sort of positivism to be able to solve real world problems. But it cannot be a positivistic position because the latter aims at discovering the truth, the former at producing knowledge. Granted, there can be a *technê* that makes use of a discovery of how things are. Applied sciences may claim to do so from a positivistic point of view, but if the process of getting to know is already a *technê*, there is no way back to *physis*.

A general concern about disciplines

Why does this generally matter? If we focus on disciplines, the idea of knowledge production is easily at hand. By their specific methods, disciplines produce knowledge, it seems. But scientific progress does not consist of knowledge production alone. To a great extent, progress is generated by a revolt against the discipline. This is why we have to consider the nature of a discipline in some detail.

Every discipline is a *technê*, i.e., an art or skill. Disciplines cannot seek truth, individuals can. If we focus on disciplines alone, we are restricted to correctness and miss the important struggle for truth in science and research.

Presently, scholars are much concerned about threats to their academic freedom by external influence. The inner constraints of disciplines are little noticed when academic freedom is at stake. The reason is simple. Scholars are socialized by their discipline. We willingly accept the rules of our discipline since they appear reasonable to us. Questioning them would mean questioning our work and our way of life. However, for the sake of scientific progress, it is sometimes necessary to do so.

Disciplines as *modus vivendi*

It is in the nature of disciplines to give limitations and rules. However, it is worth considering to what extent they do so and how rigid they are. At first sight, disciplines are defined by their field of inquiry and a specific method. According to a wider definition, disciplines are specified by their "intellectual practices" (Osborne 2015, 6). But

[1] From a philosophical point of view, such a correspondence theory of truth is one of various conceptions of truth. However, disciplines other than philosophy do not consider the question of truth in that way. As long as sciences do not say on what concept of truth their way of inquiry relies, one has to suppose that it relies on a basic correspondence theory of truth. To rely on another concept of truth sciences had to give up the idea of discovering real world facts.

even this falls short of what is at stake. The scholarly community of a discipline is a social entity, and consequently every discipline consists of lots of particular norms, rules and values. Disciplines preserve traditions and rules, and it may seem that individual reputation within a discipline becomes more and more important to survive as a scholar.

Much has been said on the question of how scholars are disciplined by their discipline, so we can be brief. Most of all, to be a scholar means to be acquainted with a tradition. One has to know the relevant debates, the relevant papers, the relevant protagonists, the relevant journals, publishers, and conferences. One has to know how to argue, how to express, and how to object, and the rules sometimes differ widely in each discipline. Moreover, at least in the humanities, one should know ancient mythology and a specific set of modern novels, works of arts, and movies scholarly discussions constantly refer to. And the subtle rules of a discipline go even further. Think of the implicit dress codes of disciplines. Physicists never wear a suit, not even on conferences, theologists, for example, do. What, then, is a discipline?

It is helpful considering the basic meaning of the Latin *disciplina* in the Middle Ages. According to the *Forcellini*, a classic dictionary of Medieval Latin, a *disciplina* is a *ratio vivendi et discendi*, that is, a rule for living and learning (Forcellini 1771, 148: *proprie disciplina est ratio vivendi et discendi, quae discipulis traditur*). One may think of cloistered living in the Middle Ages, which for the young monks largely consisted of a combination of rules for learning and living. One may also believe that with the rise of the universities the discipline was no longer a rule for living. But a short glance at student life in American colleges reveals that academic learning is still considered closely interrelated with academic life. If the traditional idea of academic life has a meaning, it must be based on the conviction that intellectual training is not enough for becoming a young scholar. The socialization at college is a first step towards the later socialization by a scholarly community.

In sum, disciplines specify more than the objects of inquiry and a certain method for discovering truth. They are more than an *organon*, a tool or a means. Rather, they are a complex art, i.e., a *technê*. From a disciplinary point of view, every resistance and doubt must be wrong-headed since it undermines the established rules of a discipline.

Scholarly constraints

Even the scholarly *modus vivendi* allows little resistance and originality. Scholars constantly argue for the importance of informal exchange at conferences. The exchange follows particular rites and rules, which young scholars are quick to acquire (and they vary by discipline). One general rule at conferences: we have to show interest in the pedestrian papers of others so we can expect their interest in our own pedestrian paper.[2]

2 As Renan expressed it, scholars need “a level of bravery to be politely bored.” E. Renan *L’avenir de la science* (Paris: Calmann-Levy 1890), 117, quoted by Bourdieu 2001, 89, our translation.

Reputation is tied to the willingness to fly around the world for a brief presentation and the important discussions during the coffee breaks. Scholars are expected to take every opportunity for a visiting scholarship at a prestigious university, disregarding private circumstances and the question of how to earn their living. Talking about the latter is a taboo, in humanities even more than in sciences. It is suspected as a sign of lacking enthusiasm.

Disciplines consist of a rich set of explicit and implicit rules. Peers mutually check compliance. In doing so, they control the limited access to a discipline by writing reviews, letters of reference, and as interviewers in application processes. CVs are read carefully and include much more information than a list of publications and teaching. They illustrate a scholarly way of life. In interviews, candidates have to prove their academic mindset, a criterion hard to specify. So far, all this is known. But what are the consequences?

DISCIPLINARY HOMOGENEITY

Should we expect that scholarly individuality continues and homogeneity does not increase? In our days, disciplines are like a dense forest. Saplings have to shoot up quickly to reach the light and to survive. They orient towards other trees around, their peers. The same can be said of a scholarly career. To survive, one has to reach the light of reputation as quick as possible. We all know the dictum “publish or perish.” Attention, through publications and citations, has to be gained as quickly as possible. There is little room left for friction agents, for individuality and for what is called in German *Eigensinn*, probably best translated as waywardness or willfulness. Such saplings will not survive.

To find a way out of this, one has to recall that science and research do not merge into disciplines. The point is that disciplines are purely restrictive. They educate in a very classical way, i.e., by rules, control, reproof (criticism), and reward. As a result, they are very useful for ruling out nonsense. But speaking negatively, they also rule out any deviation from its norms. Moreover, nothing in a discipline may foster courage, dedication, vision, brilliancy, and smartness. Toulmin is probably right in claiming that “[m]en demonstrate their rationality not by ordering their concepts and beliefs in tidy formal structures, but by their preparedness to respond to novel situations with open minds” (Toulmin 1972, vii–viii). Disciplines as such cannot prepare us for doing so.

Critical reflection is not build into any discipline. If there is scientific progress, we all agree that to a great deal, it is driven by doubt and change. New scientific paradigms, new theories, new methods, and new solutions go back to doubts about the established beliefs and rules. Doubt and critical reflection are not a *technê* (there are only a *technê* if the skeptical position becomes a dogma, i.e. a way of life, as the Pyrrhonian skepticism). There are no rules of how to doubt and when. Doubt of established beliefs and rules is an undisciplined and unpredictable revolt.

Moreover, doubt inevitably is a struggle for truth. Every scientific doubt puts into question what is generally believed to be true. So, if disciplines are some sort of *technai*, it is scientific doubt that ties them down to the struggle for truth. Since disciplines consist of a wide range of intellectual and social rules, scientific doubt may revolt against any of them. And it should do so as long as science and research do not believe in possessing the ultimate truth. We must not believe that the only difference between a monastic life and an academic life lies in the purpose; namely, salvation versus discovery. The great difference lies in the fact that an academic life is and should be full of doubt. This is why a strict *ratio discendi et vivendi* is not enough for science and research.

UNDISCIPLINED SCHOLARSHIP: THREE EXAMPLES

Socrates was like a gadfly by annoying and provoking his fellow citizens of Athens. What and how he asked was disturbing. In doing so, he invented and cultivated the dialectical method.[3] May we hope that a new Socrates will enter scholarly debates if, in each discipline, we all read the same articles, attend the same conferences, and apply the same methods of inquiry?

In 1914, the polymath Michael Polanyi published his potential theory of adsorption of gases on solids. The theory had been rejected for some decades by leading physicists. It seemed to be inconsistent with the theories of physical chemistry at that time. Almost half a century later, Polanyi's theory had finally been widely accepted.

So far, it is just another story of the tortuous paths in the history of science. However, Polanyi admitted that he would never have developed his theory if he had been more involved within the context of discovery in physics at that time. Retrospectively, he wrote:

"The first point to mention is the fact that I would never have conceived my theory, let alone have made a great effort to verify it, if I had been more familiar with major developments in physics that were taking place. Moreover, my initial ignorance of the powerful false objections that were raised against my ideas protected those ideas from being nipped in the bud." (Polanyi 1963, 1012)

And he admits:

"I merely insist on acknowledgment of the fact that the scientific method is, and must be, disciplined by an orthodoxy which can permit only a limited degree of dissent, and that such dissent is fraught with grave risks to the dissenter." (ibid., 1013)

Polanyi's lack of discipline has been fruitful for science. He was free to follow his own reasoning instead of following the rules and leading opinions of his discipline.

We add an another example. Wittgensteins' *Tractatus* is one of the most influential philosophical works of the 20th Century. At the same time, it is a revolt against

---

[3] This claim is historically doubtful. Probably, the dialectical method goes back to the Eleatics. Moreover, the question of whether the method was cultivated by the historical Socrates or rather by Plato in his Socratic Dialogues remains open. But these historical details need not worry us here. At the least, the provocative Socrates is considered the ancestor of Western dialectics.

philosophical method. The work includes no argument at length even though arguments are considered the core of philosophical method. Nor does it offer any reference to the philosophical tradition or to relevant debates. The *Tractatus* is highly undisciplined, as Wittgenstein's whole academic life was. Note that he wrote parts of the *Tractatus* during the First World War, as a soldier. No scholars, no academic debates, no libraries surrounded him. This might have helped him revolting not only against traditional philosophical beliefs but also against philosophical method.

CONCLUDING REMARKS

So we hope our message is clear. Disciplines are not enough for science and research; they also need doubt and revolt. Whatever interdisciplinarity or multidisciplinarity can be, it should not replace one set of rules with another. For the most part, it should be a revolt against what too long has been taken for granted by all of us. The readiness to revolt is in danger due to the constant pressure of early reputation in an academic life. The more academic success solely relies on mastering all the intellectual and social rules of a discipline, the less *Eigensinn*, individuality, and resistance can be expected.

Two general considerations need to be added. Our position is far from being positivistic. We do not claim that science and research discover truth. Rather, we claim that they struggle for truth, and that they should do so. For struggling for truth, scholars have to be undisciplined from time to time in order to doubt the explicit and implicit rules of their discipline. Universities should encourage them to do so instead of focusing on university rankings generated by a measurement of publications and citations.

As far as we can see, there is no positivistic escape from our concern. It does not suffice to believe that science successfully discovers facts, and by doing so, need not to doubt in the rules of its particular disciplines. As the German philosopher Ernst Cassirer noted some 70 years ago: "A richness of facts does not necessarily produce a richness of ideas" (Cassirer 2007, 45–46, our translation). To become a relevant fact, to become meaningful and of a pragmatic value, facts need to correlate with ideas. Even from a positivistic point of view, much of our knowledge is not about real facts, but a knowledge of problems, inconsistencies, lack of definition, and incompletion. Even for positivists, the successful story of science must also be a story of doubt, refutation, and revolt against disciplinary rules.

We come back to solutionism. It is a prejudice that solving problems is the highest aim of intellectual inquiry. Bernal seems to have a point in claiming that solving a problem is much easier than discovering one. The first requires but acumen, the second lots of fantasy (Bernal 1954 [1971], 12). The idea of knowledge production appears to be blind for any critical struggle for truth that is a propeller for scientific progress. And the struggle inevitably involves methodical doubts. By focusing on "knowledge production", the essential role of doubt in science is heavily neglected.

References

J. D. Bernal (1954). *Science in History*, 2nd edition 1971, Boston: MIT Press

P. Bourdieu (2001). *Wie die Kultur zum Bauern kommt*. Hamburg: VSA-Verlag

E. Cassirer (2007). *Versuch über den Menschen. Einführung in eine Philosophie der Kultur*. Hamburg: Meiner

M. Gibbons, C. Limoges, H. Nowotny, S. Schwartzman, P. Scott, M. Trow (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, London: Sage Publications

M. D. King (1971). "Reason, Tradition, and the Progressiveness of Science" *History and Theory* 10/1, 3–32

C. Knorr-Cetina (1981). *The Manufacture of Knowledge: An Essay on the Constructivist and Contextual Nature of Science.* Oxford: Pergamon Press

B. Latour and S. Woolgar (1979) *Laboratory Life: The Construction of Scientific Facts*. Beverly Hills: Sage

H. Nowotny, P. Scott, M. Gibbons (2001). *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity Press

H. Nowotny, P. Scott, M. Gibbons (2003). "Mode 2 Revisited: The New Production of Knowledge." *Minerva* 41, 179-194

P. Osborne (2015). Problematizing Disciplinarity: Transdisciplinary Problematics. *Theory, Culture, and Society* 32, 5–6, 3–35

M. Polanyi (1963). "The Potential Theory of Adsorption." *Science* 141 (September 13), 1010–1013

P. Strohschneider (2014). "Zur Politik der Transformativen Wissenschaft," in A. Brodocz et al. (Eds.) *Die Verfassung des Politischen*. Wiesbaden: Springer, 175–192

S. Toulmin (1971). *Human Understanding.* Oxford: Clarendon Press

Totius Latinitatis lexicon, consilio et cura Jacobi Facciolati opera et studio Aegidii Forcellini, lucubratum (1771, reprint 1940). 4 Volumes, Padua

Short Biographies

Sascha Spoun is President of the Leuphana University of Lüneburg since 2006. Moreover, he is permanent Visiting Professor of Management at the University of St. Gallen (HSG). He is author of several anthologies and papers on university management and education.

Sebastian Weiner is Research Fellow at the President's office at the Leuphana University. Moreover, he is part-time Lecturer in Philosophy at the University of Zurich. His recent book is on Aristotle's concept of form.

This report is originally published in German and has been translated into English.

22.

IT'S THE INNOVATION, STUPID

Wolfgang KNOLL & Claudia von der LINDEN

ABSTRACT

Research and development in Austria is suffering from two problems in particular. Firstly there is a lack of a positive trial and error climate. Any kind of failure culture is unknown in this country. The logical consequence: there is a reluctance to set out on large, bold pathways to innovation, the tendency that prevails is to take smaller, more secure steps instead. Secondly: bureaucracy and regulations in Austria act as an impediment to research and development. Although there is definitely a will to carry out research. And indeed one that has cross-party consensus and is undisputed.

So what can be done? The initiation of structural and cultural change, for example, such as that aspired to by the TU Graz and the AIT Austrian Institute of Technology, so that noticeably more resources are freed for scientists to carry out their key innovation-relevant task: research. And once the majority of structures and cultures have become more research-friendly, the next question arises: how can passionate young people be attracted to research? The answer is: by making researchers heroes. What we need is innovation dramaturgy in accordance with the hero principle. Because research is a great adventure. One that encompasses daring heroes, one that encompasses both flops and brilliant victories.

Austria needs a different culture for innovation. Intellectual independence and willingness to take risks are called for, rather than bureaucracy and regulations.

Wolfgang Knoll, Managing Director of AIT, and Claudia von der Linden, Vice-Rector of the Technical University of Graz for Communication and Change Management call for a new way of thinking in domestic scholarship. On the one hand, more freedom and personal responsibility for academics, along with fewer bureaucratic regulations and administrative requirements on the other, should unleash researchers' ideas and creativity.

Here in Boston, nobody is afraid of really big questions. What does the future of children look like? What about the future of art, of machine learning, of health, of communication, of architecture, of learning? The Media Lab is engaged with these topics. Five hundred researchers in interdisciplinary research groups in the Lab take on the questions whose answers the world comes to know only years later.

Not without reason, this faculty at MIT is considered one of the world's greatest forges of ideas. Many institutions of higher education from all around the globe co-operate with the Media Lab, not least to profit from the culture of innovation that is nurtured there. That culture is playful, it is free, and it is successful. The Media Lab's culture of innovation – this is what needs to be established in Austria.

To do that will require rethinking. The desire for research and development is certainly present. In all of Austria there is unanimous agreement: only innovation, only research and development can bring the country success in the international competition. In an age of globalization and digitalization, pushing innovation is the royal road for a small country that wants to maintain its prosperity. Innovation lays the foundation for economic performance, for jobs, and for social security.

This assessment is expressed in a wide variety of official reports and recommendations from actors who are relevant to research. For example, "The Austrian Council for Research and Technology Development emphatically recommends setting stronger budget priorities for future-oriented areas such as education, research and innovation. That is the only way to reach the strategic goal set by the federal government of catching up with the most innovative countries and thereby again improving Austria's competitiveness."

Thus the indisputable goal of all relevant players: Austria should change from being an innovation follower to an innovation leader.

That is worth mentioning because there is seldom such unanimity about any question at the national level. A look at the political discourse surrounding questions of elementary and secondary education, transportation planning, or integration policy all clearly show that there is much more potential for conflict in other decisive areas of policy.

What is even more worth mentioning is that this common goal has not gone on to join the ghostly army of great plans that are either never realized or are shrunk down to fit reality. No, the amount spent domestically on research has risen from 1.1 percent of GDP in 1981 to 3.07 percent in 2016. Since 2014, however, this share has stagnated, and Austria is still far from being a leader in innovation; nevertheless, this chosen development is remarkably consistent. It is also proof of how R&D is valued in the country's higher education, in research-oriented institutions, and companies.

Nonetheless, widespread dissatisfaction can be discerned in the field of R&D, because innovation is not just a matter of financial support; it is not just a matter of planned hires and equipment. Steve Jobs, one of Apple's founders, put it like this, "Innovation has nothing to do with how many R&D dollars you have. When Apple came up with the Mac, IBM was spending at least 100 times more on R&D. It's not about money. It's about the people you have, how you're led, and how much you get it."

Or, as Germany's Fraunhofer Institute for Industrial Engineering IAO, which is located in Stuttgart, describes the requirements, "It is necessary to have a suitable climate and supporting structures for ingenuity, creativity, risk, and the bravery to attempt new things to be able to unfold."

This climate is increasingly needed in Austria's institutions of higher education. Science is increasingly governed by monitoring. Bureaucracy, applications and reporting are operating like emergency brakes that have been pulled. Administration takes up increasing amounts of time and space – at the cost of research. This environment promotes procrastinating instead of getting on with things, restraint instead of giving something a try.

That is unfortunate, and it is wrong. Austria lacks a positive climate for trial and error. There is no “culture of failure,” neither in business nor in science. Whoever fails has truly failed, or so the saying goes. The logical consequence is that people are reluctant to attempt the great paths to innovation with their attendant risk; instead, people prefer smaller, more secure approaches.

Things could be different. Companies that constantly have to prove themselves in the market demonstrate that efforts at innovation also lead to economic success. International companies transfer research groups for a certain period of time so that they can work in a new, innovative environment such as a technology park. Companies including Google, Apple, Hewlett-Packard and 3M have a distinctive innovation culture. Their products and services are disruptive, changing entire markets and industries. They even create entirely new markets and industries. Companies such as these invest in R&D at well above average rates. They have also organized their work around innovation because no matter how you look at it, people make inventions, people create innovation. The better the “habitat” is for innovation, the more successfully the innovative ideas will be put into practice.

TU Graz supports its potential for innovation with structural and cultural changes

Now, institutions of higher education are not as agile as companies. They also have other tasks. And they have to retain the balance between flexibility and stability.

Innovations in the environment of higher education exist along an exciting continuum. At one end, a task of higher education is to create space for the free spirits in research. At the other end of the continuum, there are also rigid structures. These are not beneficial in the increasingly international competition for talent and money. Austrian institutions of higher education have, however, recognized that they cannot implement the necessary changes as agilely as might be desired, or as, for example, industry is able to.

How can institutions of higher education optimize and liberate the potential for innovation within a bureaucratic environment? For innovation creative minds need the necessary resources (time, infrastructure and a good team) and as much freedom as possible. One aspect is in service-oriented university administrations. Universities are thus engaging with the task of how traditional models of administration can act with greater agility in a dynamic and international higher-education landscape. Clearly that has to take place without subordinating the particular characteristics and freedoms of a university to poorly designed or overly hasty rationales in terms of efficiency and effectiveness. It is also worth clarifying how modern approaches to management can support universities in these efforts.

This set of questions was the starting point for the TU Graz. As an answer, a vision of an effective and smart university was formulated, a vision that is summed up in the following three overarching goals: simplification, relief, and service orientation.

With these goals, the TU Graz is reacting to an environment of intense competition and sees opportunities to actively shape this competitive environment with internal measures and strategic decisions. The first step in this direction is a unified and coordinated alignment for the whole organization that structures and facilitates all of the management tasks such that the scientists find noticeably more resources for their core tasks and innovations, while simultaneously gaining relief for the central administration. Means of meeting these goals can be particularly found in the organizational culture as well as the opportunities presented by digitalization. These two areas complement each other, and they are driven by the TU Graz's approach to change management. The new aspect of digitalization is not the use of IT, but rather a strategic approach creating overall added value. The change dynamic that this construction brings with it is closely tied to the working culture and to structures within the organization.

What is also interesting about this process is that it is itself an innovative process, because the culture of innovation as an object of research is only partly understood at the present. At a meta-level, the TU Graz is trying to exemplify what is sought by the operative level of research.

By the way, the dilemma of domestic institutions of higher education is something that most of the research institutions in the country also face. They also have administration and bureaucracy that costs far too much energy, to the detriment of research.

TRIAL AND ERROR SHAPE THE HISTORY OF INNOVATION

Nobody can force innovation. One can, however, set up the necessary preconditions for it, and one must give the researchers the greatest possible amount of freedom to implement their ideas. An eloquent example of how even the most generous provision of funds may not bring the desired success is provided by Emperor Rudolf II. No matter how many alchemists he gathered around his court in Prague, not one of them succeeded in the task he had set for them of making gold.

It is always worth learning from history, also with regard to innovation. One learns how cultural embedding and the social climate influence innovation, both negatively and positively.

In the history of humanity, innovation arose for the longest time out of trial and error. Taming fire, using stones and bones as tools, or the invention of the wheel were not the logical consequences of scientific thinking. No, they were the results of coincidental observations.

From 2010 to 2013, Helga Nowotny was president of the European Research Council. In her widely praised book, *The Cunning of Uncertainty*, she describes the role of serendipity, of the coincidental, unexpectable discovery of something that was not even being sought. Nowotny, who is currently a member of the Austrian

Council for Research and Technology Development, calls coincidence an important ally of every scientist. Up through today. She does not forget, however, to note that it is necessary to be capable of recognizing serendipity and its importance. As Bruno Kreisky said 40 years ago, "A dummy might get lucky, but then what will a dummy do with the luck?"

Before the Renaissance, innovation was based almost exclusively on coincidence, trial, and error. Then a knowledge society arose in Europe, shaped by the English philosopher Francis Bacon, whose dictum "Knowledge is power" as well as his tract, published in 1620, calling for the unification of science and technology were the starting gun for a generalized and conscious approach to invention.

This starting gun leads us to universities as places that generate knowledge. They replaced monasteries and cathedral schools for elite education and, since that time, have stood for certainty that cannot be achieved by belief. Rationality and systematic research have emerged as the motors of creating knowledge. In the Renaissance and the Age of Enlightenment, universities became respected, exciting institutions. Universities became the incubators of free and logical thinking. Clever men (women were, at the time, forbidden to become students and instructors) in a free environment sought explanations, answers, and discoveries.

The free climate of the Renaissance would be desirable again today. The decisive question is how to create a climate in which the people who bring about innovation can implement their ideas.

One aspect is returning individual responsibility. Remember, Roentgen, Edison and other great inventors had individual responsibility. They had a generous budget for "scientific play money," and could thus playfully test and experiment without having to fear that the money could be cut off for lack of success.

In addition to the Media Lab, an international model worth noting as an example is the maker scene in China, in Chengdu for instance. There are already small, positive sprouts in Austria as well. The maker scene is slowly establishing itself here as well, for example at METAStadt in Vienna.

AIT as a Know-How Provider for Next-Generation Production

Another example is the Austrian Institute of Technology, AIT. Up until ten years ago, both the Institute and its image were, one has to say it plainly, in deplorable condition. Today AIT is an internationally acclaimed institute with an excellent image and an outstanding culture of innovation.

In 2009, AIT was reorganized to become a capable long-term partner with considerable foresight for national and international companies in their research efforts. Particular emphasis was placed on digitalization in industry, business and society.

The industrial revolution in the digital age means a radical change in the production, sales and innovation chains. That also means turning away from previous models of thinking and acting. This "next-generation production" requires know-how, optimal tools, and above all a view of the whole. Even as one is working on the trees, it is necessary to recognize the forest as such. That is precisely what AIT offers. Today, roughly 1300 experts at AIT are working on producing answers to the challenges of digitalization and industry 4.0. Not least thanks to research efforts by AIT, Austria and its partners are poised to do even better in global competition. Because, as stated at the beginning, at the end of the day the best chance for Austria and Europe is to be more creative, more innovative and faster than other regions of the world, and thus also to remain sustainably successful.

RESEARCHERS AS HEROES

Presume that all of the prerequisites for a positive research environment are on hand. One question still remains open: How do we get passionate young people in research? How do I make R&D so sexy and thrilling that children and young people are excited to be a part of it?

One answer could be by making researchers heroes. Firefighters, lifeguards, and medical doctors are already heroes thanks to the power of their duties. Researchers are that only to a very limited extent. Naturally, we are excited about our research, but this excitement mostly ends at the lab's exit doors. Outside of higher education and research institutions stories about researching and development are not all that convincing. Nevertheless, research has all the ingredients of a hero's story.

THE DRAMA OF INNOVATION ACCORDING TO HEROIC PRINCIPLES

A look at the past often helps to understand the present. In the Middle Ages, traveling singers constantly performed heroes' stories for an intent public. There were two kinds of adventures that did best: *aventiure* and quest. An *aventiure* (adventure) always had the following plotline. A knight makes his way, experiences the unforeseen and emerges victorious from glorious battles of all kinds. A quest (task) shows a different plotline. The knight has a particular task that he must undertake (rescue a princess, etc.), and he completes his mission despite many obstacles (battles with other knights, dragons, etc.).

This principle of storytelling is still current. The first is the principle of the road movies, of *Star Trek* and *The Blues Brothers*. The second is the fundamental principle of cinema that pervades Hollywood: the job that has to be done. It runs from *The Lord of the Rings* through *Die Hard* to *Indiana Jones*.

These forms of storytelling also shape literature. They create heroes who make the seemingly impossible possible, who catch serial killers or who explore new galaxies.

What does that have to do with science? Quite a bit. The story of Nobel Prize winners, for example, is told retroactively as an adventure or a quest. The persons who have been recognized for their achievements has either reached a goal chosen long before, or they have researched more or less freely and reached a goal that was not necessarily in focus at the start of the research.

Let us recall the 2014 Nobel Prize in Physics. The three Japanese researchers Isamu Akasaki, Hiroshi Amano and Shuji Nakamura won it for the development of blue LEDs. They researched for many years, despite major setbacks, until finally they were successful and had made the impossible into reality. What a great quest that bestowed on us blue, and thus white, LED light.

Conversely, the discovery of penicillin's effects was simple coincidence. Alexander Flemming coincidentally left a petri dish unattended, and when he returned from vacation he noticed something in the petri dish that later became known as penicillin. Microwave ovens, Viagra, X-rays, Teflon. All of these inventions were based on coincidence, or other goals. Each individual invention is the result of an adventure, because researchers never know when they head in to the research institute in the morning what new insights might come home at the end of the day.

Research is a great adventure because we never know what will come out of it at the end. But we can improve the odds. Innovation is 50 percent coincidence, or so the saying goes. We should use this 50 percent every bit as much as the remaining 50 percent. If the enemies of the knights of old were dragons or other knights, today the enemies of innovation are bureaucracy, regulations and a ban on failure. They have to be reduced as much as possible so that researchers can do what they are able and willing to do: research.

Short Biographies

Wolfgang Knoll earned a PhD degree in Biophysics from the University of Konstanz in 1976. From 1991–1999 he was the laboratory director for Exotic Nanomaterials in Wako, Japan, at the Institute of Physical and Chemical Research (RIKEN). From 1993 to 2008, he was appointed Director at the Max Planck Institute for Polymer Research in Mainz, Germany. Since April 1, 2008 he is the Scientific Managing Director of the AIT Austrian Institute of Technology. Since 2010 he is a Regular Member of the Austrian Academy of Sciences, and in 2011 received an Honorary Doctorate from the University of Twente, the Netherlands.

Claudia von der Linden holds an MBA from the renowned IMD Business school in Switzerland and is an industrial engineer with a diploma from the University of Applied Sciences Würzburg-Schweinfurt in Germany. From 1982–1988 she worked in industry at Robert Bosch GmbH, and until 2002 as management consultant, managing director and partner in a range of international consulting companies, among others L.E.K. Consulting, Mitchell Madison Group and Theron Business Consulting. Since 2002 she has been founder and managing director of Permion Consulting GmbH, Austria, with a focus on strategy and change management. Since 2015 she is also Vice Rector for Communication and Change Management at Graz University of Technology.

This report is originally published in German and has been translated into English.

23.

THE ROLE OF IST AUSTRIA IN THE NATIONAL RESEARCH LANDSCAPE

Thomas A. HENZINGER

President, IST Austria

ABSTRACT

The Institute of Science and Technology Austria (IST Austria) was founded to add a globally visible beacon of frontier research to the Austrian science system. We review the purpose and goals of the Institute, and the conditions that are necessary for its success.

IS THERE A RECIPE FOR INSTITUTIONAL SUCCESS IN SCIENCE?

Science turns human curiosity about nature–i.e., curiosity about our environment and ourselves–into a systematic effort. While a world without science would see little change in our living conditions, human curiosity brought about and science has accelerated the perpetual change we call progress. Science is the long-term driver behind new technologies, whether in healthcare, agriculture, energy, transportation, communication, manufacturing, or defense. Net science production is therefore the only sustainable way for a nation to profit from human progress and create wealth; nations that are net science consumers will fall behind in the long run. This insight lies at the root of most national efforts to participate in the world-wide scientific enterprise.

Successful participation in science is tough. Science is not just international, competitive, collaborative, expensive, and constantly changing–science exhibits all of these attributes *in the extreme*. The markets for ideas and for scientists are global. Whether the goal is to publish or to patent, there is neither fame nor fortune for second place in science. Scientific progress often requires teamwork and the cooperation of experts from different fields. Some areas of science need infrastructures that individual institutions or even countries cannot afford. New insights and new methods can change the scientific landscape from one day to the next. Above all, science is serendipitous. Scientific breakthroughs are rarely expected; if they could be foreseen or brought about with certainty, they would not be science. Successful participation in science therefore cannot be decreed by a master plan about strategic directions and concentrated expenditures; it requires a far more extensive and less guided approach to create an eco-system in which science can thrive.

The only reliable way of safeguarding a nation's investment in science is to create and maintain a comprehensive national education system that lays the groundwork through substantive science education in school, produces the professionals needed by industry and society through effective tertiary science education, and competes in the world-wide scientific enterprise through competitive doctoral and postdoctoral science education. Primary and secondary school science education is substantive if it not only imbues all pupils with the importance of science and prepares them for life in a high-tech world; it must also rouse and foster scientific talents. Tertiary science education is effective if it produces sufficiently many graduates that are sufficiently broadly prepared for the professional needs and job markets of the future. Finally, most scientific progress is based on research performed by doctoral students, postdocs, and young independent scientists; it will happen at the institutions that are able to attract the best doctoral, postdoctoral, and faculty candidates from around the world.

Just as science itself is international, competitive, collaborative, expensive, constantly changing, and serendipitous, the spearheads of a successful national science system must be open to the world, highly selective in their recruitment, multidisciplinary and well-funded, dynamic and non-bureaucratic, and fully autonomous. In order to attract ambitious scientists from all over the world, an institution must also be permeated by a special spirit. The most successful international examples form pockets of "restless bliss" for scientists in a noisy world–quietly busy islands whose inhabitants are driven by the common sense of purpose to expand the frontiers of human knowledge. A scientific institution forms a pocket of restless bliss if it is steeped not only in scholarship and individualism but also in community and respect for each other; if it values creativity and originality but also hard work and tenacity; if it is well-funded but rewards only performance and achievement; if it is open to all but thrives on constant competition; if it disdains limits and hierarchies but embraces evidence and reason; if it perpetually reinvents itself and yet maintains as its most valuable asset its long-term brand and reputation.

The leading American research universities form such pockets of restless bliss. They are magnets that attract scientific high performers at all levels–from the apprentice (doctoral student) to the assistant (postdoc) and independent scientist (a.k.a. principal investigator)–from all corners of the world. The unique value of a Princeton or Stanford lies not in the total cost of their buildings and scientific instruments, nor in the accumulated brain power of their Nobel laureates and other human resources, not even in the expected value of their inventions and spin-offs, but in the atmosphere that permeates their campuses, classrooms, research labs, and nearby coffee shops. The infrastructures and the salaries of Princeton or Stanford are easy to match and top for rich nations like the gulf emirates or Singapore, yet a campus atmosphere that stimulates intense intellectual inquiry and discourse is difficult to recreate. For a small country like Austria it is fortunate that not all conditions for the success of a scientific institution can be bought and decreed. Despite enormous investments, serendipity is unlikely to strike in closed, restrictive, or hierarchical societies.

The purpose of IST Austria

IST Austria is the result of a conscious effort to create in Austria an internationally oriented apex of its national science system. The Institute was founded in 2006, started operating in 2009, comprises 45 research groups in 2017, and will double in size till 2026. The two core missions of IST Austria are to perform world-class research and to provide world-class doctoral and postdoctoral education in science. In order to accomplish these missions, IST Austria must attract top scientists from the entire world, i.e., it must compete successfully for doctoral students, postdocs, and faculty (professors) against the leading scientific institutions in the world. Every decision in the design and development of IST Austria, no matter how large or small, has been guided by this principal goal. This applies equally to the construction of the campus and scientific infrastructure, to the recruitment of scientific and support personnel, and especially to the creation of internal structures and a scientific culture that, over time, shall enable the emergence of an internationally known pocket of restless bliss for scientists in Austria.

Two of the most important early design decisions at IST Austria were the creation of a professorial tenure track and an institutional doctoral school, both common around the world but, in their uncompromising versions, new in Austria. The professorial tenure track offers regular professorships to young scientists, first for a multi-year trial period after which their scientific performance is evaluated rigorously. It is these offers which allow IST Austria to compete for faculty candidates with the leading institutions around the world. The institutional doctoral school requires all doctoral students to pass a selective admissions process and complete a rigorous structured curriculum, while offering full-time employment in return. It is these offers which allow IST Austria to compete for doctoral candidates with the leading institutions around the world.

IST Austria can succeed only as part of a strong national science system and, by succeeding in its core missions of world-class research and doctoral training, will further strengthen this system. The Institute relies on national research funding agencies that are financed generously and distribute their grants strictly competitively, on doctoral candidates from the Austrian universities whose education prepares them to compete successfully with their international peers, on a national science infrastructure that keeps up with the state-of-the-art, on a scientific establishment that is open to new administrative structures, and on a public that understands the value of science for society. The Institute collaborates with scientists across the nation and the world; it produces graduates for research and leadership positions within the nation and the world; it contributes to the scientific infrastructure that is available to all Austrian scientists; it introduces to Austria successful international models for science administration such as the professorial tenure track and the institutional doctoral school; it gives an impetus to the Austrian start-up scene and enhances the attractiveness of Austria for research-intensive international companies. Above all, IST Austria increases the amount and raises the level of the engagement of Austria within the international scientific enterprise, by bringing top performers, their ideas, and ultimately economic and public value to Austria.

IST Austria sees itself as vanguard of Austrian science–a nimble spearhead that can react quickly to international developments and new challenges; more advance guard than heavy flagship; more bold prototype than safe product: always looking out for and probing new directions in science, in science infrastructure, and in science management. By constantly moving with the unpredictable leading edge of international science and by adapting quickly to new trends, the Institute can play a central role in keeping the entire national science system competitive. As the forces that drive international science are extreme, so must be principles that govern IST Austria.

THE CONDITIONS FOR THE SUCCESS OF IST AUSTRIA

As science itself is extremely international, competitive, collaborative, expensive, dynamic, and serendipitous, IST Austria can fulfill the spearhead role within the Austrian science system only by creating and maintaining extreme conditions that will not guarantee but facilitate success in science. The Institute would not add value by duplicating other parts of the Austrian science system. Instead, the Institute has set up and strives to maintain the following conditions.

Extremely international The majority of scientists at all levels (doctoral students, postdocs, professors) are international. The language spoken on campus is English.

Extremely open There must be no in-house careers: all professors are recruited from outside the Institute, preferably from abroad to bring new scientific strengths to Austria. For every scientific position, IST Austria recruits world-wide. The Institute evaluates each applicant individually, looking for unique experiences and outstanding accomplishments rather than specific degrees or titles. Doctoral students can be hired without Master's degree, professors without habilitation.

Extremely selective For all positions, scientists are chosen from the largest possible pool of candidates. Doctoral and professorial candidates apply to the Institute, usually in the thousands, not to a research group or search committee. Students and postdocs are not recruited for specific research projects, nor professors for specific research topics.

Extremely opportunistic IST Austria always tries to hire the best available scientists, independent of their research interests. Whenever the opportunity to hire a world-leading scientist arises, in any field of science, the Institute must seek to attract that person. It is the availability of outstanding candidates, rather than strategic planning or stakeholders' wishes, which will determine the research portfolio of the Institute.

Diverse IST Austria values differences in scientific approaches and views, as well as differences in scientific and personal backgrounds.

Undirected IST Austria is an academic institution. All scientists are free to choose their scientific projects and their scientific collaborators -within the Institute, within Austria, and abroad.

Extremely competitive Half of IST Austria's budget depends on performance criteria such as the successful acquisition of competitive external research funds. Also, a significant fraction of the Institute's internal resources is distributed to the research groups on a competitive and time-limited basis. A successful research group is funded in three ways: by winning external competitions for research grants; by winning internal competitions for research funds; and through a base budget promised by the Institute.

Extremely performance-oriented The base budget of each research group depends on the scientific performance of the group and is promised for five years at a time. After the first five years, junior professors need to undergo an international evaluation of their scientific accomplishments. The outcome of this so-called "tenure evaluation" determines whether or not the professor may stay at the Institute. There are no predefined criteria for successful tenure evaluations, except that the professor must meet the standards of leading international competitors.

Extremely dynamic IST Austria hosts doctoral students and postdocs for one stage of their careers. At the completion of their training, they must leave the Institute. This means that close to 20 percent of all scientists are replaced every year, and that less than 10 percent of all scientists–namely, those professors who pass their tenure evaluation–may stay at the Institute beyond five years. Professors who retire or leave IST Austria for other institutions are not replaced by new hires in the same field.

Extremely young Most professors of IST Austria are hired early in their careers, near their peak of creativity. Every professor, no matter how junior, is independent from day one, with complete control over their base budget and research group, and not subordinate to a more senior professor.

Extremely non-hierarchical IST Austria is, on the scientific side, organized into research groups. Each research group is headed by a professor and consists of a small number of doctoral students and postdocs. All students and postdocs are supervised directly by their group leaders. All professors report directly to the president of the Institute.

Extremely interactive IST Austria is not partitioned into departments or scientific units of any kind, other than the individual research groups. The size of each research group is limited to 15 scientists, including the group leader (professor). This group size limit enables the direct supervision of the group members by the group leader, and fosters the interaction between different groups, even across different scientific disciplines. Small research groups interact with each other more than large groups do.

Multi-disciplinary IST Austria unites all major fields of science on one campus: the life sciences, the physical sciences, and the mathematical sciences. Cross-disciplinary collaborations are supported by the space allocation to research groups, by infrastructure sharing between groups, by an internal competitive fund that is available for multi-group collaborations, and by the institutional doctoral school. IST Austria has a single, multi-disciplinary doctoral program. All doctoral students are required to take courses together with students from other disciplines and to complete research projects with several different groups before choosing a supervisor for their doctoral research.

Well-funded To compete with world-leading institutions, IST Austria must provide its scientists with a state-of-the-art scientific infrastructure and with colleagues that can offer any needed expertise. Hiring strictly the scientists with the greatest potential is one thing, providing them with an environment that supports them to live up to their full potential the other. This requires generous financing. Otherwise the Institute will attract only second-rate scientists, in which case it would be wiser to save the funds altogether.

Efficient IST Austria pools its lab spaces, scientific equipment, and technical services centrally, whenever feasible, to make them available to all scientists of the Institute. There is an internal market-place for equipment use and technical services in order to guide and control the investments of the Institute into scientific infrastructure. Any unused capacities are made available to other scientists in Austria and abroad.

Extremely independent IST Austria must maintain complete autonomy from all sponsors, public and private. While sponsors have the obligation to demand that their funds be spent economically and the right to ask for any reporting they wish, all Institute decisions regarding research directions, personnel, internal processes, scientific infrastructure, and individual projects must be made on their scientific merits, without external influences.

Extremely flexible All planning processes for the development and operation of IST Austria exhibit large margins of uncertainty, both at the level of individual research groups and at the Institute-wide level. This has scientific, personnel, and financial reasons: neither the results nor the timeline of scientific projects can be predicted, nor the future developments in science; the scientists that the Institute tries to attract and keep are in high demand around the world and may join competitors; the outcomes of all efforts to acquire competitive research grants or private donations are marked by a high degree of variability. It is therefore paramount that individual professors as well as the entire Institute maintain maximal flexibility in spending their funds; that they can always and non-bureaucratically change or postpone expected expenditures due to new developments.

Extremely intense IST Austria employs only full-time scientists: they must be fully committed to the advancement of science, their own scientific career, and the support of the Institute. In return, the Institute must provide a 24/7 work environment that allows dedicated scientists to focus single-mindedly on their scientific success.

Extremely supportive Besides performing world-class research, the training of scientists is the second main priority of IST Austria. The goal of the Institute is to become a world-wide brand for doctoral education. The doctoral students and postdocs of the Institute receive not only close guidance by world-class scientists, but also professional training in the communication and leadership skills necessary to succeed in academia, industry, and the public sector. Much of the reputation of the Institute will depend on the success of its alumni.

Extremely ambitious All evaluations and measurements of IST Austria must compare the Institute and its conditions against the world-leading institutions, both in the direct competition for scientific talent and in the indirect competition for success at the most prestigious international journals, conferences, prizes, fellowships, and funding agencies.

Long-term The success of individual research projects and scientific hires can be measured in years, typically 3-5 years. The impact of research results and scientific careers beyond a narrow community of scientific peers, on other disciplines, on society, and on industry, must be measured in decades. The reputation of a scientific institution therefore requires decades to build.

Valuable IST Austria is built on the premise that wherever world-class scientists are brought together and given the freedom and the means to pursue their interests, driven only by their curiosity, some of the outcomes, while unforeseeable, will benefit society and industry. The Institute is committed to profit, in the long run, also financially from the scientific discoveries that will happen on campus, through the management of intellectual property and through the entrepreneurial training it offers to students and postdocs. If the Institute succeeds in its scientific mission, it will also generate economic value on a scale that is comparable to the leading scientific centers around the world.

BEYOND IST AUSTRIA

International science is organized as a network of universities and research centers that are connected through the constant exchange of scientists and ideas, both in competition and in collaboration with each other. The strongest nodes of the network form hubs that, through their gravitational attraction, grow even stronger over time. Unlike natural resources, brain power is distributed equally around the globe. In the global competition for talent it is therefore especially the small countries which must strive to build attractive science hubs in order to be net importers of brain power. The Vienna and Lower Austria region satisfies many prerequisites for becoming a global science hub in the center of Europe: a rich historical legacy, a high quality of life, many diverse universities and research institutions. Nonetheless, this can happen only through a concerted and sustained effort by all stakeholders to build a top-notch, flourishing, and many-faceted eco-system for science in and around Vienna. A successful IST Austria can contribute an essential building block towards that goal.

Acknowledgments The development plan for IST Austria was written by Haim Harari, Olaf Kübler, and Hubert Markl and laid out the principles described in this chapter (see ist.ac.at/HarariKublerMarkl). The author thanks Laurenz Niel and Georg Schneider for many improvements of the text.

SHORT BIOGRAPHY

THOMAS A. HENZINGER is President of IST Austria (Institute of Science and Technology Austria). He holds a Dipl.-Ing. degree in Computer Science from Kepler University in Linz, a Ph.D. degree in Computer Science from Stanford University, and Dr.h.c. degrees from Fourier University in Grenoble and from Masaryk University in Brno. He was Professor of Electrical Engineering and Computer Sciences at the University of California at Berkeley, Director of the Max-Planck Institute for Computer Science in Saarbruecken, and Professor of Computer and Communication Sciences at EPFL in Lausanne. He is an ISI highly cited researcher, a member of Academia Europaea, the German Academy of Sciences (Leopoldina), and the Austrian Academy of Sciences, and a Fellow of the AAAS, the ACM, and the IEEE. He has received the Milner Award of the Royal Society, the Wittgenstein Award of the Austrian Science Fund, and an ERC Advanced Investigator Grant.

24.

Research Funding in a Multipolar, Increasingly Interdependent World

Wilhelm Krull & Antje Tepperwien

"The important thing is not to stop questioning. Curiosity has its own reason for existing. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day. Never lose a holy curiosity."
Albert Einstein

Abstract

Over the past decades we have been witnessing that the speed as well as the impact of largely science and technology induced change has increased quite dramatically. The quality and accessibility of new knowledge have become decisive for the future well-being of our societies. It is against this background that the importance of research funding as well as the role and function of private foundations in supporting some of the brightest minds is being investigated. In addition to transnational collaborations among researchers, the need for strategic alliances among research funders is highlighted, in particular with respect to establishing and maintaining sustainable, ideally symmetric partnerships.

Introduction

In 2016, a new word has entered our vocabulary, a word that does not bode well for the future of science and research, and thus for our future and that of our children: According to many commentators – not least those of the US presidential campaign – we now live in a post-factual or post-truth world. Occasionally even evidence-based, well-established facts are disputed by representatives of the new Administration claiming to have "alternative facts".

On 6th November 2012, the then influential business and show business man and now US President Donald Trump tweeted: "The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive." After his election in November 2016 he appointed what Lawrence M. Krauss, board member of the Federation of American Scientists, called an "anti-science Administration"[1]: The new head of the Environmental Protection Agency is a critic of climate science with close links to the oil-and-gas industry, the new Secretary of the Interior is an outspoken climate change denier, and the new Secretary of Education is likely to propagate the teaching of the intelligent design "theory" in schools. According to Krauss, Trump's team considers science to be "just a politicized tool of 'the elites'".[2]

The new administration has already threatened to dramatically cut down NASA's funds for climate research[3] and in a since-deleted Facebook post the nominee for head of the White House Office of Management and Budget has even generally questioned the need for any government-funded research. Nevertheless, it still came as a surprise to many research policy-makers that on 23 January 2017 it was announced by the new Administration that in future no more government funding will be provided for the National Endowment for the Humanities as well as the National Endowment for the Arts.[4] This development is in complete contradiction to the urgent need for more funding not least of basic research in our multipolar, increasingly interdependent and globalized world.

Since the mid-1980s, we have been witnessing dramatic changes in the political landscape and the economic map not only of Europe but of the world at large. Since the end of the Cold War we have become part of a dynamic ongoing process only loosely characterised by the term 'globalization', a process that involves " *the inexorable integration of markets, nation-states, and technologies to a degree never before witnessed, in a way that is enabling individuals, co-operations, and countries to reach around the world further, faster, deeper, and cheaper than ever before*."[5]

When we look back at the fundamentally new developments of the past 30 to 35 years, we cannot help but recognize that the speed as well as the impact of change has increased quite dramatically. This applies not only to the European political landscape and its re-structuring since 1990, but also to the public and private infrastructures that have such a deep impact on our daily lives. We live in a highly complex, largely science-, and technology-driven world, and it seems that the enormous changes we have been witnessing since then are merely a foretaste of the challenges ahead.

The global environmental crisis; population growth; massive migration: the rise of terrorism; the decline of freedom and democratic governance – not only in countries situated in the least developed parts of the world but also in countries such as

1 Krauss, L. M. (2016). Donald Trump's War on Science. *The New Yorker*, 13 December 2016. http://www.newyorker.com/tech/elements/donald-trumps-war-on-science. Accessed 20 January 2017.

2 Ibid.

3 Cp. e.g. Milman, O. (2016). Trump to scrap Nasa climate research in crackdown on 'politicized science'. Nasa's Earth science division is set to be stripped of funding as the president-elect seeks to shift focus away from home in favor of deep space exploration. *guardian.com*, 23 November 2016. https://www.theguardian.com/environment/2016/nov/22/nasa-earth-donald-trump-eliminate-climate-change-research. Accessed 20 January 2017.

4 Vgl. http://scilogs.spektrum.de/engelbart-galaxis/praesident-trump-beendet-die-staatliche-foerderung-der-geisteswissenschaften/. Accessed 30 January 2017.

5 Moïsi, D. (2009). The Geopolitics of Emotion. How Cultures of Fear, Humiliation, and Hope are Re-Shaping the World. Anchor, p. 9.

Hungary and Turkey: All of these and many other challenges make it imperative for us to re-think, and subsequently re-align our approaches as well as to develop – against current trends of re-nationalisation – a truly transnational perspective. If our globalized world is becoming increasingly "*hot, flat, and crowded*", then it is time for us to develop a sense of urgency and to act accordingly, or as Thomas Friedman already put it in 2008: "*We have been living for far too long on borrowed time and borrowed dimes. We need to get back to work on our country and on our planet. The hour is late, the stakes could not be higher, the project could not be harder, the pay-off could not be greater*."[6]

In view of the critical state of affairs it is by no means easy to maintain an optimistic approach to the challenges ahead. Turning them into opportunities will require all the intelligence, boldness, creativity, and persistence we human beings are capable of. In particular at a time like this, we have to follow the path on which hope prevails and to resist the forces which propagate xenophobia and fear.

In his book "The Geopolitics of Emotion", published in 2009, the French political scientist Dominique Moïsi outlined two quite extreme scenarios of "the world in 2025", one of hope and one of fear. He predicted "new Dark Ages"[7] should we not proactively respond to the challenges ahead. He called on politicians to be attentive to the problems involved in globalization and stressed the importance to learn more about the emotions of people living in other cultures and countries: "*The Other will increasingly become part of us in our multicultural societies. The emotional frontiers of the world have become as important as its geographical frontiers*."[8]

Recent events have shown the validity of Moïsi's interpretation. It is of crucial importance that we become more knowledgeable about our own cultural, political, and social heritage and its impact on our daily lives as well as to raise our awareness of historical, social, and political differences among and between regions, countries, and continents. The trend towards post-truthism and isolationism needs to be reversed – and research and (higher) education must live up to their important role in that process.

This paper will stress the importance of research funding, and it will investigate the role private foundations can play in the support of curiosity-driven as well as use-inspired basic research.

First, it will look at the state of higher education and research in Europe, the increasingly fierce competition for resources, and the (vain) attempts to quantify quality.

6 Friedman, T. L. (2008). Hot, Flat, and Crowded. Why the world needs a green revolution – And how we can renew our global future. Allen Lane, p. 25.

7 Moïsi, op. cit., p. 144.

8 Ibid, p. 157f.

CURRENT MODES OF RESEARCH FUNDING AND ASSESSING

The quality and accessibility of new knowledge are decisive for the future well-being of our societies. The European Union has thus vowed to develop into a knowledge-driven society and to create a European Research Area (ERA). The Lisbon European Council already in March 2000 formulated the daring strategic goal for the European Union to become the most competitive and dynamic knowledge-based economy in the world by 2010.

This goal has not yet been achieved. Though Europe is still the world's largest research area with respect to the total number of graduates, Ph.D. graduates and scientific papers published in the field of research and technological development, Europe is facing increased global competition, particularly from the Asia-Pacific region. The rapid growth of scientific output in Asia Pacific is in stark contrast to slow growth in Europe and stagnation in the United States (US). If this trend continues, the Asia-Pacific nations will be the biggest research community in about ten years' time from now.[9]

Over the last three decades, the European nations have largely considered higher education as a tool for regional development, and not really focused on creating first-class, internationally competitive research universities. The result is reflected in many benchmarking studies and rankings as well as in the overall development with respect to Nobel laureates and awardees of other prestigious prizes. Fifty years ago, European scientists dominated the list of Nobel Prize winners. Nowadays it is mainly researchers working in the United States who win prizes for major breakthroughs.

Apart from a few research areas such as astrophysics, space research, nuclear physics, and molecular biology, Europe suffers from an almost total lack of transnational support of basic and strategic research. In Europe, research is simply not supported sufficiently, particularly with respect to risky, open-ended transformative research.

In its 2007 report "Enhancing Support of Transformative Research at the National Science Foundation" the National Science Board adopted the following working definition of "Transformative Research": "*Transformative research involves ideas, discoveries, or tools that radically change our understanding of an important existing scientific or engineering concept or educational practice or leads to the creating of a new paradigm or field of science, engineering, or education. Such research challenges current understanding or provides pathways to new frontiers*."[10]

To support this kind of research, current modes of research funding need to be reconsidered. In almost all of Europe we currently too often pursue a "we don't trust you, we know better, and we want results now" kind of approach, which extinguishes

---

9 Cp. e.g. Andersen, J. Challenges and perspectives in European research funding. Funding Forum. http://www.eua.be/Libraries/funding-forum/EUA_andersen_article_web.pdf?sfvrsn=0 Accessed 20 January 2017.

10 National Science Board (2007). Enhancing Support of Transformative Research at the National Science Foundation, National Science Foundation, p. V.

small flames of creativity, and certainly prevents them from turning into strong fires of transformative research and scientific innovation.

Competing for Resources

Research money is increasingly granted on a competitive basis. According to Scientific American, researchers spend 40% of their time writing grant proposals.[11] They have to fit their research into the framework of public and private grant schemes which often have a short-term perspective that is in stark contrast to the realities of undertaking curiosity-driven research. Applying for grants under the current funding regime means operating a machinery of writing proposals and reports instead of writing books or articles, presenting well-tested results instead of getting new ones, thinking in short intervals, i.e. in terms of two to three year projects, instead of thinking long-term. Often researchers are discouraged from thinking in terms of complex and possibly time-consuming endeavours. Instead they are confronted with obsessive bureaucracy, agenda-setting, and in some cases also the deficiencies of a peer review process that exchanges rigor for relevance.

In 2012, Gunnar Öquist, a Swedish biologist and permanent secretary of the Royal Swedish Academy of Sciences from 2003 to 2010, and the sociologist Mats Benner published a report on "Fostering breakthrough research: A comparative study". In this study the authors compared the Swedish higher education and research system to that of Denmark, Finland, the Netherlands and Switzerland (all countries of a similar size). The background to their report "*is concern about the conditions for breakthrough research in Sweden. It also reflects more general concern about research governance in Europe today, and the relative decline of European centres of learning despite the historically central position of universities and research in Europe. Although scientific development has always been accompanied by other goals in science policy, conditions for and involvement in original and innovative research as such are, perhaps, more constrained today than ever before*." [12] The focus – of major research funders – lies on applicability, utility, relevance and impact. Sweden has quite a strong commitment to research (1,1% of GDP). However, Öquist and Benner come to the conclusion that *"the inconsistent, uncoordinated nature of resourcing and organization of research prevents Swedish universities and researchers from attaining the other countries' levels.* "[13] They call for a "*skillfully managed tenure-track system*" and a new funding system for university research with at least 60% of research money coming from internal resources.[14]

Currently, too much research money has to be gained in competitions whose rules and goals are not necessarily conducive to the freedom and creativity of research.

---

[11] http://www.sciencephilanthropyalliance.org/wp-content/uploads/2016/09/Science-Philanthropy-Alliance-why-basic-science-factsheet-070516.pdf. Accessed 20 January 2017.

[12] Öquist, G., & Benner, M. (2012). Fostering breakthrough research. A comparative study. Kungl. Vetenskapsakademien, p. 61.

[13] Ibid, p. 64.

[14] Ibid, p. 65.

To support more truly transformative basic research this trend should be reversed. Universities as institutions but also individual researchers should receive more basic funding for research and should be allowed to set their own research agenda(s). Ultimately, a sufficient amount of core-funding must be seen as an important ingredient of a high-trust culture of creativity.[15] But still, a substantial amount of competition – whether internal or external – for research funds should remain. The question is how best to identify those projects and researchers most worthy of support.

TRUSTING PEERS

As numerous examples in the history of research tell us, truly transformative research seems to be by definition beyond peer review. A particularly striking example is that of the 2014 winner of the Nobel Prize for Chemistry Stefan Hell. As Hell describes it in his autobiographical notes on the website of the Nobel Foundation, he had great difficulties in obtaining funding for his research which challenged an established law of physics. It was the trust of leading scientists from a Finnish university and the Max Planck Institute of Biophysical Chemistry at Göttingen and the decision of an official of the German Federal Ministry of Research to overrule peer reviewers' recommendations which finally provided Hell with the funds and the environment necessary to carry out his research.[16]

For universities as well as funding agencies the question is whether we can ultimately encourage reviewers to be prepared to give innovative, high risk projects the benefit of the doubt – and whether the leadership of the university and the respective funding agency in the end are prepared to back the one reviewer who, in opposition to the majority of his colleagues, considers an idea to be brilliant and wholeheartedly supports the proposal. In the current climate low trust regimes seem to prevail. However, what we need is a leap of faith based on high trust principles that allow for some thorough rethinking of common wisdom and for conducting research in unknown territories and 'off the beaten track' areas.

Of course, it does not suffice to simply provide more time and space for creativity. As many outstanding research institutions such as Rockefeller University, the Max Planck Society, the Wellcome Trust, or Howard Hughes Medical Institute (to name but a few) are demonstrating, it is a conditio sine qua non to rigorously invest time and expertise in assessing the candidate's performance so far, the leadership qualities, and the potential for future ground breaking research. Only if all of these aspects and the consistency of the candidate's principles, beliefs, values, and actions provide a sufficiently coherent picture of his or her personality, should the person be hired. If not, an institution should not refrain from searching anew for the best possible candidate. But once the appointment is made, the person hired should be able to work under optimal conditions at the frontiers of knowledge, for at least five to seven

---

15 Cp. Krull, W. (2004). Towards a Research Policy for the New Europe: Changes and Challenges for Public and Private Funders. *Minerva* 42: 29-39.

16 https://www.nobelprize.org/nobel_prizes/chemistry/laureates/2014/hell-bio.html Accessed 20 January 2017.

years undisturbed by other assessments than the ones made anyhow by the funding agencies to which he or she will apply for additional, hopefully at least medium-term grants. If we do not reshape our systems of assessment and accountability in the direction of high-trust modes of operation, we will miss important opportunities for achieving breakthroughs in basic research and harvesting their potential for innovative developments. Ultimately, these knowledge gains provide the foundations on which tomorrow's world will be built.

Quantifying Quality

Unfortunately, numbers seem to play an increasing and sometimes nefarious role in assessing the potential of a researcher and the quality of his or her work. The misuse or inappropriate application of metrics for measuring scientific quality is currently all too widespread.

The prevailing terms to describe scientific quality are overused and, at the same time, underdefined. In Germany, "excellence" is one of the dominant catchwords in the science policy and research-assessing vocabulary, in the UK it seems to be "innovation" and "impact". Words like these, that are being used in an inflationary manner are subject to the danger that their meaning is becoming increasingly vague. They also trigger a whole cascade of expressions desperately trying to differentiate between various grades of excellence such as 'mega excellent', 'outstanding' or even 'truly outstanding'. No wonder that some choose the counter-strategy to operationalize or formalize its meaning by making scientific quality measurable. Quantitative indicators have been developed to assess publications, individual researchers, projects, programmes, and scientific institutions. While the aim to define the term 'scientific quality' is, indeed, very laudable, the proposed solution of operationalizing and formalizing its meaning with quantitative criteria has serious deficiencies. Misplaced concreteness and false precision are just two of them.[17]

More and more metrics, scales, and indices have been developed to assess scientific quality – be it the number of publications, the academic performance of scholars measured by citation counts, and the position of universities in global competitions expressed in rankings. In addition, during the last few years metrics related to social usage and online comments like Mendeley or Altmetric.com have gained some significance. At the same time, it is evident that almost all metrics are based on the arbitrary contribution of indicators, or even inaccurate data. The fact that an article was quoted very often or commented on frequently does not automatically speak in favor of its quality. What if it was quoted as a bad case?

Nevertheless, even if we can come to sound metrics in some cases, a third aspect still shows a problematic trend which seems to affect academia quite seriously: Data are increasingly used to govern science. Many recruiters for academic positions request the Hirsch Index figures for candidates. Various institutions base promotion decisions on the number of articles in "high impact" journals. And universities, in

17 Cp. Krull, W. (2017) Die vermessene Universität. Ziel, Wunsch und Wirklichkeit. Passagen.

Scandinavia or China for example, allocate research funding or bonuses on the basis of a mere number, for example by calculating individual impact scores, or by giving researchers a bonus for a publication in a journal with an impact factor higher than 15. On nature.com a group of researchers warned: "*Research evaluations that were once bespoke and performed by peers are now routine and reliant on metrics*". [18]

The very problem is that more and more research assessments, evaluations, and recruiting decisions in academia are based on mere data and statistics instead of qualitative judgement by peers. While quantitative indicators, of course, can be supportive in a decision making process, they cannot substitute expert judgement. Metrics have to be interpreted, assessed themselves, and, what is even more important, compared to and seen in relation to other relevant criteria. If this is not done, we run the risk of damaging the decision-making process with the very tools designed to improve it. Research organizations and decision making bodies need to develop a sound knowledge of good practice and wise modes of interpretation of metrics. In no way can metrics substitute a thorough discussion and a thoughtful deliberation of all aspects of scientific quality.

We have thus seen that current modes of research funding and assessing are in many ways problematic. The balance between internal and external research funding needs to be redressed in favour of the former. Competitive grants need to provide more time and room for creative research. Quality assessment should not rely almost exclusively on numbers; and peers, and faculty and university leaders should not mistrust an idea, simply because they have never heard of it before.

In the next part of this paper we want to look at the role which private foundations – themselves grantmakers – can play in fostering transformative research.

THE ROLE OF PRIVATE FOUNDATIONS

Given the billions, if not trillions of Euros/Dollars etc. spent – and sometimes misspent – by public authorities and enterprises, one might ask what private research foundations can achieve for fostering and strengthening research. Measured in financial terms, most foundations are in fact comparatively small actors. It is indeed not the overall amount of money spent but rather the approach taken by foundations that makes the difference.

Foundations do not have to wait for political consensus. For them the objectives to be achieved are usually more important than bureaucratic rules and regulations. They can help their partners in universities and other research institutions to act, not only to react, when it comes to tackling the challenges of change. Their autonomy, alertness, and flexibility enable them to operate effectively as facilitators of change, establish islands of success, and thereby to achieve considerable impact on policy-advisors and decision-makers alike. By fostering risky projects, encouraging networking across

[18] Hicks, D., & Wouters, P. et. al (2015). Bibliometrics: The Leiden Manifesto for research metrics. nature.com, 22 April 2015. http://www.nature.com/news/bibliometrics-the-leiden-manifesto-for-research-metrics-1.17351 Accessed 20 January 2017.

disciplinary, institutional, and national borders, and by helping some of the most creative researchers to break new ground, foundations are able to prove that small things matter.

Attempts to characterize what is going on in academia, in science and scholarship as well as in higher education and research, are fraught with metaphors such as borders, boundaries, frontiers, horizons, and thresholds (to name but a few). Professors and students alike seem to be occupied with crossing national borders, overcoming disciplinary boundaries, extending the frontiers of knowledge, widening experimental horizons, meeting epistemological thresholds, opening up windows into the world of new knowledge, and realizing significant advances in their respective domain.

Private foundations should support them in this endeavour. Especially with regard to the crossing of national borders, private foundations can and do play a particular role.

Transgressing Boundaries and Borders

Since the 1960s we have been witnessing an enormous expansion of the higher education and research systems in many parts of the world. In particular, universities have often been considered as a tool for regional development. Overall, the framework conditions for universities and research facilities remain fragmented between and even within countries. However, the increasing demand for truly transnational curricula, dual degrees, etc. as well as for research to be conducted in global perspective have in recent years led to quite some realignments of internationalization policies and their subsequent implementation. By and large, universities now realize that they are at the heart and centre of today's knowledge-driven and knowledge-dependent societies. Their functioning or mal-functioning is not only decisive for the future of the region or nation-state they happen to be located in, but also for the future of mankind.

Foundations can and should foster such internationalisation efforts and transnational cooperations. Anyone getting engaged in international networking activities and cross-border collaborations must be aware of the fact that these usually require long-term commitments on all sides. Instead of thinking in terms of months or years, we have to be prepared to stick to our endeavours at least for a decade, perhaps even two or more. Only then will we be able to see how successful we have been in achieving our goals, in particular with respect to making a difference in sustainable capacity-building, e. g. in and for Sub-Saharan Africa, Central Asia, and the Caucasus.

The Volkswagen Foundation has been focussing on these parts of the world for the past 15 years. Back then we had a clear goal in mind with respect to overcoming at least two of the major pitfalls of postcolonial funding of research projects and fellowships: the asymmetries in defining the research agenda, and the provision of short-term funding (usually for no more than two to three years) which often produced negative side-effects such as speeding up the brain drain from the global South towards the North.

Whilst previous approaches to project-based funding were characterised by researchers and funders from the North being in the driver's seat, and researchers from developing countries being employed as service providers, or at best as researchers following in the footsteps of the dominant PI, we tried to work our way towards symmetric partnerships by getting the African researchers involved early on, i. e. already at the stage of jointly defining the conceptual framework for the respective call for proposals[19]. Furthermore, we saw to it that a sufficient number of African experts participated in the subsequent review process, and that the grantees had full transparency as far as the amount of money was concerned which they were entitled to.

Perhaps, even more important for the credibility of our efforts was that we declared upfront to not only fund projects for three to five years but to be prepared to support the successful Masters and PhD students as postdocs and then as group leaders along their career paths, provided that they continued to work for a higher education and research institution in Africa. As this is still an ongoing activity, it may be too early to ultimately assess its successes and failures. But we can clearly see the positive effects of this long-term commitment with respect to African researchers developing a strong sense of ownership as well as avoiding most of the previous patterns of brain drain.

What is also very encouraging is the readiness of colleagues from various private foundations and public agencies to join us in areas of mutual interest and great concern such as neglected tropical diseases, to better coordinate our efforts, and to get engaged in establishing sustainable global networks of researchers and funders alike.

Establishing and maintaining sustainable transnational partnerships requires a high degree of political and economic as well as institutional stability. In times of budgetary constraints and social deficiencies, let alone in times of terrorist attacks and armed conflicts, they are often among the first ones that fall victim to cuts in public spending. Occasionally even private foundations give in to pressures from local constituencies at home demanding them to give priority to those in need of support at the local or regional level.

At times even the best of intentions can be misinterpreted, and thus lead to a boycott of urgently needed measures to build bridges of research-based activities across borders. The Volkswagen Foundation has a long tradition in building trust across crisis-ridden borders through scientific and scholarly collaboration. Jointly with the Max Planck Society it was the first to fund an exchange of Israeli and German researchers in the early 1960s. In view of the Holocaust, not at all an easy attempt to rebuild trust. Later a Chinese-German cooperation followed, and of course in the 1990s Central and Eastern Europe were ranking high on our agenda. In view of the Ukrainian crisis, and assuming that the Minsk Agreement might pave the way towards peaceful negotiations, we took the decision to launch a call for proposals focussing on trilateral partnerships between Ukrainian, Russian, and German researchers. Once again we wanted to offer opportunities for parts of the scientific and scholarly elites

[19] Cp. Krull, W. (2005). Helping to create symmetric partnerships: a new approach to supporting research in Sub-Saharan Africa. *Tropical Medicine and International Health*, Vol. 10, p. 118-120.

to exchange their views and ideas, and thus help to overcome the repercussions of the armed conflict in Eastern Ukraine. Despite strong reservations on the part of the Ukrainian government, we received more than 200 applications for trilateral projects, workshops, and conferences. Given the size and the scope of the conflict we should not overestimate what a few dozen projects can achieve. But we remain convinced that even in view of such a severe crisis small things matter.

What all of this shows us is that we should strive to develop inter-culturally sensitive concepts and sustainable approaches, but that in times of armed conflicts and civil wars we must also be able to adapt quickly to the changing environment without becoming too depressed about the backlashes and the stubborn resistance we meet. We should never give up our endeavours to create coherent and consistent constellations of transnational collaboration. If needed, we should remind ourselves of the words of Albert Camus who once said: “We must conceive of Sisyphos as a happy man.”

Joining Forces

Cooperating across national borders in our globalized world is no longer just a matter of students and researchers as well as their institutions but more and more also of funding agencies and foundations. If the latter are deeply concerned with realizing their full potential and achieving higher impact, they have no choice but to collaborate transnationally. And experience tells us that these kinds of partnerships (for instance in Sub-Saharan Africa, but also in jointly launched initiatives such as “Europe and Global Challenges”) are to the benefit of getting more high quality applications, of enhancing the career prospects of the researchers and research managers involved, and of achieving better results. Needless to say that these collaborations require a high degree of mutual trust in each other’s intentions and modes of operation. As success breeds success, they often turn into lasting friendships and sustainable institutional ties.

Recently, foundations have also joined forces to promote the funding of basic research. A very prominent example is that of the US based Science Philanthropy Alliance. Members include private donors as well as the Howard Hughes Medical Institute, the Kavli Foundation, the Research Corporation for Science Advancement, and the (British) Wellcome Trust. On its website the Alliance announces: “*The Science Philanthropy Alliance is a community of funders who work together to inspire new, emerging and current philanthropists to dedicate a portion of their philanthropy to basic science. Alliance members act both as champions and advisors to other philanthropists to ensure more private funding is earmarked for the kinds of research initiatives that have led to the scientific, technological and medical breakthroughs that fuel our technology and information-driven economy of the 21st century.*”

This initiative was launched against the background of deep cuts in the US research and development budgets which hit basic science particularly hard. To illustrate: In 1980, the US federal government provided 70% of the funds for basic research, in 2012, its share was only 53 %.

The Alliance members stress the importance of basic science. On their website, they give some famous examples of how basic science can (finally) lead to major breakthroughs with high financial, social or ecological benefits: How a discovery made in the late 1960s sparked the growth of the biotech industry, and how Albert Einstein's work on relativity led to the development of the atomic clock which provides precision time-keeping necessary for the well-functioning of the Global Positioning System (GPS).[20] They invest large sums in funding basic research – but they are also dedicated to informing the public about the importance of basic research and to providing advice for individual philanthropists and foundation staffs on how to support basic research most effectively.

Along similar lines, major European foundations are currently soliciting to what extent they can develop strategic steps and measures to mobilize more private resources to the benefit of higher education and research, last but not least by building more and stronger bridges between civil society and academia. Enhancing transparency and inviting participation in research-oriented deliberations are essential ingredients in fostering a high trust culture of creativity in our universities as well as in publicly financed funding agencies and private foundations devoting themselves to advancing knowledge production in the domains of curiosity-driven as well as use-inspired basic research.

Private Foundations can thus play an important part in fostering (transnational) transformative research. With their activities they can contribute to the crossing of boundaries of scholarly knowledge and borders between nation states. Together they can become a force to be reckoned with when it comes to funding and advocating basic research. As Nobel Prize laureate David Baltimore recently wrote in a *Science* editorial on "The boldness of philanthropists": "*Although private funding cannot match the scale of government funding (the U.S. National Institutes of Health alone is allocated $30 billion per year), it can help fill gaps. Most importantly, it can initiate research thrusts into unproven directions, which generally do not draw government funding*." [21]

THE WAY AHEAD

In our rapidly changing, increasingly globalized world, we are confronted with huge problems ranging from local wars and regional conflicts, mass migration, and terrorist attacks all the way through to earthquakes, pandemics, climate change, and financial instabilities. Many of these issues can only be dealt with in an adequate way through jointly increasing our knowledge base. In this respect transnational cooperation has to be given priority over competition among and between nation states. Universities as strongholds of research and training need to recontextualize themselves in global

---

[20] http://www.sciencephilanthropyalliance.org/wp-content/uploads/2016/09/Science-Philanthropy-Alliance-why-basic-science-factsheet-070516.pdf. Accessed 20 January 2017.

[21] Baltimore, D. (2016). The boldness of philanthropists. *Science*, 21, September 2016. http://science.sciencemag.org/content/early/2016/09/21/science.aak9610. Accessed 20 January 2017.

perspective and pay much more attention to the expectations of other stakeholders, their fears and anxieties as well as their hopes for results and solutions. At the same time the public at large, and politicians in particular, must acknowledge the fact that the search for fundamentally new knowledge operates under highly fragile, risky and uncertain conditions. In many instances the researchers cannot immediately deliver the straightforward answers, forecasts, or solutions we all would like to see so urgently.

The message for higher education and research in the era of globalization seems pretty clear. Without major breakthroughs in basic and strategic research many of our problems – current and future ones – cannot be solved. To achieve more breakthroughs we will have to make a great effort to provide adequate institutional arrangements for establishing new creative milieus, not only in our research institutions but also in our research funding and research policy making organizations. In today's world a country can only be successful in establishing and maintaining a globally competitive knowledge-based society, if it continuously strives to enhance the quality of its research base, to strengthen the structural dynamics of the various research and innovation systems, and to support transformative research in carefully selected areas. Based on mutual trust, each research and funding institution will have to review its own processes of decision-making, priority-setting, and quality assurance, and to respond to the question whether it fosters a culture of creativity which encourages risk-taking and enables its members to leave the beaten tracks of well-established research areas and to break new ground.

In November 2016, in an open letter to President-elect Donald Trump and the 115th Congress entitled "Science and the Public Interest" over 2,000 US scientists, among them 22 Nobel Prize laureates, urged the new Administration to respect scientific integrity and independence. They concluded the letter by stating: "*We will continue to champion efforts that strengthen the role of science in policy making and stand ready to hold accountable any who might seek to undermine it*." [22] Independent research funders will surely be prepared to support them in this endeavor.

References

Andersen, J. Challenges and perspectives in European research funding. Funding Forum. http://www.eua.be/Libraries/funding-forum/EUA_andersen_article_web.pdf?sfvrsn=0. Accessed 20 January 2017.

Friedman, T. L. (2008). Hot, Flat, and Crowded. Why the world needs a green revolution – And how we can renew our global future. Allen Lane, p. 25.

Krull, W. (2004). Towards a Research Policy for the New Europe: Changes and Challenges for Public and Private Funders. *Minerva* 42: 29-39.

Krull, W. (2005). Helping to create symmetric partnerships: a new approach to supporting research in Sub-Saharan Africa. Tropical Medicine and International Health, Vol. 10, p. 118-120

Krull, W. (2011). Research and Responsibility. Reflections on Our Common Future. CEP Europäische Verlagsanstalt.

[22] http://www.ucsusa.org/center-science-and-democracy/promoting-scientific-integrity/open-letter-president-elect-trump#.WIHi9jIzWUk. Accessed 20 January 2017.

Krull, W. (2017). Die vermessene Universität. Ziel, Wunsch und Wirklichkeit. Passagen.

Moïsi, D. (2009). The Geopolitics of Emotion. How Cultures of Fear, Humiliation, and Hope are Re-Shaping the World. Anchor.

National Science Board (2007). Enhancing Support of Transformative Research at the National Science Foundation, National Science Foundation.

Öquist, G., & Benner, M. (2012). Fostering breakthrough research. A comparative study. Kungl. Vetenskapsakademien

Stockhammer, C. (2016). Forschungsförderung. Mehr Mut zum Risiko. *Austria Innovativ* 5-16: 18-19.

www.guardian.com

www.nature.com

www.newyorker.com

www.nobelprize.org

www.sciencemag.org

www.sciencephilanthropyalliance.org

www.spektrum.de

www.ucusa.org

SHORT BIOGRAPHIES

After leading positions at the German Councilof Science and Humanities and at the headquarters of the Max Planck Society WILHELM KRULL became Secretary General of the Volkswagen Foundation in 1996. Besides his activities in science policy as well as in the promotion and funding of research, he is a member of numerous national, foreign and international boards, councils, and committees.

ANTJE TEPPERWIEN joined the Volkswagen Foundation in 2008 as Executive Assistant to the Secretary General. In 2016, she became head of the Foundation's funding team "Persons and Structures". Since 2012, she is a member of the Advisory Board of the German University Association of Advanced Graduate Training (UniWiND/GUAT).

25.

UNIVERSITY EDUCATION: QUO VADIS? THE FUTURE AND RESPONSIBILITIES OF THE UNIVERSITIES FROM THE PERSPECTIVE OF BUSINESS

Peter SCHWAB/Anita GUFLER

ABSTRACT

Megatrends influence companies and universities alike. To be able to succeed over the long term, they both have to adjust continuously.
In the future, companies such as voestalpine will continue to need personnel with a top education, even though many job descriptions will change in the future. These changing jobs increasingly require a constantly rising level of education. For workers with tertiary education, value is placed on a solid understanding of fundamentals, and a methodological approach that, paired with social skills, flows into decision-making and responsibility.
So that in the future people with the best education are produced by the system of higher education, traditional universities and universities of applied sciences should consider a strategic approach like corporate leadership does, and reassess their tasks and their offer. Only in this fashion will institutions of higher education be able to lay the groundwork for the future in a global and digital environment, in which lifelong, self-directed education is a significant aspect of a successful high-technology country.

INTRODUCTION

Universities make an important contribution to the progressive development of our country. For that reason, every euro that is invested in education and research is an investment in the future.

The universities have always been in a state of transformation. Although Humboldt's ideal of education, the formation of a complete personality, is as valid as ever and, one might concede, is even undergoing a renaissance, adaptation to the underlying conditions has taken place again and again. Thus, for example, education reforms were implemented after 1960 and numerous Austrian universities newly founded (e.g., Salzburg, Linz and Klagenfurt). One of the most recent developments included the much-discussed harmonization and internationalization of the European higher-education space (known as the Bologna Process), which reaches far beyond the EU borders and in which 45 countries are participating.

Reforms such as these are necessary and correct to stay abreast of the "megatrends." This can also be denoted the evolutionary process of the university system, which takes place via step-by-step adaptation to current conditions, thereby securing the sustainable existence of the university system and, with it, the success of a country. In a fast-moving world like today's, this continuing process of adaptation is indispensable, because trends such as individualization and internationalization do not stop at the classroom door.

Particularly thanks to digitalization, there is an increasing amount of organized knowledge in the world. Furthermore, education today – in contrast to the past – is imparted via a large number of channels, and not only by institutions that were set up for that task. Education is becoming a personal issue, and lifelong learning is long since more than just a slogan.

Apart from that, though, there is far too much knowledge to be able to know everything. Further: knowledge becomes obsolete much faster now. Thus, for example, a fully trained computer scientist cannot rely on the knowledge gained during formal education but must constantly keep learning new things to be able to keep up with current developments.

We are in the middle of the transformation from an industrial society to a knowledge society. This type of society poses different demands on education. The great importance of research, however, remains undisputed. Thus education in particular is facing a massive change, and the university system must also rise to this challenge and align itself with the new requirements. For these reasons, this article concentrates on the university as an educational institution. Accordingly, in the pages that follow the influential factors and requirements are explicated from the perspective of a business, before subsequently a closer look is taken at the development of the university from the perspective of education.

MEGATRENDS AND THEIR INFLUENCE ON COMPANIES AND UNIVERSITIES

Neither universities nor businesses have yet invented the crystal ball that can look into the future. But what is it that will shape our future? What influences both companies and institutions of higher education?

Above all, it is the megatrends that will determine our future.

These to not have to be foreseen, because they are already reality. They are changing the world. Slowly, but surely. Knowing and recognizing them is important to be able to adapt to them. The following is an attempt to take up a few of them that will have an effect on both companies and the university system.

An overriding driver that was mentioned at the very beginning is the *digital revolution*. It is based on, among others, the invention of the microchip and on Moore's Law, which in a broad and updated sense states that computing power doubles every 18 months (corrected in the meantime from 12 to 18). To better imagine this exponential growth, here is a short story by way of illustration:

The game of chess was invented by a highly intelligent person in the 6th century in what is today India. This person traveled to the capital to present his invention to the emperor, who was so impressed by this game that he would grant him a wish. The inventor wished for rice to be able to feed his family, and proposed using the chessboard to calculate the amount of rice he should receive. “Place one grain of rice on the first square of the game board, two on the second, four on the third, and so forth,” he proposed. The emperor, who was very moved by the inventor’s apparent modesty, overlooked the fact that 63 doublings would produce more than 18 trillion grains, a pile of rice whose size would be greater than Mount Everest (Brynjolfsson, McAfee 2014, p. 60ff.)

While the amounts in the first half of the chessboard are already impressive, but still imaginable, those in the second half achieve sizes that reach beyond the power of our imagination. In the second age of machines this development is taking place far faster than in the first, and the amount of data in the second half of the chessboard is difficult to imagine. This results in an *information explosion* similar to the rice explosion just sketched. As a result, the half-life of knowledge becomes much shorter – a development that both companies and universities must learn to cope with. To know everything is increasingly difficult, and also appears no longer necessary today because information and knowledge are more readily accessible than ever before. This leads, on the one hand, to learning taking place as needed and less in advance, and on the other hand to an enormous gain in the importance of fundamental knowledge, because it is valid both today and in the future despite the rapid pace of change.

Increasingly, not only conversions and transformations are taking place, but also digital disruptions (Kühmayer, 2017). So, for example, the largest taxi company in the world does not own a single taxi (Uber). Similarly, the largest travel lodging company (Airbnb) holds no real estate. Software sellers like Apple and Google do not program the apps themselves, and the most valuable retailer (Alibaba) maintains no inventory.

This development is not stopping at the classroom door. There are already educational institutions with no lecture halls. For example, Udacity communicates knowledge about computer science exclusively online. The platform for learning and continuing education developed out of an experiment at Stanford University. The founder and another professor offered an online course, and 160,000 people from more than 190 countries signed up (Udacity, 2016). Following a similar experience, two additional Stanford professors founded Coursera in 2012. It is a platform that offers courses from the world’s best universities and other educational institutions, and makes them accessible for anyone in the world. In total, 1600 courses from 145 partner institutions are offered. According to the company, more than 22 million people interested in learning have already taken advantage of Coursera’s offerings. These include individual courses (4–6 weeks), specializations (4–6 months) and even master’s programs (1–3 years). Tuition fees for a master’s program range from $15,000 to $25,000. (Coursera, 2016) In addition to Stanford, other world-famous universities are opening their teaching to the World Wide Web. In 2012, under the name edX (analogous to the opening of the TED conferences under the label TEDx) Harvard and MIT founded a platform for online learning for students from around the world. Their group includes approximately 90 extremely renowned universities as well as other non-university institutions. (edX, 2016)

The Khan Academy offers a global classroom for visitors from kindergarten through high school for learning math, biology, chemistry, astronomy and much more. Their offerings include exercises and examples, teaching videos, and a personal dashboard for monitoring learning progress. Khan Academy is a non-profit organization. (Khan Academy, 2016)

From these examples, a clear trend can be seen toward *openness*, which could also be characterized as *connectivism*. This leads to knowledge becoming transparent and flexible. Today it is no longer necessary to fly around the world to be present at a lecture by the best professors and speakers; it is sufficient to enter the right search terms on YouTube (or one of the platforms listed above). Additionally, people share their knowledge voluntarily on Wikipedia, which has as a result become possibly humanity's largest encyclopedia. *Sharing, exchanging, transformation and do-it-yourself* are very much in vogue.

Paradoxically, a societal trend toward *individualization* is also increasingly coming to the fore. As a result, classic normative institutions are losing authority, while at the same time striving for autonomy and self-direction are increasing. That can be seen in a particularly drastic form in the anti-institutional movement of self-educators in the USA, known as "edupunks," who are proponents of a "deschooling society". (Incidentally, this goes back to the expatriate Austrian priest Ivan Illich (Kamenetz, 2010, p. 112).)

Biographies are increasingly becoming multigraphies ("slash careers") in which straight career paths are an exception. The classical phases of education, work and family are blurring. As a result, learning in particular is also taking place outside of the institutional education phase that precedes working life.

Furthermore, a trend toward *self-tracking* is recognizable. Observation has shown that people motivate themselves intrinsically if they can note their own progress with scorecards. This, in turn, is often combined with "*gamification*," in which, for example, awards of points and level upgrades make learning visible and make the process similar to computer games.

Another significant trend, which many businesses have been contending with for years, is *globalization*. Country borders are visibly blurring, and mobility is increasing. This development, which also is not stopping for education, is particularly reflected in the introduction of the European Higher Education Area, as decided in the Bologna Declaration. For higher education, that has made the spectrum of "customers" larger, but it has also increased competition. That forces universities, like companies, to become better.

Finally, *demographic transformation* should be noted, because the global population is becoming on average older, an aspect that must be taken into account by companies and educational institutions.

Which workers will a voestalpine need in the future?

In the future the company will continue to need well-educated employees. This applies both to skilled labor and to employees who have tertiary education.

It is utterly uncontroversial that job descriptions will change in the future. Many future jobs do not yet exist today. Professions that are today described as classic professions will disappear. Banking staff or supermarket cashiers may soon be replaced by digital systems. What will definitely remain in demand is expertise. Not a bank clerk for handling wire transfers, but a skilled credit adviser. And that only as long as the information is not completely available on the internet, which will soon also be the case.

The question arises: What does this mean for a company like voestalpine? What are the characteristics of the ideal employee in the future?

For illustrative purposes we will call this employee Alex. Alex is ambitious, diligent, curious, and solution-oriented. He or she has made a passion into a profession, possesses a breadth of general knowledge, is visionary, engaged, open to the world and yet modest and grateful.

The ideal Alex has either completed an apprenticeship in a skilled trade and then, perhaps through night school and part-time university studies while working, worked their way up the ladder. In the case that Alex has completed university studies, he/she has acquired a bachelor's degree that has imparted solid *understanding of the fundamentals.* Afterwards he/she has acquired a master's degree, alongside regular employment if possible, for further specialization. Alex has in any case the broadest possible education, and ideally also completed a longer internship in another country.

If Alex has studied chemistry, then he or she is someone who is educated about chemistry and not a chemist. Alex has mastered the skill of pursuing numerous questions with a *methodical approach*, thereby solving each problem. Naturally Alex does not know everything, but he or she does know how to attack problems and to come to a solution. What is needed is *decision-making and responsibility*, not just specialist knowledge. This requires *situational knowledge management*. Alex seeks out what is needed to solve a problem, whether that is in the internet, in social networks, or on video platforms. Somewhere in the world, someone has certainly had a similar problem.

Industry already no longer needs the values – obedience paired with memorization – that are still often transmitted by the educational system. Instead, today's employees as much as future employees should be able to ask the right questions. What is needed are *creativity*, in the sense of a spontaneous skill for solving problems, and networked thinking.

Out of all of these, the social skills are particularly important, that is, skills for relating to other people (especially people from other cultures), to themselves, and for cooperation. Although basically one skill or another, especially repetitive tasks, will in the future be replaced by machines, because it is more economical and thus makes sense to do so, certain skills remain in demand, skills that even in the employment market of the future will not be able to be replaced by automated processes.

Especially for people with a tertiary education, it must be expected that they are interculturally experienced, capable of working in teams, and verbally adept. Just as important is the sense of empathy, that is, their ability to put themselves in the position of another. As a result, these skills rise in value, which means that they can be developed into educational goals that are worth pursuing.

In addition, Alex will face the expectation that alongside these social skills lifelong learning goes without saying, because the fast-moving times that digitalization has brought about mean that skills and knowledge must be constantly updated, regardless of what one has formally studied. For this, and in general, there is an expectation of initiative, personal responsibility, along with flexibility and the willingness to change.

Admittedly, for the purposes of illustrations Alex of course originates from a collection of wishes. Some of that is just nice to have. Nevertheless, it serves as an example for defining the tasks of a university of the future.

One thing at a time.

WHAT DOES AN INDUSTRIAL COMPANY EXPECT FROM THE UNIVERSITY OF THE FUTURE?

What does all of the foregoing mean for the universities? What does an ideal university look like from the perspective of an industrial company? We know very well that the following description only depicts partial aspects of the necessary full picture, particularly of a full picture that equally includes the demands of all stakeholders (society, students, business and academia).

It is indisputable that one great challenge for universities is to live up to the demands of tomorrow's knowledge society, and come to terms with the megatrends. To do this, ideally a strategic approach, in the sense of corporate leadership, is necessary.

FUNDAMENTALS OF SUCCESS: VISION, COMMUNICATION AND HR

The vision of an ambitious professional athlete is to make a mark in sporting history. The goal that results from the vision is to win a world championship in a particular discipline.

The same holds true for businesses. They define a vision that leads to several goals that bring the firm closer to the vision that has been articulated.

Why should that not also apply to universities? Just as it is necessary for successful businesses to think about the future in the form of vision and positioning, so entrepreneurial thinking about strategy is also the key to success for educational institutions.

And aren't the world champions of the universities the Nobel laureates?

What characterizes a good *vision*? It is clear, challenging and, above all, inspiring. An excellent example of a stirring vision, including its explanation, was provided by John F. Kennedy many years ago when he declared:

> … We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard; because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one we intend to win …
> (Kennedy, 1962)

A really good vision catapults an institution forward. There is always room at the front. Whoever is at the top sets the tone and the direction; the others follow. It is thus worth to be the first, because that means a lot of freedom. That should also be the standard for our universities: to be or become the first. To do that it is necessary to define their core competences clearly, and subsequently to carefully consider in what realm an institution is aiming to be first in (positioning). The best approach is to find an attractive niche, because attempting to be good at everything leads, in the best case, to mediocrity, and that should not be the goal for our institutions of higher education.

Underlying the vision is the fulfillment of customers' needs, because at the end of the day that is what business is about. But who are a university's customers? Tentatively, one must reformulate the usual term of "customer value" as "stakeholder value," and in this case one can consider the four groups named above as the stakeholders: society, students, business and academia.

As a result and following from those, the corresponding strategies can be derived, upon which measurable goals are determined. Only in this manner is it possible to bring the vision down to earth and make it workable.

That sounds easier than it is; otherwise, not nearly as many companies would fail. Nevertheless, this is an essential process if success is to be made possible at all. The question still arises of how success is defined for a university. This should also be defined, if possible at the national level in the form of a small number of significant key performance indicators (KPIs). These parameters should be able to be drawn on for comparison purposes, and particularly for evaluation, to analyze how a particular vision is being implemented.

Further, it is essential to communicate the vision effectively, along with the (desired) positioning that is derived from the vision. A good *communications plan* and, potentially, building up a (university) brand are necessary to build a commensurate good reputation. In this area, it is a matter of differentiation from the competition, and to build up communication strategically over the long term. Only those who strive to be the best and also talk about it can actually become the best.

One of the main tasks of a CEO is *personnel management*. Carried over to institutions of higher education, that means that this is also one of the main tasks of a rector. Compared with compensation in business, the earnings of professors at institutions of higher education often appear modest. The incentive for good professors to remain at the university instead of going into business or even to applying for better-paid professorship in other countries, is comparatively small. However, it is precisely the best who should be in charge of the education of our rising generation. For that reason, it is particularly worth noting that an adequate and attractive salary is necessary to be able to keep the best of the best professors in Austria. It goes without saying that payment based on performance accompanies time-limited appointments. Quality, and not only in personnel matters, is the highest priority. That is the only way to bring out excellent students and outstanding research results.

That brings us to the next questions: What will the tasks of a university actually be in the future? What should they offer? And what else should be said on the subject?

TASKS, OFFERINGS, AND GENERAL ISSUES

It is the most basic task of universities to transmit *subject-specific fundamental knowledge* (content) and to promote *networked thinking as well as the ability to solve problems methodically* (skills). Equally, it should, as illustrated by the ideal of Alex, also be seen as having the task of developing social skills (socialization) in the students, something that is particularly important in a digitalized future. Kamenetz (2010, p. 83) summarizes this proposition as the bundle of services of a university – content, skills, and socialization – and adds the fourth task of *accreditation*: "you get the diploma so the world can learn about you" (ibid.). Furthermore, it is important to *maintain* students' *curiosity* – because students are at a university voluntarily, their self-motivation and curiosity can be presumed – and offer *opportunities for lifelong learning*. While the first items are a matter of setting up an approach to teaching skills that is interesting and appropriate to the times, the last one requires an expanded view of the target audience of "customers" that suddenly encompasses not just 18- to 25-year-olds but 15- to 80-year-olds. This idea can be extended even further, especially if one turns it toward porousness. Increasing precisely this characteristic is important and correct to improve the overall level of education in the general population as much as possible. Nevertheless, this cannot take place at the cost of quality.

If one reduced the discussion for simplicity's sake to the tasks of research and teaching, without regard to what is being taught, then both are necessary for one to ensure the quality of the other. That is because only constant research makes it possible to incorporate the latest insights into teaching, and only teaching can drive research forward.

Speaking of research, precisely this area illustrates mutually beneficial cooperation with industry, especially in applied research. The company profits from gaining knowledge, because in the ideal case a problem has been solved, or at least a particular topic has been better understood, which can as a consequence contribute to a solution. The university, for its part, profits not only from the financing that is provided by the company but also from the questions that come from "real life" and from cooperation with industrial research. The latter needs university (academic) research, because universities operate on longer time scales and want to come to a fundamental understanding of things. For that reason, fundamental research is important for business, although that often only becomes apparent secondarily, and securing appropriate financing is in the general interest. Furthermore, transfer of knowledge in the direction of business is important so that both sides can develop equally and profit from one another. In this sense, cooperation between industry and the academy should be equally supported by all sides.

Another important task for the university is the *transmission of values*. Namely, it is also the university's task to educate students to, on the one hand, have a fundamental understanding of their subjects as well as skills in its methods, and on the other have the ability to address ethical, moral and social questions.

For the sake of completeness, this discussion must also take up the question of whether universities of applied sciences and traditional universities, which have been casually grouped under the term "university" in this article, have different tasks. Thus it would make sense to continue the separation of their emphases, as originally conceived, into the future. While the universities of applied sciences concentrate on practice-oriented education, which leads to concentrating their research efforts on applied research, universities primarily educate future researchers with significant emphasis on basic research. Of course when all is said and done business needs researchers whose education is practice-oriented as well as those who emphasized basic research. Further, both the graduates of universities of applied sciences as well as those of traditional universities should be absolutely solid on the fundamentals and skilled in their methods. In today's business, people regularly complain that graduates of the universities of applied sciences often lack basic knowledge, while those of traditional universities have studied topics that are distant from any practical application.

Research should at any rate be an important component of all tertiary educational institution, and scholarly work should equally be a basic prerequisite. A return to the respective emphases (basic versus applied) is advisable in this regard. The further conclusion can be drawn: the students who would later like to devote their professional lives to research should mostly attend traditional universities.

In this discussion, one should also not lose sight of the private universities. Here as well, accreditation should guarantee a high level in both key areas in order to live up to the level of quality associated with the term. From the perspective of business, there is nothing against the establishment of the private universities as elite universities that are particularly open to gifted students. Consequently, there is nothing to be said against the corresponding tuition fees – quite the opposite, these are in fact desirable to attract international students, because only things that have a cost have a value (there is no free lunch) – although studies should be also be made possible for poorer people via scholarships that are tied to achievement. It should be added here that this does not mean that only private universities should have the claim to establish themselves as elite universities, which are also not necessarily tied to high tuition.

The famous American universities are role models – and precisely not just for private universities – that enjoy excellent reputations and offer high-quality education. They are characterized not least by a campus that supports teamwork in all concerns. Adequate and up-to-date infrastructure and equipment are prerequisites for success. The wider the range of courses of study that are available on a single campus, the greater the opportunities for bringing about interdisciplinary thinking.

In this context, it is impossible to avoid the topic of limits to access. These make sense for elite universities, where primarily the best of the best should study. But they should definitely also be uniform for universities of applied sciences and traditional universities. Why there are universal admissions exams for the universities of applied sciences and no such test for roughly two-thirds of the traditional universities is incomprehensible, disregarding the limited number of university places. In addition to standardization, the goal should be to make higher education possible for the largest possible number of people. The mathematics of capacity should no longer play a role in the age of digitalization.

Whether there is an entrance examination or not, it is important for all tertiary educational institutions that a bachelor's curriculum should be as thematically diverse as possible. Business expects that graduates of both traditional universities and universities of applied sciences have sufficient understanding of the basic principles of their chosen field of study. It is primarily the task of the bachelor's programs to teach them and consolidate them. The bachelor's education thus requires reduction to what is most important, and particular emphasis should be placed on understanding, and less on the acquisition of encyclopedic knowledge. The latter is no longer contemporary, first because it is going out of date more quickly, and second because the megatrend of digitalization makes so much knowledge readily accessible for looking up.

In contrast to a bachelor's program, the master's programs that follow serve to add depth and specialization. Thus they enable the selective implementation of the fundamentals that were learned for the bachelor's degree. For that reason, it requires at least two disciplines for deeper study, because that is the only way that methodological skills on the one hand and trans-disciplinary knowledge on the other can be facilitated, and deep understanding made possible. To attain these goals, reworking numerous curricula will be necessary.

This reworking will also be made necessary by the demographic transformation that was noted in the introduction, as well as by the shrinking half-life of knowledge brought about by digitalization. Today education never truly ends. The longer people live, the greater the actual need to renew knowledge. At present, however, this learning curve falls noticeably with increasing age (Kühmayer, 2016). In a knowledge society, this should be counteracted, in part by a change in the role of the educational system. Thus the system should not only be oriented toward younger people, but should equally integrate adult education. To create a suitable offering in the tertiary sector as well is, correspondingly, to be understood as a future-oriented task, one for which demographic developments should not be ignored.

What would these structures look like in concrete terms? Professional continuing education keeps getting closer to studies at institutions of higher education, and part-time study while working is certainly a model of success. In the future, there will be demand for intelligent models of education that cleverly combine academic training and continuing education with paid employment. Given the megatrend of individualization, distance and part-time studies will show their value as models, but will also develop further. Whether the first will succeed without any in-person element remains questionable. Because it's generally possible to take care of most office work from anywhere, and yet people still go in to the office every now and then. This is for exchanging, for cooperation, for interaction, for communication; keeping the social system of a company is, despite all of the technical possibilities, an integral part of work. That means that the in-person time during studies remains, to a certain extent, an integral part of education, because based on Maslow's hierarchy of needs, even in the digital age, the university will remain a place where people encounter one another, particularly with regard to university's task as a transmitter of social skills and values. Nevertheless, the accompanying question arises of what is actually taught during the in-person time that is devoted to teaching, particularly because digitalization has made the knowledge accessible to everyone, often free of charge. And although digital resources are often not sufficiently integrated in teaching and lectures, these are nevertheless used by students. Is it still up to date that lectures are there for the purpose of communicating contents, although these could be learned anywhere and at any time through self-study? One could argue that this was also possible in the time before digitalization, with students reading books, but with YouTube – following the trend toward openness – where the grandees of the most honored universities can be found, this has become vastly easier. If teaching is limited to the one-sided transmission of contents, why go to a university? This could be an incentive to consider the in-person time as a time for tutorials, where what was learned prior to class can be discussed, practiced, implemented, and, in certain circumstances, the trend toward gamification – catchword edutainment – taken up.

This unavoidably leads to a reorientation of the culture of education, from one that is shaped by external, authoritarian compulsion to one of knowledge acquisition that is motivated by students' individual interests. In this context, it is always necessary to note that in the field of business it is primarily employees' strengths that are supported and extended, and not their weaknesses that are worked on, under the precondition that sufficient basic knowledge in a particular discipline is present. This approach, however, is not, or only seldom, carried over into our educational system, particularly in compulsory schooling.

The new task of educational systems, beginning in pre-school and ranging through to the university level is thus to create structures in which people who are hungry for knowledge can learn on their own responsibility and, above all, in which they want to learn. Supporting their intrinsic motivation and having contents ready for precisely each situation, that is the new challenge for established institutions of education. In that manner, personal talents can come to the foreground, rather than mass education. Ideally, these talents can be supported and put to use in an interdisciplinary fashion.

The use of the many tools that digitalization has supplied, e.g., open source, exchange on social media, or digital mass collaboration, must become a part of modern tertiary education just like the use of digital textbooks that can immediately react to the latest research results. Similarly, the range of courses that are offered must be expanded to include online courses whose in-person components are used to connect what has been learned.

Further, it must be recognized that increasing mobility, particularly of students, means that education is not an exception to globalization. Thus it can be assumed that students will increasingly attend institutions of higher education in other countries if these have a better reputation than the local ones, especially because the Bologna Accord has swept away many barriers. In this context, it should be noted that is not enough for a university to position itself in relation to the competition within its home country. In fact, the horizon in this regard must reach much further.

As a result, universities in the future, not just because of digitalization but also because of globalization, will increasingly constitute a "one world university," which is characterized by students no longer matriculating at a single university but instead take part in widely varying courses at numerous universities. This fully conforms with the trend toward individualization, and only when it is possible to receive in a degree in a particular discipline by seeking out the best courses from anywhere in the world, only then will globalization have truly arrived in the university system. This development, which the authors see as inevitable, nevertheless requires a completely new arrangement for our system of higher education.

CONCLUSION

Darwin said that the species that best adapts itself to change will be the one that survives. Similarly, the success of our system of higher education will depend on how fast we can modernize it to meet the requirements of the current and future society /stakeholder groups. Within the system of higher education each traditional university or university of applied science is, to a large degree, responsible for organizing itself, with the assistance of fundamental insights of corporate leadership, and thus setting the course for the future in a global and digital environment, all the way to do-it-yourself education, which takes place especially outside of lecture halls and increasingly over the course of a lifetime.

> "In other words, forget about giving the guy a fish, or teaching him how to fish either. Teach him how to teach himself, and he'll always be able to acquire the skills he needs to find food… " (Kamenetz, 2010, p. 134)

Nevertheless, if our universities manage to imbue their students not only with knowledge and methods, but also with rationality, modesty and the courage to think for themselves then, and only then, will the universities be places of scholarship.

REFERENCES

Brynjolfsson E., McAfee A. (2014). *The Second Machine Age*. Plassen Verlag.
Coursera (2016). About. https://about.coursera.org/. Accessed on 15.12.2016.
edX (2016). About. https://www.edx.org/about-us. Accessed on 15.12.2016.
Kamenetz, Anya (2010). *DIY U. Edupunks, Edupreneurs, and the Coming Transformation of Higher Education*. Chelsea Green.

Kennedy, John F. (1962). https://www.youtube.com/watch?v=g25G1M4EXrQ. Accessed on 17.01.2017.

Khan Acadamy (2016). About. https://www.khanacademy.org/about. Accessed on 5.12.2016.

Kühmayer, Franz (2016). http://www.ooe-zukunftsakademie.at/Nachlese_Informelle_Bildung_20160623.pdf. Accessed on 14.2.2017.

Kühmayer, Franz (2017). Die Zukunft der Arbeit. Lecture at IMC FH Krems. 30.1.2017.

Udacity (2016). About us. https://www.udacity.com/us. Accessed on 15.12.2016.

Zukunftsinstitut (2016). Megatrends. http://www.zukunftsinstitut.de/dossier/megatrends/. Accessed on 10.12.2016.

Short Biographies

Dipl.-Ing. Dr. Peter Schwab, MBA is a Member of the Board of Management of voestalpine AG and leads the Metal Forming Division, which has 10,500 employees and annual sales of approximately € 2.2 billion. Previously, he was Head of Research & Development for the voestalpine Group for 12 years. He studied technical physics at the Johannes Kepler University Linz. In addition, he earned a Global Executive MBA at Limak Austrian Business School and completed a course of study at Harvard Business School.

Mag. (FH) Anita Gufler, MBA is responsible for the areas of branding and communications at the Metal Forming Division of voestalpine AG. Before that, she worked in sales for five years at voestalpine Krems. She studied export-oriented management at the IMC University of Applied Sciences Krems and later earned an MBA in communications and leadership at the Technical University of Munich's School of Management.

This report is originally published in German and has been translated into English.

26.

Universities as Hotbeds of Innovation

Klara Sekanina

Abstract

The increasing technological dynamics, and the far-reaching consequences that arise from, pose a challenge for everyone involved in innovation. At universities, the activities in innovation are experiencing a transformation. These institutions are strengthening their networking and opening themselves to innovation processes that are taking place in society. The "third mission" – the range of activities beyond teaching and research – is becoming central and establishing universities as hotbeds of innovation. Important prerequisites for powering innovation are a willingness to take risks and the ability to change perspectives.

Starting position

In current research policy, the maxim that innovation is a key factor in the competitiveness of national economics is well established. Innovation brings competitive advantage for the actors involved – universities, companies, and national economies. Nevertheless, the advance of globalization and digitalization are increasing competitive pressures by, for example, making the markets for goods and services continuously more transparent. The decreasing half-life of knowledge, and the increasing technological dynamics strengthen these trends; product cycles are shortening – at the same time that the variety of options is growing. Technology's dynamic trends are getting stronger. A study from the OECD examines the rising production technologies that will trigger major changes in the next 10 to 15 years. According to the study, these developments offer opportunities in manufacturing and services; however, they also have far-reaching consequences for productivity, the labor market, income distribution, and the environment. Governments are well advised to address the societal challenges that will arise from these developments.[1] In terms of education and research policy, it will be particularly important to continuously adapt to new conditions the instruments and provisions that support innovation.

---

1 http://www.oecd.org/sti/Next-Production-Revolution-OECD-Interim-Report.pdf

OUTLINES OF CURRENT INNOVATION POLICY

Education, research and innovation are fundamental to the prosperity of small, resource-poor national economies. They are forced to invest in high-quality education to ensure future economic success. The universities contribute effectively to innovation and growth with their training and research; they generate and transmit knowledge and skills; they increasingly ensure the use of their research results. Today's universities offer an environment for innovation by providing access to knowledge, talent, space, and, increasingly, financing as well.[2] In the 1990s, with their triple-helix model Ethkowitz *et al.* were the first to take up the concept of an entrepreneurial university. Such a university interacts as the third branch in the creative spiral, alongside business and the public sector, and is a key driver of innovation in the modern knowledge society.[3]

Partnerships and research consortia linking universities and research institutes with business are now firmly established and are actively supported. This support places particular emphasis on aiding, and on the networking activities of, small and medium-sized enterprises (SMEs), because these companies display less pronounced innovation activities when compared to large firms. The mix makes the difference – the research of large multinational corporations as well as SMEs is crucial for regions. Not only are a significant portion of research achievement and employment generated by SMEs– in Austria, 68 percent of employees in the private sector are working at SMEs[4] – but also regions are most successful if they have businesses of various sizes along with a strong system of higher education.[5]

Austria's university landscape comprises 22 public universities and 21 universities of applied sciences; furthermore, there are 12 private universities. A wide variety of external research institutes contribute to the creation and transfer of extensive knowledge through extramural research. Examples of the latter include the Austrian Research Centers, the Austrian Institute of Technology, Joanneum Research and the Christian Doppler Research Association.

Austria's universities of applied sciences sector is comparatively small, measured by its number of students. Whereas in Germany and Switzerland more than 30 percent of all students in higher education are enrolled at universities of applied sciences, in Austria the figure is only about 15 percent. At 19,462 new students in the 2015–16 academic year, roughly 25 percent of higher-education students started at a university of applied sciences. This is in line with the continuous rise of the universities of applied sciences; nevertheless, this is not yet enough to constitute a significant change in the trend. Austria's recently started process of aligning traditional univer-

---

2 For example, http://www.foreurope.eu/fileadmin/documents/pdf/Workingpapers/WWWforEurope_WPS_no071_MS65.pdf

3 Loet Leydesdorff & Henry Etzkowitz, "Emergence of a Triple Helix of University-Industry-Government Relations, Science and Public Policy," *Science and Public Policy* 23 (1996), pp. 279–86.

4 KMU Forschung Austria; http://www.kmuforschung.ac.at/index.php/de/kmu-daten-oenace

5 Agrawal et al.; Why are Some Regions More Innovative than Others? The Role of Firm Size Diversity; NBER Working Paper No. 17793, January 2012

sities and universities of applied sciences ("Future of Higher Education") pursues the goals of clearer profiles, strengthening competitiveness, visibility in the national and international context, as well as strengthening and unburdening the two main sectors of higher education. The growth of the universities of applied sciences, and thus an increase of the share of the total number of students who are enrolled at them, constitutes a significant structural change.[6]

There are many reasons to foster a strong and capable sector of universities of applied sciences, and reduce the burdens on the university system. The training curricula at universities of applied sciences are predominantly complementary. The universities of applied sciences offer training that qualifies people for entry into professional life, and the course of study can also be completed on a part-time basis alongside employment. Accordingly, the training curricula are close to current practice, and the research is fundamentally application-oriented. Further, the close ties of universities of applied sciences to vocational training ensure permeability in the education system.[7]

The prerequisites for extending the sector of universities of applied sciences are, however, the appropriate quality of the education being offered, strongly application-oriented research, the ability to transfer to institutions at traditional universities, and common academic support for young scholars that takes into account the valuable closeness to practice that a career at a university of applied sciences represents.

The state establishes the legal framework for innovation. The public sector is playing an increasingly important role in *supporting basic research*, because companies' time horizons have become too short for long-term investments in basic research, or their research focus has shifted.[8][9] Another reason commonly given for the partial retreat of private business from basic research is that the monopoly rents that were applied to basic research, as was done at Bell Labs or AT&T, have been gradually dismantled since the 1960s. Public research policy thus increasingly determines the research mix; that is, the balance among support for basic research, applied research, and technology transfer activities.

The state and its funding agencies finance basic research at universities, and thus support the long-term creation of a capital market orientation. Push activities also include promoting the founding of companies spun out from universities. Because these start-ups are often active in high-tech fields, they play a particular role in promoting innovation.

In 2011 as part of its strategy on research, technology and innovation, the Austrian government set the goal of increasing *total spending on research* from 1 percent

---

6 https://wissenschaft.bmwfw.gv.at/bmwfw/wissenschaft-hochschulen/zukunft-hochschule/

7 A. Loprieno, E. Menzel, A. Schenker-Wicki, Zur Entwicklung und Dynamisierung der österreichischen Hochschullandschaft – eine Außensicht. http://hochschulplan.at/wp-content/uploads/2012/06/Bericht_ExpertInnen_2011.pdf

8 For example, I. Rafols *et al.*, "Big Pharma, little science? A bibliometric perspective on big pharma's R&D decline"; *Technological Forecasting and Social Change* Volume 81, January 2014, pp. 22–38.

9 https://www.jec.senate.gov/public/_cache/files/29aac456-fce3-4d69-956f-4add06f111c1/rd-report--final-report.pdf

of GDP to 3.76 percent *by 2020*. Implementation has proceeded less ambitiously than planned. Nevertheless, by 2016 a sum of 3.07 percent of GDP was attained. On the whole, however, to reach the goal by 2020 R&D expenditures would have to rise from a current level of € 10.7 billion to approximately € 15 billion.[10] Basic research, in particular, remains underfinanced. Competitive pressure for the acquisition of third-party funding and alternative sources of financing has increased. The odds of securing successful support for research and development have fallen; in parallel, the share of third-party financing at universities has risen, which strengthens this effect further.[11]

An additional factor that increases the financial constraints is sparked by the increasing technological dynamics, because that is also affecting the infrastructure for education and research. It requires investment to be able to keep up with the many new developments, and to enable modernizations or new acquisitions. In sum, financial constraints are increasing and can only be partially offset with alternative sources of financing.

Good education, research, and achievements in innovation are expensive. At the same time *fiscal constraints* are becoming more important. The universities were subject to a far-reaching expansion process. The push toward developing "mass universities" resulted from a social opening and the increased economic demand. Increasing public expenditures on research and development also led to a rise in the number of doctoral candidates.[12] Following years of increases, the higher-education sector in most countries must accustom itself to growth that is proportional to the overall growth of state budgets.

THIRD MISSION ESTABLISHES UNIVERSITIES AS HOTBEDS OF INNOVATION

The "third mission" includes all of the activities and range of services at an university that take place in addition to the core tasks of teaching and research. The portfolio of services and the areas in which they are applied have increased significantly in recent years. The most important aspect of transfer at universities remains the education of a talent pool of highly qualified graduates who ensure rapid diffusion of knowledge in the economy and society. Today's science has brought additional transfer activities to center stage. These include, for example, knowledge and technology transfer, continuing education, children's universities, infrastructure, networks, regional engagement, and interaction with society at large. In European countries, the third mission had and has a strongly *technological aspect*. Cooperation with private business was strengthened, the utilization of patents and licenses was taken into account in performance evaluation, and programs for promoting entrepreneurship and start-ups were

[10] Cf. Hoffmann, K., Janger J. Forschungsquotenziele 2020 – Aktualisierung 2017, Abbildung 4: Finanzierungspfad zur Erreichung des F&E-Quotenziels von 3,76% im Jahr 2020.

[11] Howard, Daniel J., and Frank N. Laird. "The New Normal in Funding University Science." *Issues in Science and Technology* 30, no. 1 (Fall 2013).

[12] See for example, "The Production of PhDs in the United States and Canada." Barry R. Chiswick, Nicholas Larsen, and Paul Piepe. December 2010, IZA DP No. 5367.

established. The focus on technology transfer activities is reflected by the mandates and performance agreements between the public sector and the universities as well as by indicators chosen in the institutions' strategies and development plans.

Social orientation and relevance are the main pillars of the current and future spectrum of activities. Additional perspectives on improving innovation such as non-economic, social challenges are integrated. The transfer of knowledge to business profits from strong links to teaching and research, and leads to mutual inspiration, while transformative science is still nascent.[13]

The third mission contributes to focusing the profiles of universities and supports reputation building. At the same time, the activities of the third mission support the development of local roots of the actors who *per se* operate internationally. An appropriate form of evaluation has not yet been able to keep up with these developments. The indicators that would guide the third mission are as yet missing from performance agreements, and from the development plans. A university's reputation and profile continue to be primarily measured according to its achievements in research. The current system of indicators mainly recognizes research activities. Rankings, third-party funding and comparisons within a discipline motivate people to organize individual and collective efforts principally around research. As a result, however, extended knowledge transfer and transformative science must also be included in the strategies of universities. To honor the accomplishments in this area equally with those in teaching and research, it will be necessary to develop appropriate management tools.

That it is worthwhile to establish the third mission as co-equal with teaching and research can be illustrated by two examples: social entrepreneurship and continuing education. Social innovations and social entrepreneurship expand the space available for sustainable solutions in that "social entrepreneurs" engage in social and ecological areas where good approaches to long-term and sustainable change are lacking. They aim for both financial and social added value ("social returns"). To address social questions with entrepreneurial answers, universities could give the topic more weight and visibility. Networking activities with existing initiatives such as Impact Hub Vienna could be used.

As part of lifelong learning and the desire to expand one's own (professional) horizon, continuing education has established itself as a booming market at universities. Their range of courses in this field often make up a solid source of income, carefully aligned with the market's demand. If the courses are embedded in the universities, that is, if the courses offered are aligned with the institution's core competences in teaching and research, then there is another dimension for the third mission. The universities enters into dialog with the occupational fields, a dialog that can have direct bottom-up effects on teaching and learning, and can complement top-down strategies. Continuing education that rests on the institute's actual core disciplines

[13] Uwe Schneidewind; "Die Third Mission zur First Mission machen?" *Die Hochschule*. 25 (2016) 1, pp. 14–22.

not only strengthens reputation-building, it can also effectively support the formation of an institutional profile and strengthen its innovativeness.

APPROACHES TO ENCOURAGING INNOVATION

WILLINGNESS TO TAKE RISKS

The present system of indicators solves the conflict in goals between the conservative approach to research topics within a discipline, which have a high probability of success, and new approaches in less familiar areas that have greater potential. Researchers play it safe to ensure the funding of their research.

Research in fields outside a discipline or in riskier areas requires financing. The pressure to find third-party financing and the pressure of "publish or perish" have a direct influence on the research topics that get chosen. Individual willingness to take risks, to reckon with negative results or to get through longer dry spells, is sinking. A balanced amount of basic financing not only ensures the continuity of research, it also enables the opening of new areas of research, including research too uncertain to be financed by external funding, due to the conditions and decision-making logic behind these grants.

Research policy and universities must do everything to rewards researchers' willingness to take risks. Policy makers can contribute by including the appropriate performance indicators in their oversight mechanisms, and/or give an appropriate weight to existing indicators. For their part, the universities could use the equal treatment of the third mission in their strategies and the corresponding research portfolios to encourage researchers to dare to work in new fields.

Possible measures include the support of very promising researchers, rather than projects. On the other hand, evaluations should not focus on individuals but rather on entire research groups. That would spread the risk, and increase willingness to take risks.[14] The hurdles for innovative projects could be reduced, particularly by evaluating the innovative content and the willingness to take risks, or by setting up low-threshold spaces for experimentation and instruments. The allocation process can also be key: always asking the same people means always receiving the same answer. Evaluation panels should have a more heterogeneous composition.[15]

A CHANGE IN PERSPECTIVE

Knowledge management and knowledge transfer are essential in the current phase of upheaval not only because of increasing technological dynamics but also because in the near future they will increasingly transcend the confines of sector boundaries.

---

[14] Rzhetsky, A., Foster, J. G., Foster, I. T. & Evans, J. A. "Choosing experiments to accelerate collective discovery." Proc. Natl Acad. Sci. USA 112, 14569–14574 (2015).

[15] http://www.rat-fte.at/tl_files/uploads/Empfehlungen/170309_Empfehlung%20zu%20mehr%20Risiko%20in%20der%20FoFoe.pdf

As noted in the introduction, researchers have a high degree of specialization. As a result, the opportunities and willingness to shift between individual scientific disciplines drops. That has direct consequences for the power to innovate. The willingness and ability to change perspectives must be supported so that in addition to the valuable benefits of insight within individual disciplines, cross-disciplinary research and development can develop.

Interdisciplinary cooperation means friction. Disciplines, organizational units and sectors have differing cultures, codices and processes, and so misunderstandings are inevitable. Support for cross-cutting knowledge contributes significantly to successful cooperation. Universities are in addition more strongly affected by the loss of knowledge because young researchers commonly change jobs after the completion of a joint project. Firmly established liaison persons with experiential knowledge and a solid understanding of processes can keep organizational wheels from spinning.

Experience in private business is valuable, but it is often not beneficial for a purely academic career. In this regard, the universities of applied sciences could make a valuable contribution to education, research and innovation by developing, together with traditional universities, paths of supporting young researchers that are not purely academic in their focus. This would strengthen the universities of applied sciences simultaneously in the formation of their profiles and in their horizontal differentiation.

Researchers are characterized by curiosity, readiness to learn, and stamina. The young entrepreneurs among them also claim as their own a high tolerance for risk and an outstanding entrepreneurial spirit. “Discipline hoppers” are likewise driven by curiosity, coupled with an appetite for risk and the willingness to do without peer recognition in order to build and attain cross-cutting knowledge. Universities have established mechanisms that recognize and promote academic research. If promotional mechanisms also accept individuals with entrepreneurial spirit or cross-cutting knowledge, their own internal logic can be overcome – and innovation can arise.

Incentive structures are increasingly being created for key areas in education, research and infrastructure that are developing structural effects that help overcome fragmentation. In this manner, problems of scale are being solved, critical masses achieved, and systemic approaches enabled.

Innovation arises at the interfaces of the branches, and also at the interfaces of the sectors. The current fiscal conditions, however, mean that at the end of the day researchers shy away from pursuing inter- and/or trans-disciplinary projects or entering into cross-sector cooperation. To further secure the capacity for innovation, the *willingness to take risks* and the *ability to change perspectives* must be rewarded at the level of science policy (framework conditions), at the level of the individual universities (strategy) and in interactions with the talent.

SHORT BIOGRAPHY

KLARA SEKANINA is an expert in higher education, technology transfer and innovation systems. She is active in advising companies, associations, federal authorities and political decision-makers. She is a member of the Austrian Council for Research and Technology Development, the Federal Foundation for the Promotion of the Swiss Economy through Scientific Research and the Impact Hub Zurich. From 2010 to 2014, she served as the executive Director of the CTI, the Swiss Innovation Promotion Agency (CTI). Among other things, she was employee of the ETH Board and Head of Life Sciences for the Ministry of Economic Affairs of the Canton of Zurich. Klara Sekanina studied chemistry and got her PhD in 1994, both at the ETH-Zürich. In 2005 she completed the Executive MBA program at the University of Zurich with Summa cum laude.

This report is originally published in German and has been translated into English.

27.

Open Innovation Hub University: The Vision and Challenge of a Strategic Reorientation

Gertraud Leimüller

Abstract

Universities must reposition themselves in complex and dynamic innovation ecosystems, lest they lose their position as beacons of knowledge generation. This paper examines the vision of transforming them into open innovation hubs, focused on finding solutions to societal challenges and exhibiting a strong absorptive capacity in combination with desorptive capacity and co-creation capabilities. By using the diverse interconnectedness of open innovation hubs, universities can make geographically and contextually distributed knowledge accessible to local and regional innovation stakeholders in a quadruple helix system including civil society (users, user communities and crowds), can elaborate new solutions for social, ecological and economic problems and in turn pass them on to potential users.

The vision of operating as an open innovation hub fundamentally changes a university's license to operate and provides a visible, strong anchoring in the innovation system, while also contributing to the novelty and societal relevance of the scientific knowledge produced by academic research, as well as the further development of teaching. The university becomes a central innovation broker, permanently executing knowledge and technology transfers in high intensity and demonstrating a strong direct competence in providing solutions for society by integrating potential users directly with scientific processes.

The transformation of a university into an open innovation hub has its price, however. It requires the relevant strategic decisions in committees and support for the change through appropriate management and governance instruments, as well as the establishment of a sound open innovation culture among scientists, teachers and students.

Open Innovation Hub University: The Vision und Challenge of a Strategic Reorientation

Universities[1] are not sinking ships that need to be saved from disaster with an emergency rescue mission. They are, historically speaking, one of the great cultural innovations of Europe. Since their emergence in the 11th century, they have been imitated globally as institutional models for the accumulation, generation and dissemination

[1] The term *university* is used in this paper as a metaphor for a large spectrum of diverse institutions of higher education and does not specify a particular type. The vision contains generic elements which can apply to very different types of academic institutions.

of knowledge – a process that continues today. Why, then, should this innovation have reached its limit precisely now, at the beginning of the 21st century?

A model that has evidenced strong resilience against societal and political upheavals in the past undoubtedly has a future; still, there remains the question as to its identity and function. Will it serve as a beacon in a new innovation system characterized by collaboration, diversity and great dynamism, or will it simply be one of many actors and sink under the flood of newly emerging future labs, science centers, hacker and maker spaces, think tanks and do tanks? Will a university degree be able to assert itself as a particular qualification or will it sink under the flood of online and offline educational opportunities?

The strong growth and differentiation of the innovation ecosystem is forcing universities to rejustify themselves and position themselves strategically. In a society in which, in comparison to previous eras, a significantly higher number of different stakeholders is taking part in transformation, renewal and innovation processes, and in which information is constantly flowing in different directions and being newly generated, universities must by definition reinvent themselves. If, in their historical beginnings, they were significant for the accumulation of knowledge, then measured against today's technological capabilities, they have become too slow and limited in their capacities for this task. In order to generate truly new findings, the core task of science, they are in many cases too bureaucratic with structures split up like silos. And for the successful dissemination and translation of knowledge out into the world of applications, the great hope of the 20th century, the engine of knowledge and technology transfer, is too spluttering and weak. Where will the university of the future find its license to operate in the social, political and economic sense?

This essay examines the possibility of a radical evolution of the university into an open innovation hub in dynamic innovation ecosystems – a significant focal point for a multidimensional interaction and relationship network within a complex system of knowledge production and distribution. This approach presumes a quadruple helix model, along with the increasing distribution of innovation-relevant knowledge in a contextual, geographic and functional sense, and it develops a vision which places the university in a very active role in relation to the other actors and stakeholders in the quadruple helix system, up to and including civil society. The future role of universities in the innovation ecosystems could, from an outside perspective, be a very central one, as long as the structural, organizational and cultural opening-up of research, teaching and knowledge transfer in the sense of open innovation succeeds, and the solution of societal problems is understood as the central task. There are significant challenges for established, path-dependent and, in many areas, top-down organizations if they are to seize this opportunity. Both the chances and the challenges will be discussed below, and the requirements for the implementation of this vision will be presented.

Opening up innovation systems and processes

Open innovation

The opening-up of innovation processes, in their various aspects, has been discussed in academia for several decades using various terms, such as user innovation (Von Hippel, 1988 and 2016), collaborative innovation, and distributed innovation. Chesbrough (2003) was the first to use the term *open innovation* and later expanded the original business-oriented definition to one that could apply to organizations in general (Chesbrough & Bogers, 2014): "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model."

Open innovation thus binds together a variety of different methods and practices such as crowdsourcing, the lead-user method, crowd science, and citizen science, which are steadily increasing in practical and innovation-oriented importance through digital technologies, as well as the search and collaboration processes these make possible. The following three characteristics are relevant here:

- Open innovation is focused on generating innovation. This includes also the process of acquiring scientific knowledge. Processes of digital participation or consensus-building, if not involved in the development of new products, services or processes, do not fall under the concept of open innovation.
- Open innovation deliberately crosses organizational, contextual and/or geographical boundaries; that is, knowledge flows across institutions, sectors, disciplines or other geographical spaces. Bridging distance increases the likelihood of generating new kinds of knowledge. The integration of untypical, novel knowledge providers in a targeted, sensible form is thus a clearly recognizable sign of open innovation.
- Open innovation can include financial and/or non-financial exchange mechanisms, thus including the full spectrum of *free revealing*, i.e. disclosing knowledge and renouncing classic intellectual property rights (IPR), including the protection of one's own knowledge through patents. Although open innovation is impossible without a certain sharing of knowledge, as for example in the formulation of a question for the crowd, the term *open* cannot be equated with the free sharing of all knowledge, but clearly includes the possibility that certain participants can use the results exclusively, so long as this has been agreed with other participants. Open innovation thereby presupposes the existence of IPR strategies as well as fairness and transparency in the negotiation of IP issues among the participants. Non-monetary rewards such as appreciation, reputation and access to networks of like-minded people are also extremely relevant in practice.

If external knowledge is brought into an organization, one speaks of *outside-in open innovation*; if the organization's knowledge is transferred out (e.g. through licenses granted to another enterprise), one speaks of *inside-out open innovation*. A mixture of both is referred to as *coupled open innovation*. As the principles and methods are constantly evolving, the European Commission (2106) refers systematically to *Open Innovation 2.0*: open innovation practices embedded in diverse and dynamic network structures.

Closed Innovation	Open Innovation 1.0	Open Innovation 2.0
Dependence on internal innovation	Independence from internal innovation	Interdependence among actors
Commissioning subcontractors	Cross-licensing	Cross-fertilization
Solo	Cluster	Ecosystem
Linear	Linear with leakage	Mash-up
Linear with subcontractors	Triple helix	Quadruple helix
Planning	Validation, pilot projects	Experimentation
Control	Management	Orchestration
Win-lose-game	Win-win game	Win more-win more
Thinking inside the box	Thinking outside the box	No boxes
One organizational unit	One discipline	Interdisciplinarity
Value-creation chain	Value-creation network	Value-creation constellation

Table 1: Characteristics of closed innovation, open innovation 1.0 and 2.0
Source: BMWFW & BMVIT (2016), modified according to Salmelin (2013)

Particular significance is attached to the integration of civil society actors – citizens, users, user crowds and user communities[2] – as they frequently innovate actively themselves (Von Hippel, 2017), and, based on their experiences as users, often found new companies (as so-called user entrepreneurs). Moreover, users possess particularly novel and relevant knowledge requirements and solutions, to which companies, non-profits, academic institutions and the state do not automatically have access unless they cooperate with them in a targeted fashion.

QUADRUPLE HELIX SYSTEMS

Innovation processes proceed not in straight lines but rather in different directions, with numerous feedback loops. They are much more the result of complex, interwoven and less determined co-creation processes. Depending on the topic, it is necessary for different stakeholders and groups of actors to work together. This is reflected in the increasingly open view of innovation systems. Instead of a triple-helix model (Etzkowitz, 2003), with a focus on reciprocal relationships among companies, universities and public administration, innovation policy now refers to the quadruple helix, which incorporates the media- and culture-based public and civil society, including citizens. From this perspective, innovation ecosystems enable innovation bottom-up

2 *Users* are people who use new products, services or processes. They profit directly from the use (unlike producers and merchants, who profit from the sale) and thus have a much higher interest in innovation and improvement in their own field of application. Users can be private citizens, but also companies that want to use innovations. *User communities* are organized groups of users who communicate and interact with one another on the internet on particular themes. *User crowds* are less organized, more like loose collections of users around a topic or task; for example, contributors to an online ideas competition are referred to as a crowd.

as users can play an active role, and feature dynamic, reciprocal relationships and dependencies among participants. These are orchestrated not through a central management role but rather in the form of *distributed leadership*, or shared management roles that change over time.

THE CHALLENGE FOR THE UNIVERSITIES

THE HISTORICAL DEVELOPMENT OF TASKS AND ROLES

"The medieval university looked backwards; it professed to be a storehouse of old knowledge ... The modern university looks forward, and is a factory of new knowledge." This quotation comes not from the 21st century but rather from the end of the 19th century: the English biologist Thomas Henry Huxley (Huxley, 1892) was describing the transformation of universities in the course of industrialization.

This impressively demonstrates the ability of universities to renew themselves over long periods of time. The concept is a living one: the tasks and self-image of universities have changed dramatically over time. Whereas in the Middle Ages universities were seen as accumulators of knowledge, and teachers and students consciously separated themselves from society and dedicated themselves to the divine teachings, from the 19th century onwards, with the advent of systematic scientific research and with the Humboldtian model in Berlin, universities took on an active role in research and education, contributing to the labor requirements of the economy, such as in technical fields (Mowery et al., 2004). From the Second World War, in the age of mass production, as the public sector in many countries increased research budgets, the universities expanded the numbers of students and teachers and took on elements of linearly organized, scalable organizations. Not only knowledge production, but also the practical application of knowledge became more important for stakeholders, as well as the competition among universities and with other institutions of knowledge production.

In a synoptic view, the original model of the metaphysical university (Barnett, 2011) became the research university, which has since become replaced globally by elements of the entrepreneurial university (Etzkowitz et al., 2000), which interacts with local, regional and international economics as well as politics (the triple helix model), while at the same time competing for resources. This does not mean that all historical concepts have been completely abandoned, but rather that the universities today contain a mix of elements from their historical development.

CURRENT RESPONSIBILITIES

As a consequence, today's universities are confronted with an abundance of often-conflicting tasks. An example is the Danish university CBS (Holten-Andersen, 2015), which combines practically all of the relevant objectives:

1. The collection of the knowledge of humankind;
2. The generation of new knowledge (research);
3. The transmission of knowledge to the next generation (teaching);
4. The transmission of knowledge to society (knowledge transfer, dissemination);
5. The generation of economic growth.

Can these five points constitute a clear mission and thus also an identity for the 21st century? For the first objective – the collection of the knowledge of humankind –, this question clearly has to be answered with a "no". If knowledge, whether explicit or implicit, is broadly and unevenly distributed and constantly being updated, then universities alone are no longer able to fulfill this objective. Not even digital technology platforms can create a repository of human knowledge, because they have no access to implicit (tacit) knowledge. Even if one limits the goal to explicit scientific knowledge, publishing houses and platforms long ago took over this task.

With regard to point two (the generation of new knowledge), "Mode 1 knowledge" (Gibbons et al., 1994), which is formal, propositional, logical, disciplined, universal and open, a feature of classic scientific research, needs to be distinguished from "Mode 2 knowledge," which is multi- and transdisciplinary, problem-oriented and often originating outside of academia. This means that a grand expansion of knowledge production has occurred, and that science centers, innovation workshops, and museums, to name three examples, can also claim to offer answers to complex questions. Moreover, one can ask how "new" much of the knowledge publicized by conventional science really is. The incentive to produce genuine "novelty" and thus contribute to radical innovations is actually quite low in most institutions.

The situation is similar for point three, the transmission of knowledge to the next generation. The rapidly expanding availability of educational possibilities, both online and offline, as well as the changes in the working world, prompts the question of whether a university degree will maintain its high value in the future, or whether it will be replaced by new forms of education and career preparation.

For knowledge and technology transfer (point four) the situation is different, however. Here universities have a great deal to offer potential recipients, but the usual mechanisms of knowledge transfer[3] fail in most cases to transfer scientific knowledge to potential users in society and the economy in a form that is actually usable. In 2013 the Brookings Institution found in a study that over the past 20 years only 13 percent of technology transfer offices in US universities could finance themselves (Valdivia, 2013). The vast majority of these bodies had to be financed or subsidized by the universities. This means that although the establishment of the technology transfer system may protect scientific knowledge in the form of patents (including other intellectual property rights), they have scarcely managed to generate any licensing revenues, which was once the great hope of the universities. One can presume that this alarming finding applies to an even greater degree to European universities, as they began later with technology transfer activities, and, with few exceptions, to a smaller extent than US universities.

3 TTOs (Technology Transfer Offices) and TLOs (Technology Licensing Offices).

There remains the question of the contribution to economic growth (point five). Universities are playing a growing role in regional politics, as seen for example in the Smart Specialization Strategy of the European Union (Kempton et al., 2013), as well as in the concepts of the Organization for Economic Cooperation and Development (OECD). Investors choose regions first for the availability of well-educated workers, second for the availability of universities, with which business partnerships can be formed, and third for tax conditions (Siegl, 2017). This also makes clear how important the perceived role of universities is in the economic competitiveness of a location. There are high expectations for these institutions with regard to cooperation and thus also their absorptive and desorptive capacity. Nonetheless, there is a certain tension between the regional expectations and the supra-regional or international orientation that many universities have in their disciplines. The deep specialization of many companies leads inevitably to international networks, which can make it difficult for universities to address local or regional cooperation partners and contribute directly to local or regional growth.

Overall, there is a strong focus – especially in the last two points – on companies and on economic growth, leading to two questions: In an era characterized by complex problems as well as networks of diverse actors, can the role of universities be reduced to that of supporting the economic development? And how does it relate to civil society?

New challenges

If one compares universities with other classic actors in innovation systems, such as companies or public sector institutions, they exhibit several key strengths:

- They are perceived by the public as comparatively neutral institutions.
- They have more time, particularly in comparison with economic actors, for the exploration of radical new topics.
- They are places for discourse and complex reflection. Its results do not need to be immediately exploited.
- They have a higher degree of freedom in organizing work processes (particularly with regard to scientific research) in comparison to other institutions.
- They have, at least theoretically, a high potential for harnessing the constant changing diversity among teachers and students and thus a permanent opportunity for evolution: various subjects and disciplines under one roof as well as heterogeneously collected pools of teachers and students with different biographies and characteristics.

Universities thus offer socially legitimate free spaces for the creation, exploration, experience and dissemination of new knowledge, which few other institutions can demonstrate. The closest are the research museums, which are superior to universities in their intensive access for visitors – and thus the possibility for interaction with society. Still, museums have less opportunity for complex reflection, as their research activity as such is more narrowly defined and connected with the collections and the designs of exhibits.

Building upon these fundamental strengths, four specific developments will now be discussed, which present great challenges for universities and question their previous strategies and patterns of behavior, yet also present options for their future orientation.

SOCIETY EXPECTS UNIVERSITIES TO PROVIDE NOVEL SOLUTIONS TO FUTURE SOCIAL, ECOLOGICAL AND ECONOMIC CHALLENGES

The overall societal impact of activities is becoming increasingly important, as is reflected in the emphasis on RRI (Responsible Research and Innovation) in international and national programs of research and innovation financing. The topics to be worked on here are not only the top-down grand challenges formulated on a European level. Rather, it is more a question of solving future problems at the local, regional and international level. These naturally affect companies as well, but at the same time go far beyond the classic university-industry collaboration so typical for the era of the entrepreneurial university. In the sense of the quadruple helix model, civil society actors, such as non-profit organizations, clubs, online communities and crowds, as well as politics and administration, such as local authorities or social services, all require new solutions and approaches from academia. This means that the scientific process cannot end with a gain in knowledge and thus with an invention, but rather with the translation into solution concepts and their testing and implementation under real-world conditions, including cooperations with potential users. Science is challenged to innovate – not on its own, but in an ecosystem with others.

Given the wide and uneven distribution of knowledge today, the challenge of generating solutions can only be fulfilled if traditional processes of knowledge production are transformed and expanded by using new methods. What is needed are novel problem-solving strategies that can identify, evaluate and sensibly combine relevant knowledge from diverse sources and fields – scientific as well as non-scientific. Since *sticky information* (Von Hippel, 1994) is often involved, this means that new, appropriate formats of cooperation between diverse actors must be found.

Thus, four major questions for universities arise:

- How do they gain access to knowledge about themes and problems relevant to society and how can these be identified and filtered at an early stage?
- How do they create interfaces for interaction with civil society actors and other "unusual suspects" of knowledge production?
- How do they create the preconditions for intense inter- and transdisciplinary work in their own organizations as well as beyond, with other institutions?
- How can they become effective solution providers, whose contributions can actually reach and be utilized by potential users in society?

UNIVERSITIES MUST FIND MECHANISMS TO GENERATE MORE RADICALLY NEW KNOWLEDGE

As leading institutions of knowledge, universities legitimize themselves through their contribution to knowledge production. Since novel knowledge has the potential not only to advance science itself, but also to lead to valuable innovations in society, it is increasingly being debated in research and innovation policy why it is that science, despite a massive global expansion of scientific activity, produces only a limited number of radical new discoveries. This question applies to universities as well.

One of the reasons is that radically new discoveries are systematically undervalued in conventional academic and promotion systems. This is due in particular to a tendency in the evaluation of scientific achievements to rate familiarity higher than novelty (novelty bias). Unorthodox approaches are less likely to be accepted in top journals and have been shown to need significantly more time until they are cited by other authors. This means that in particular classic bibliometric impact indicators, often used as a basis for financing and recruitment decisions, systematically evaluate novelty negatively. For this reason there are attempts to develop alternative indicators for measuring the novelty of a scientific publication, e.g. by unusual combinations of scientific sources like cell biology and materials sciences (Wang, Veugelers & Stephan, 2016).

Through the conscious use of heterogeneous knowledge sources both within and without academia, and with inter- and transdisciplinary work in research teams, findings with a high degree of novelty can be obtained.

This leads to the following questions for the universities:

- How can they better support the emergence and collaboration of trans- and interdisciplinary teams in scientific research?
- How can they support the generation of radically new knowledge through their own incentive systems, thereby compensating for the bias against novelty in the internal and external environment?

An informed, increasingly emancipated civil society demands participation in the processes of knowledge production and utilization

Influenced by the wide availability of and easy access to information, and by their own rising level of education, citizens are calling not only for transparency but also for direct participation in processes of knowledge generation, which goes far beyond the classic communication of knowledge. It is more a question of new forms of role allocation between laypeople (e.g., as citizen scientists) and experts, as well as cooperating at eye level. Laypeople recognize that they have expertise and resources (e.g., as cave explorers or amateur astronomers) that they can contribute to discovery or problem-solving processes, and they want to do so. The inhabitants of the ivory tower are called upon to engage in mechanisms of co-production with interested elements of civil society, as well as to develop new groups, whose knowledge can benefit the process of knowledge acquisition and the generation of novel solutions.

For universities this means that in addition to the questions listed in Section 2.3.1, they have to deal with the following topics:

- What makes a university attractive to civil society?

- Which formats of cooperation and communication with various actors can complement and improve the scientific discovery process, as well as intensifying knowledge transfer to society?

Students expect novel learning environments with flexible blended learning, experimentation, problem-solving and intense social interaction with teachers

Universities are facing the challenge that their students have grown up as digital natives, having learned from an early age to use digital tools and two-way information channels in their daily lives, while simultaneously possessing a high awareness of the selectivity of the labor market. In comparison to previous generations, they are aware of the abundance of available information and critical towards a simple straightforward presentation of knowledge,. They demand more effective forms of learning, in particular experiential learning, which includes the exploration of real contexts (e.g., case-based teaching), problem-solving strategies, entrepreneurial thinking, experimentation and social interaction between teachers and students, as well as among the students themselves. This means that universities must further develop the content as well as didactic methods of instruction, to enable high-quality experiential learning both online and offline, with the involvement of social actors as well.

This leads to the following questions for the universities:

- How can they develop and offer high-quality, hybrid and strongly experience-based learning opportunities?
- How can they motivate students to take part in the design and further development of these learning opportunities?
- How can they offer attractive opportunities for different social actors to participate in learning experiences for the students?

The vision of the university as an open innovation hub

The fundamental concept

Ronald Barnett (2011), who has worked intensively on a new concept of the university, especially in times of extreme complexity and uncertainty, sees the *ecological university* as a reasonable utopia and answer to today's challenges. Other what the name suggests, he is not proposing a thematic focus on ecological topics, but rather sees a close cooperation with the social ecosystem as one of the possibilities for the university of the future. The central characteristic of the *ecological university* is its alterity – its orientation towards the other. Its aim is the responsible further development of society and the resolution of societal problems on a local, regional and global level, by networking with other actors. This is a significant departure from previous concepts, based on a separation of the university from society – particularly in the *metaphysical university* and *research university*, according to Barnett (2011) – or, as in the *entrepreneurial university*, which regards the university as its own agent in competition. Illustration 1 represents the evolutionary development of the four models.

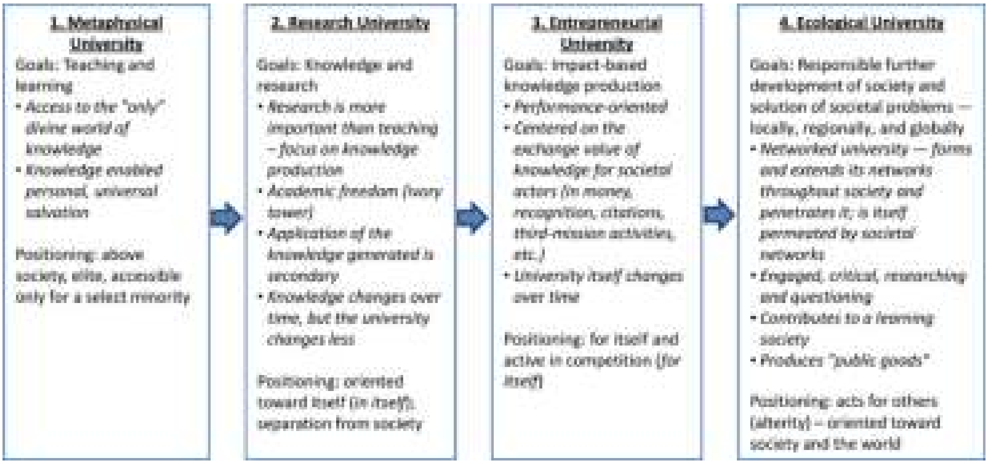


Illustration 1: The evolution of universities towards the vision of the ecological university
Source: own elaboration, 2017, based on Barnett (2011)

The concept of the university as an open innovation hub is based on this vision of an outward-oriented institution closely interlinked with other actors. Because social innovation and evolution form its central mission, the university opens its academic activities as well as its teaching to interaction with external, non-academic actors and builds a specific competence in applying instruments of open innovation. Open innovation is not the thematic content, however, but rather a strategy and tool, making it possible to develop novel solutions in defined thematic contexts in a targeted way.

The university, in the vision of an *open innovation hub*, is thus a transformative institution, which makes geographically, contextually and sectorally distributed knowledge accessible to other actors in a quadruple helix system, deconstructed and combined in new ways to achieve solutions. The term *hub* here is a deliberate choice. The authors *Toivonen & Friederici* (2015) have studied the *innovation hubs* that have arisen in many cities through bottom-up mechanisms and have identified four common features:

- Innovation hubs create communities of cooperation centered around entrepreneurial thinkers
- They attract different members with heterogeneous knowledge
- They support creativity and cooperation in physical and digital spaces
- They are decentralized points of a global entrepreneurship culture

The term *hub* thus characterizes the openness towards local or supraregional, heterogeneous innovation actors that are thematically aligned. The *open innovation hub* university is thus a social space, with physical and/or digital components, which acts locally while at the same time linked with supraregional or global innovation systems, and which actively organizes flows of knowledge among the different contexts: academia, education, the economy, entrepreneurship, civil society, art and culture, as well as investors. The role of boundary spanning is thereby central for this new functionality.

External Characteristics of an Open Innovation Hub University
1. The university is also perceived by *Unusual Suspects* as an open and accessible institution, particularly by civil-society actors, but also by other groups in the system of innovation. Unusual suspects in the context of the university are, particularly, people who are neither researchers nor students.
2. The university invites external actors to actively participate in analog or digital innovation processes, by, for example: – Actively disseminating research results, in forms that are understandable and easily findable, directly to stakeholder groups and others who are potentially interested; – Defining topics for new research and/or innovation projects together with external experts from society (e.g., needs assessments); – Encouraging participation of external stakeholders in research and/or innovation plans; – Making resources (both spatial, such as labs, maker spaces, or co-creation spaces, and digital such as platforms and data banks) available for common use by citizens and/or external institutions.
3. The university is intensively integrated in supra-organizational innovation networks. Within them, the university is a visible hub. These networks generally have a specific thematic focus and can be locally, regionally, or internationally aligned.
4. The university is forward looking; it discusses and initiates, together with the quadruple helix actors of the innovation system, new innovation projects that are both analog and digital.
Internal Characteristics of an Open Innovation Hub University
1. Collaborative leadership in the university and its departments. Top administrators support both openness toward external actors and the sharing of knowledge.
2. The targeted opening of research, teaching and knowledge transfer to societal actors including *Unusual Suspects* is anchored in the university's strategy, vision, and mission.
3. Co-Creation as a working principle: high levels of interdisciplinarity in research groups (including non-academic actors) as well as cross-departmental cooperation on topics that are important to the university.
4. Researchers are skilled at working in and with networks.
5. Researchers are skilled at open innovation methods.
6. Teaching supports the mind-set for open innovation in students and their learning of the appropriate methods.
7. The university includes support units that assist faculty and staff in building up networks, applying the instruments of open innovation, co-creation processes and knowledge transfer across disciplinary and organizational borders.
8. The university offers systems of incentives and rewards for, among other things, generating societal impact (e.g., in local communities, for the solution of social, ecological or economic problems) and cooperation in heterogeneous working groups and/or with *Unusual Suspects*.

Table 2: Characteristics of an open innovation hub university
Source: own elaboration, 2017

As a university develops further into an open innovation hub, it opens up new possibilities for the innovation system and external actors interlinked with it, as well as for the university itself. It can more effectively fulfill its old core services: the advancement of scientific knowledge, teaching, and knowledge and technology transfer.

Open innovation in science

If an university is prepared to focus on the generation of social impact, then it must deal with the transformation of scientific research, which becomes *science with and for society*. Scientists can train and become acquainted with methods in the open innovation hub enabling them to utilize external knowledge during the research process and to integrate external, also non-scientific actors, to achieve ultimately superior, socially relevant research results. This is the concept of *Open Innovation in Science* (OIS), which was developed in Austria by a non-university research institution, the Ludwig Boltzmann Gesellschaft (2017), and which has been used in several successful pilot programs since 2014 under the umbrella of an OIS initiative. Through the application of open innovation principles in science, scientists gain access to knowledge about societal needs which can be the starting points for new scientific questions and thus projects, ideas, contextual knowledge and resources that can support and supplement their scientific work or even make the elaboration of certain scientific problems possible in the first place. If intelligently implemented, open innovation can significantly support novel combinations of knowledge in scientific research and inter- and transdisciplinary cooperation. Through its openness, the open innovation hub also enables young talent to come into early contact with science.

Open innovation in knowledge and technology transfer

In the broadest sense, the transfer of knowledge is a complex exchange of knowledge between scientific research and non-scientific institutions (mostly enterprises) or individuals, which can take very different forms, from the communication of knowledge to the (temporary) acquisition of employees. In a more narrow sense, the practice of technology transfer at universities is implemented in a linear model. The university identifies exploitable knowledge, patents it and sells the license to an existing enterprise or uses it itself in a newly founded spin-off. As already noted, the exploitation rates have until now been quite low. Policy makers and financial institutions nonetheless expect that research findings will be disseminated in the market and society and translated into concrete innovations – in other words, successfully commercialized. When a university acts as an open innovation hub, the knowledge and technology transfer is fundamentally enhanced and is strongly anchored in its core activities. Through the ongoing interaction with non-scientific actors the course can be set early during the scientific discovery process for a successful subsequent exploitation in society and the economy.

At the present time, it is unclear whether, and in which areas, there is potential for practical applications for scientific discoveries, be it in the economy, in public policy or, to name another example, in developmental aid. In an open innovation environment, on the other hand, targeted open innovation search and networking processes take place online and offline throughout the research process, rendering also tacit knowledge accessible and identifying new and unexpected fields of application for scientific knowledge at an early stage. Thus scientists acquire orientation points for a possible later application, which can be taken into account during further research.

A central task of the open innovation hub is thus the creation of discussion, feedback and validation loops for and with science. Experts and potential users from possible fields of application – companies, intermediaries, venture capitalists, as well as potential founders, to name just a few – are available to the scientists to discuss their work. This makes it possible to identify at a very early stage those scientific projects with a high potential for concrete exploitation and significantly increases the chances that scientific discoveries will find an audience and an application in society.

Open innovation in teaching

An open innovation hub can create new learning experiences for students. Co-creation or crowdsourcing processes, for example, can become part of teaching methods, enabling students to gain practical experience with problem-solving processes in heterogeneous constellations of actors. Student teams can learn open innovation search methods and work together in innovation projects at the hub, which can even lead to the founding of businesses or non-profit organizations. Through the hub and its communities, instructors can gain new approaches to knowledge (in the form of question formulations, cases and teaching materials) and to people from different practical contexts, which they can use in their teaching – making new forms of experienced-based learning possible for students both within the hub and outside it.

The three critical functionalities of universities as open innovation hubs

Universities can decide for themselves, in coordination with societal requirements and in their respective contexts, what their focus areas will be as they develop into open innovation hubs. In many cases this transformation does not immediately encompass the entire organization completely, but rather an experimental approach is chosen for one section of the organization, such as a particularly suitable department or a cross-organizational theme. On the basis of these experiences, the open innovation hub can then be scaled up later.

The precondition for this transformation is that universities develop specific structures, capacities and cultural imprints, in order to be able to succeed in the new functionality of the innovation ecosystem. As innovation brokers – organizing *in-bound* and *out-bound* flows of knowledge, building connections with specific, innovation-relevant actors, and linking them, in order to drive the joint development of new solutions – they will have to build capacities on an organizational and individual level and strongly support management and governance mechanisms.

Absorptive capacity

The concept of absorptive capacity, or ACAP (*Cohen & Levinthal, 1990*), which until now has been used primarily by businesses, is nonetheless indispensible for universities that act as open innovation hubs and must be actively developed by them; without

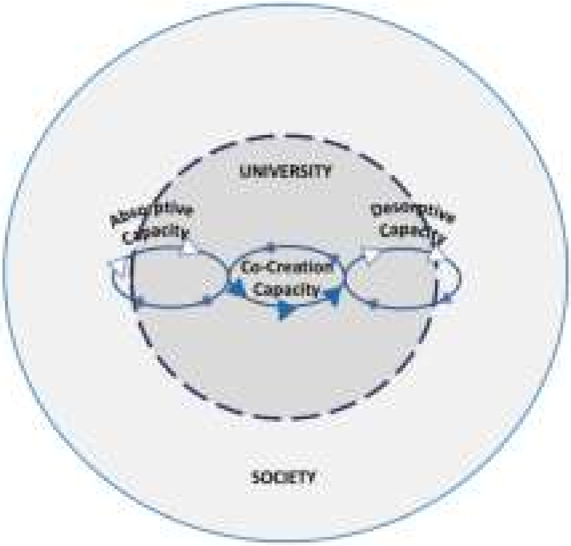


Illustration 2: The basic model of the university as an open innovation hub
Source: own elaboration, 2017

it, they will be unable to access broadly distributed external knowledge and use it for learning processes.

Absorptive capacity is usually understood to be the ability to identify relevant external information, to recognize its potential value, to record it, and to use it for commercial purposes. In the context of universities, the important thing is not only to find the right questions relevant to society, but also to find new solutions (e.g. for scientific problems) and to apply these to their own work. Of course, unlike in companies, it is not merely a question of commercial applications but also of scientific, or general, non-commercial purposes. In this regard, the definition needs to be amended.

Universities can build up absorptive capacity through active networking and exchange activities with scientific and non-scientific actors in relevant subject areas, in particular through exchange mechanisms with *unusual suspects* and through building skills in the application of open innovation search and analysis methods.

Desorptive capacity

In contrast to absorptive capacity, desorptive capacity (DCAP) describes the ability to share knowledge with a potential recipient so that it can be used immediately, or in the near future. In scientific discussion, both abilities are seen as critical cognitive barriers or supporting elements of knowledge transfer (Le Masson et al., 2012).

In the context of universities it is extremely important, in exchanges with potential recipients in society, to get to know their language and their needs and to translate the knowledge accordingly, depending on the target group. In order to be able to contribute significantly to new solutions in society, universities in particular must learn with which societal actors they should collaborate when, to what degree, and with which methods. This requires the experimental development of the novel process of desorptive capacity.

Both capacities, ACAP und DCAP, are strongly influenced by the motivation of all participants to transfer and translate knowledge, themselves to learn and then in turn to apply this new knowledge (Minbaeva et al., 2003). What is important is that they themselves give meaning to the knowledge transfer. The existence of training opportunities, the readiness to learn, expertise in the given subject and previous experiences are key factors for the successful transfer of knowledge.

CO-CREATION CAPACITIES

Because access to tacit, individual knowledge is central to open innovation processes, open innovation hubs must build up the capacity to initiate and moderate collaborative processes among different actors, and in this way to generate new solutions. Cooperation and the creation of the new are the central elements of co-creation processes. These must be structured and controlled. This includes the productive management of heterogeneity, work in distributed management roles, fair and transparent IP strategies, conflict management and the identification of suitable participants, who can contribute information about needs and/or solutions to the innovation process.

CONCLUSIONS

This essay offers universities an attractive vision of the future: by taking on a connecting, mediating and transforming role between society and the systems of knowledge production, they become *open innovation hubs*, and thus central actors in dynamic innovation systems. Intensive networking, new access to knowledge and the application of open innovation principles strengthen them in their scientific performance, teaching and knowledge transfer.

Universities can only take on this role, however, if they transform themselves. Universities are called upon to radically develop their self-understanding and their activities, whereby "radical" refers particularly to the opening up to the outside and the assumption of responsibilities for innovation rather than merely research. This means changing from an organization oriented towards itself and its own competitiveness to an open institution of interaction and social transformation, oriented towards the problems of society. This requires corresponding strategic decisions in the committees of the universities themselves and support for the change through appropriate management and governance instruments. Only when this can be achieved, universities will succeed in building sustainable open innovation cultures and central capacities for a strong future role in innovation ecosystems.

REFERENCES

Barnett, R. (2011): The coming of the ecological university. Oxford Review of Education 37 (4).

Bundesministerium für Wissenschaft, Forschung und Wirtschaft & Bundesministerium für Verkehr, Innovation und Technologie (2016): Open Innovation Strategie für Österreich.

Bozeman, B. (2000): Technology transfer and public policy: a review of research and theory, Research Policy 29.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. Administrative Science Quarterly, 35.

Chesbrough, H. (2003). The logic of open innovation: managing intellectual property. California Management Review 45(3).

Chesbrough, H., & Bogers, M. (2014). Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation. New Frontiers in Open Innovation. Oxford University Press, Oxford.

Dell'Anno, D., & Del Giudice, M. (2015): Absorptive and desorptive capacity of actors within university-industry relations: does technology transfer matter? 4:13.

Etzkowitz, H. et al. (2000): The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. Research Policy 29, 313–330.

Etzkowitz, H. (2003): Innovation in Innovation: The Triple Helix of University-Industry-Government Relations, Social Science Information 42(3).

European Commission (2016): Open innovation 2.0. Yearbook 2016. Online via http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=16072.

Franzoni, C., & Sauermann, H. (2014). Crowd science: The organization of scientific research in open collaborative projects. Research Policy 43(1).

Gibbons, M. et al. (1994). The new production of knowledge: the dynamics of science and research in contemporary societies. Sage Publications, London.

Holten-Andersen, P. (2015). The Role of Universities in Modern Societies. http://www.cbs.dk/en/about-cbs/organisation/senior-management/news/the-role-of-universities-in-modern-societies

Huxley, T. H. (1892). Letter from April 11. http://www.gutenberg.org/dirs/etext04/llth310.txt.

Kempton, L., et al. (2013). Universities and Smart Specialisation. S3 Policy Brief Series No. 03/2013. http://s3platform.jrc.ec.europa.eu/documents/20182/115084/JRC85508_Universities_and_S3.pdf/23a84c8b-233f-4cee-aae9-c89914f23e9c

Le Masson, P., Cogez, P., Felk, Y., & Weil, B. (2012). Revisiting absorptive capacity with a design perspective. International Journal of Knowledge Management Studies, 5, 10–44.

Ludwig Boltzmann Gesellschaft (2017). www.openinnovationinscience.at

Minbaeva et al. (2003). MNC knowledge transfer, subsidiary absorptive capacity and HRM. Journal of international Business Studies 34 (6), 586 – 599.

Mowery, D., Nelson, R., Sampat, B. & Ziedonis, A. (2004). Ivory Tower and Industrial Innovation. Stanford Business Books, Stanford, California.

Siegl, R. (2017): Persönliches Gespräch mit der Autorin betreffend Standortfaktoren für ausländische Unternehmen mit Interesse an einer Ansiedelung in Österreich.

Toivonen, T., & Friederici, N. (2015). Time to Define What a "Hub" Really Is. Stanford Social Innovation Review. April 7. https://ssir.org/articles/entry/time_to_define_what_a_hub_really_is.

Valdivia, W. (2013). University Start-Ups: Critical for Improving Technology Transfer, Center for Technology Innovation at Brookings. https://www.brookings.edu/wp-content/uploads/2016/06/Valdivia_Tech-Transfer_v29_No-Embargo.pdf

Von Hippel, E. (1994): "Sticky Information" and the Locus of Problem Solving: Implications for Innovation. Management Science 40, 4, 429-439.

Von Hippel, E. (2016) and Von Hippel, E. (1988). Sources of Innovation. Oxford University Press. New York.

Wang, J., Veugelers, R., Stephan, P. (2016). Bias against Novelty in Science: A Cautionary Tale for Users of Bibliometric Indicators. NBER Working Paper No. 22180.

Youtie J., & Shapira P. (2008). Building an innovation hub: A case study of the transformation of university roles in regional technological and economic development. Research Policy 37.

SHORT BIOGRAPHY

GERTRAUD LEIMÜLLER is an expert for open innovation and managing director of winnovation, an international research and consulting firm specialized on the development and application of open innovation strategies in corporations, non-profit-organizations and innovation policy environments. She did her studies at the University of Vienna (Dr. rer. nat), at Harvard University (Master in Public Administration) and at the Massachusetts Institute of Technology (MIT). Gertraud Leimüller was intensively involved in the development of Austria's national Open Innovation Strategy in 2016 and supports scientific institutions like Ludwig Boltzmann Gesellschaft as well as leading international corporations such as LEGO Foundation, Philips, Schindler and Fujitsu in conceptualizing and implementing open innovation initiatives.

This report is originally published in German and has been translated into English.

28.

DEVELOPMENT OPPORTUNITIES FOR AUSTRIAN PRIVATE UNIVERSITIES

Karl WÖBER

ABSTRACT

The development of Austrian private universities in recent years has been characterized by steady growth in the number of students and new admissions. Private universities have positioned themselves in a variety of ways among state institutions of higher education and cross-border offerings from international institutions. The following essay illustrates the previous development and current state of this newest sector of the Austrian higher education system. In the course of this study, two development phases are differentiated. In addition, research and teaching performance will be examined and the current accreditation requirements for private universities in Austria, as well as their opportunities for development, will be discussed.

THE DEVELOPMENT OF THE THIRD PILLAR OF THE AUSTRIAN HIGHER EDUCATION SECTOR

PHASE 1: THE FOUNDATION AND INNOVATION PHASE (1999–2012)

In 1999 a federal law (UniAkkG, BGBl 1999/168) was passed allowing the establishment of private universities by institutions or individuals. Austria thus came rather late to the international trend towards the foundation of private higher educational institutions – and without a basis in a strategic development plan – as can be seen from the reports and protocols of parliamentary debates (cf. Report from the Committee for Science and Research (2084) from 9 July 1999, Protocol of the Plenary Session in the National Council from 14 July 1999 and the Protocol of the Debate in the Bundesrat from 29 July 1999). The Report from the Committee for Science and Research on the University Accreditation Act speaks of the need to recognize private universities in Austria, primarily as a reaction to the development of Webster University, accredited in the USA, which has had a campus in Vienna since 1981. Students at Webster University have faced continuous educational, legal and social problems stemming from the fact that the recognition of their degrees was not regulated until 1999. This led to discussions as to the extent to which foreign universities could operate in Austria without fulfilling the legal requirements of state universities. The

University Accreditation Act, passed in 1999 by the Austrian People's Party (ÖVP) and the Social Democratic Party of Austria (SPÖ), created the possibility for private universities to be accredited in Austria.

Since that time, private universities, like Austrian state universities, may offer bachelor's, master's and doctoral programs of study as well as university courses. They are authorized to grant academic degrees to their graduates. Accreditation, carried out by an independent accreditation authority, also has the academic legal effect of providing for the national recognition of examinations and degrees awarded by private universities. Teachers and students at accredited private universities are equated with those at Austrian universities with respect to laws for employing foreigners. In addition, students are granted equal social rights as well as membership in the Austrian Student Union. Since students at private universities initially had the right to vote for student representatives but did not have any institutional representation of their own, the participation in elections was so low that these elections were later discontinued. The allocation of funds from the federal government for the ongoing operation of accredited private universities was precluded, but a contractual agreement to fund particular fields of study remains possible. This possibility has not yet been utilized.

With the creation of high-quality non-governmental study programs, which could not be integrated into state university programs because of their cost, the government intended to open up access to new further education and training opportunities for students (cf. Annexes to the Government Bill for the Accreditation of Educational Institutions as Private Universities). At the same time, standards of quality were defined for the first time for Austrian universities and rules were established for regular evaluation and oversight by the Austrian Accreditation Council (ÖAR). Position, mission and responsibilities, objectives, working principles and profile were defined by the ÖAR in a mission statement. The following objectives were specified (ÖAR 2007, p. 55):

- To open up the university sector to national and international private providers;
- To ensure, support, develop and guarantee the quality of the private university sector;
- To create transparency and comparability in the interest of providers, students and the labor market;
- To support innovative content and forms of university education and training;
- To ensure the comparability of degrees from Austrian private universities with standard international degrees; and
- To implement the targets for the development of the European Higher Education Area for the private university sector.

In the first 12 years under the control of the ÖAR numerous institutions were founded:

- 2000: Private Catholic University Linz (previously: Catholic-Theological Private University Linz);
- 2001: University for Health Sciences, Medical Informatics and Technology;
  Webster Vienna Private University;
  International University Vienna;

IMADEC;
- 2002: PEF Private University of Management Vienna;
- 2003: Paracelsus Medical University;
  TCM Private University Li Shi Zhen;
- 2004: Anton Bruckner Private University for Music, Drama and Dance;
  New Design University;
- 2005: Sigmund Freud University Vienna;
  Music and Arts University of the City of Vienna (previously: Konservatorium Wien);
- 2007: MODUL University Vienna;
  Private University Seeburg Castle (previously: UM Private University of Economics);
- 2009: Danube Private University;
- 2010: European Peace University;
- 2013: Karl Landsteiner University of Health Sciences

On the other hand, many private universities also closed:
- 2003: International University Vienna (revocation of accreditation);
- 2006: IMADEC (expiry of accreditation);
- 2009: TCM Private University Li Shi Zhen (expiry of accreditation);
- 2012: PEF Private University of Management Vienna (termination of academic program);
- 2013: European Peace University (termination of academic program).

The failure of nearly one third of these institutions resulted on the one hand from negative accreditation decisions on the part of the accrediting authorities, and on the other hand from decisions made by the operators, who were unable to fulfill the accreditation requirements they faced. The significance of the private university sector in Austria has remained relatively small, despite a continually increasing number of providers. By the end of the 2011/2012 academic year there were 12 recognized private universities with a total of 7,060 students, making up around 2.1 percent of all students in Austria at that time.

In the period between 1999 and 2007, the significance of quality assurance for institutions of higher education continued to grow and became a major field of action for European higher education policy (cf. Berlin Communiqué 2003; Findings of the Bergen Conference 2005; Recommendation of the European Parliament and of the Council (2006/143/EC) on Further European Cooperation in Quality Assurance in Higher Education; Report on the Bologna Process at the Ministerial Conference in London 2007). In the Berlin Communiqué of 2003, the European Commission on the one hand emphasized the responsibility of the universities for quality processes in accordance with their institutional autonomy, and, on the other hand, committed themselves to a comprehensive national quality assurance system. Thus in the intergovernmental agreement of the XXIII legislative period, the importance of the further development of this system of quality assurance was explicitly addressed, with the goal of an "increase in the quality of university offerings and an improvement in evaluation instruments." This was successfully implemented through the Quality

Assurance Framework Act of 29 July 2011 and became the basis for a common legal framework for the external quality assurance of public universities, universities of applied sciences and private universities. This included an Act on Quality Assurance in Higher Education (HS-QSG) and a new Federal Act on Private Universities (PUG), as well as numerous changes to various other laws (on courses of study at universities of applied sciences, documentation of education, health and medical care, midwives, medical massage and massage therapy). The HS-QSG initiated the establishment of a new, cross-sectoral Agency for Quality Assurance and Accreditation Austria (AQ Austria), which was formed on 1 March 2012 and took over the responsibilities of the Austrian Quality Assurance Agency (AQA), the Austrian Universities of Applied Sciences Council (FHR) and the Austrian Accreditation Council for Private Universities (ÖAR).

In the discussion forum on the new Quality Assurance Framework Act, many private universities expressed their concern that the newly planned AQ Austria would be unable to represent the interests of the sector to the same extent as the ÖAR, which was responsible exclusively for the private university sector. On the basis of this assessment, the Austrian Private University Conference was founded in 2009, and has represented the educational and economic interests of its members with respect to national and international stakeholders since that time.

Phase 2: The positioning phase (2012–2016)

Numerous competition-inhibiting and development-inhibiting conditions meant that the development of many private universities during their foundational phase (1999–2012) did not correspond to the profile of other international private universities. Until the legal reform of university law in 2012, private universities were excluded from important platforms of higher education policy discourse. The exclusion of private universities from federal research support programs, as well, hindered the appropriate development of the sector and led to criticism of its lack of research orientation.

The new legal regulations of 2012 have brought various improvements, however. The merger of the responsibilities of the three previously separate quality assurance agencies has led to a continually increasing awareness of the high requirements for quality at private universities. Since the new law, private universities have been able to participate in publicly advertised research, technology, development and innovation programs of the federal government. With the opening up of access to federal competitive research support programs for private universities, they can fulfill their legal mandate for basic research and their research projects can be measured against those of public institutions. It is often overlooked, however, that newly founded private universities are only able to fulfill the requirements of linking teaching and research, and of promoting young scientific talent on a wide scale, after a certain amount of time has passed (cf. the criticism by the Austrian Science Council of medical university training facilities outside of state medical universities, ÖWR 2016a, pp. 40ff and p. 72 point 19, or of private universities in general, ÖWR 2016b, p. 28).

The importance of private university research and development has steadily increased as a result, with various concrete successes in evidence. At the Institute for Molecular Regenerative Medicine of the Paracelsus Medical University, molecular and cellular therapies for brain and spinal cord regeneration have been developed under the leadership of Prof. Dr. Ludwig Aigner (see www.pmu.ac.at/molekulareregene rativemedizin.html). The results obtained, in particular for age-related neurodegenerative brain illnesses, serve today as a foundation for the development of spinal cord regeneration therapies.

Paracelsus Medical University was able to implement a project in 2012 in Wiener Neustadt that provides for developmental and advisory services in the area of software development for MedAustron, one of the most modern centers for ion therapy and research in Europe (see www.open-radart.org/cms/index.php). Over many years of cooperation, a control system was developed that serves as the heart of the entire facility, and ensures the smooth operation of all the interfaces between the accelerators developed at CERN, three therapy rooms, the research area and all of the instruments that control patient positioning. This cooperation represents the largest single research contract at Paracelsus Medical University to date. In addition to the scientific value of the cooperation, an additional advantage has been generated for the Salzburg region in the form of the transfer of high-end technology for application in conventional radiation therapy with photons from linear accelerators. Robotics developments, in particular, enable the University Hospital Salzburg to offer its patients the best and most efficient therapy options possible.

The Laura Bassi Centre of Expertise “THERAPEP” at the University Clinic for Pediatrics and Adolescent Medicine of the University Hospital of the Paracelsus Medical University Salzburg evaluates the therapeutic potential of small protein molecules – so-called neuropeptides – in the treatment of infectious diseases (see www.w-fforte.at/laura-bassi-centres/therapep.html). The neuropeptide Alarin was first described by THERAPEP director Prof. Barbara Kofler in 2003. A further focus of the center is the massively transformed metabolism of cancer cells, which presents a target for adjuvant dietetic therapy, for which the first promising successes have been achieved in preclinical studies using a ketogenic diet.

SCI-TReCS (Spinal Cord Injury and Tissue Regeneration Center Salzburg), aims to treat patients with spinal cord injuries according to the latest state-of-the-art research and to develop therapies for spinal cord and tissue regeneration in general (see sci-trecs.pmu.ac.at/kliniken-und-institutionen/universitaetsklinik-fuer-blutgruppenserologie-und-transfusionsmedizin). Its foundation in 2011 was made possible by what at the time was the third largest private grant to a university in Europe. Together with other Salzburg University hospitals, a closed supply chain has been developed for patients and for facilities that carry out clinical studies. The basic research and preclinical research follow the principles of Good Manufacturing Practice, enabling the production of newly developed medicines or cellular products in compliance with legal requirements.

In 2015 the Institute for Ecomedicine was launched at Paracelsus Medical University, emerging from the Laboratory for Translational Immunological Research (see www.pmu.ac.at/ecomedicine.html). It engages in application-oriented research and development at the interface of economics, ecology and medicine and thus positions itself as a research and innovation platform for the integration of basic science into regional economic structures. For many years, the laboratory has played an important role in the conception and implementation of the Salzburg region's goal of "the establishment of Salzburg as an alpine health region" by 2020. One of the key objectives of the institute is to carry out independent clinical studies and basic research on the effectiveness of natural health care resources for the prevention and cure of chronic illnesses and lifestyle-related illnesses.

The study and research focus "Economy – Ethics – Society" (WiEGe) is an interdisciplinary research focus at the Catholic Private University Linz, which aims towards a direct discourse between economy, sociology and theology (see www.ku-linz.at/theologie/forschung/wiege/forschungsschwerpunkt). The development and exploitation of the arts at art and music universities is the counterpart to research at scientific universities and takes place at universities dedicated to the performing arts (music, drama, dance), primarily in the context of artistic performances. The Anton Bruckner Private University for Music, Drama and Dance offers on average 500 public events per year (see www.bruckneruni.at/veranstaltungen/aktuelle-veranstaltungen). In addition, both teachers and students contribute to the opening up of the arts at premieres and debut performances at other venues, and appear to the public at presentations of CDs, DVDs and through online publications. The Anton Bruckner University also distinguishes itself in the area of artistic and scientific research (see www.bruckneruni.at/forschung/kunst-und-forschung). Similar achievements can be demonstrated by the Music and Arts University of the City of Vienna (see www.muk.ac.at/veranstaltungen/detailsuche/), which established an independent Institute for Knowledge and Research in 2014 (see www.muk.ac.at/forschung/iwfevents/).

In 2016 the European Research Council awarded the academic staff of MODUL University Vienna a Consolidator Grant of € 2 million for a five-year project to analyze the land-use rights of indigenous peoples, with regard to optimizing the legal administration structure (Project "INCLUDE," Consolidator Grant ERC-2015-CoG). This is the first ERC Grant obtained by an Austrian private university. This is all the more notable as the ERC Grant was won by a team of colleagues who had researched and taught for many years at MODUL University Vienna without the support of the FWF (the Austrian Science Fund). One research focus of the Department of New Medical Technology at the MODUL University Vienna is the automated analysis of online media to provide valuable indicators for the strategic positioning of an organization. In addition, PR and marketing activities are effectively supported with presence and image studies, advertising effectiveness studies, and trend analysis. Several EU and FFG-funded research projects and awards have been previously achieved in this field (see www.modul.ac.at/about/departments/new-media-technology/projects/).

In view of these research achievements – relative to the size of the sector – it is incomprehensible why private universities have not yet been included in the Alliance of Austrian Science Organizations (FWF 2016, p. 23, Annex 07).

Due to increasing challenges in research and rising student numbers, several locations have invested in new infrastructure. The Anton Bruckner University moved into a new building in Linz Urfahr in the summer of 2015. Webster University Vienna moved in the fall of 2014 into a new site at the Palace Wenkheim in Vienna's second district. Also because of rising student numbers, the Private University Seeburg Castle has been using new premises near Wallersee since October 2016. Danube Private University will expand with new construction on the former site of the Krems-Stein train station, with ca. 3000 square meters of lecture halls, auditoriums and office space. Karl Landsteiner University of Health Sciences, which was accredited only in 2013, is moving in 2017 into a new building on the university campus in Krems. Work began on a new building for the medical faculty at Sigmund Freud University Vienna in 2016, with the inauguration expected to take place in 2018. At its meeting on 13 December 2016, the board of AQ Austria discussed the application of JAM MUSIC LAB GmbH for accreditation as a private university and decided to approve it.

The Austrian Private University Conference, which also won a seat and vote in the General Assembly of AQ Austria in 2011 with the Act on Quality Assurance in Higher Education, was admitted to the Austrian University Conference on 15 May 2014, thus enabling a new quality of dialogue with other stakeholders involved in Austrian higher education. This was followed by the admission of students at Austrian private universities to the Austrian National Union of Students (HSG 2014), and the admission of representatives of private universities to the assembly of delegates of the FWF (FTFG 2015) and to the National Qualification Framework (NQF) steering committee (NQR-Act 2016). Students at private universities were allowed access to course completion grants, and the Ars Docendi Award of the BMWFW was revised in an action to support the teaching by employees at all Austrian institutions of higher education.

The numerous positive developments in the period 2012–2016 have ultimately been reflected in student numbers as well. In this period private universities recorded the highest rate of growth, 61.9 percent among the three higher education sectors (universities of applied sciences: 32.4 percent; public universities: 8.8 percent). In the 2015–16 academic year, for the first time, more than 10,000 students were enrolled and a further increase of more than 23 percent was expected in the 2016–17 academic year (see www.statistik-austria.at or www.oepuk.ac.at). In total, only three percent of students graduate from private universities, but if one examines the share of international students in the 2015–16 academic year, they made up 39.4 percent of the students at private universities, significantly more than at universities of applied sciences (16.9 percent) and public universities (28.3 percent). Private universities thus contribute significantly to the Austrian export of know-how.

The financing of private universities

The federal government's ban on funding is an essential feature of private universities in Austria. Exceptions are payments from contracts for the provision of certain teaching and research services by a private university, which the federal government concludes with a private university as a supplement to studies offered by public universities, as well as financial benefits from the federal government within the framework of publicly announced research, technology, development and innovation programs (§ 5 (1) PUG).

The financing ban is interpreted very differently, however and was the reason for a 2016 motion for a parliamentary resolution (cf. Motion for a Resolution 1833/A(E) from 21 September 2016) and public discussions. On the one hand, there are private universities that are financed exclusively by grants. The development opportunities and concerns of these private universities are often very similar to those of public universities. On the other hand, there are private universities that are primarily or exclusively financed by tuition fees and which are very dependent on national and international competitive conditions due to this form of financing. Finally, there are hybrids.

Private universities that receive few or no grants towards teaching are forced to charge relatively high tuition fees. A "strategic politically motivated refusal of accreditation," as called for by the Austrian Science Council (ÖWR 2016b, p. 47), is not justified for this type of private university and would lead to additional distortions of competition. The presumption that a high level of social intermingling can take place only at state institutions of higher education has yet to be proved. The results of the Student Social Survey of 2015 show no significant difference in the social mix at private and state institutions of higher education (Zaussinger et al. 2016).

Accreditation challenges at private universities

A significant criterion distinguishing private universities from state universities is the mandatory accreditation and regular re-accreditation of private universities. The Federal Act on Private Universities (PUG) regulates only the principles for accreditation; the implementation is regulated by the Act on Quality Assurance in Higher Education (HS-QSG) and takes the form of institutional or program accreditation. The regular inspection of adherence to quality standards is carried out by the independent Agency for Quality Assurance and Accreditation Austria (AQ Austria). For this purpose, the board of AQ Austria passed the Private University Accreditation Act (PU-AkkVO), which defines the areas of inspection and methodological procedures. The section § 6 (2) PUG also authorizes AQ Austria to issue a private university annual report directive, to define the essential contents of the annual report presented by private universities to AQ Austria. Furthermore, the Board of AQ Austria determines and communicates explanations and guidelines on the inspection criteria contained in the directive, which on the one hand must be compulsorily fulfilled (e.g. 'Notes on the Interpretation of Inspection Criteria' § 17 (1) lit b PU-AkkVO from 25.5.2016) and on the other hand should serve as guidelines (e.g. Guideline for the Interpretation of § 17 (1) lit o. PU-AkkVO 'Requirements for the Research Environment in Doctoral Studies' from 01.07.2015 or Guideline for the Interpretation of § 14 (5) lit b PU-AkkVO 'Organizational Structure at Private Universities' from 13.12.2016).

The first accreditation, which may not be subject to conditions, pertains both to the institution itself and to the academic programs applied for at that time (HS-QSG § 24 (9)). Approval of accreditation grants legal status as a private university for a period of six years (HS-QSG § 24 (7)). The extension of institutional accreditation, which includes all of the academic programs accredited at that time, requires proof that the accreditation requirements continue to be met and that this can also be expected throughout the next six-year period (HS-QSG § 24 (8)). In contrast to the first accreditation, the extension of the accreditation by the AQ Austria can also come with certain conditions (HS-QSG § 24 (9)). Accreditation of new academic programs can take place at any time, also within the context of a reaccreditation process. The accreditation obligation applies not only to regular studies, but also – only in the private sector, of the three sectors of higher education – to university courses leading to an academic degree. After a period of twelve years of continuous accreditation, a private university can apply for accreditation for a maximum of twelve years (HS-QSG § 24 (10)). An accreditation period of twelve years has not yet been awarded.

Accreditation as a private university, as well as accreditation of academic programs, should occur in line with the requirements of the PUG and with the inspection areas named in HS-QSG § 24 (3-5). The procedural rules are very similar for institutional and program accreditation, and comply with the principles of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG), which supports the international recognition of the courses accredited by AQ Austria.

Representatives of state universities often criticize the fact that the PUG consists of only six paragraphs, which implies a certain lack of governance of private universities (ÖWR 2016b, p. 24; Brünner 2013). This does not sufficiently acknowledge, however, that the PUG is only a framework law, and that many provisions are defined in the HS-QSG, the PU-AkkVO and in subsequent explanations by the Board of AQ Austria. Accreditations of private universities and their courses of study are linked to numerous conditions, which are explained in different places by various regulations, and sometimes go beyond the requirements of state universities.

The statutory body of a private university must be a legal entity based in Austria, which must present a development plan that takes into account the objectives of the educational institution, its priorities and methods in both teaching and research, as well as structural and content-related development planning, equality of men and women, support for women and the development of a quality management system (§ 2 (1) Z 1-2 PUG). This development plan must also include at least two (Bachelor's) courses leading to an academic degree in one or more scientific or artistic disciplines, awarded according to international standards for at least three years of full-time studies (§ 2 (1) Z 4 PUG).

To carry out doctoral studies, private universities must demonstrate an established research environment. Furthermore, the regulation on accreditation requires additional criteria (§ 17 (1) lit o PU-AkkVO), which must be fulfilled at the time of the application. The accreditation of doctoral studies within the context of a first accreditation is thus not possible. The staff responsible for implementing the doctoral studies program must be sufficiently qualified through a *Habilitation* or equivalent qualification in the academic or artistic subject in line with the study profile, demonstrate through publications or third-party projects an involvement in current research activities at the institution relevant to the study profile, and have experience in the supervision of doctoral candidates. Such supervision requires at least a full teaching qualification of the academic or artistic subject. In addition to their teaching and administrative duties, personnel who supervise doctoral candidates must have sufficient capacity for research activity and supervising students. As a guideline, the PU-AkkVO suggests a ratio of a maximum of eight doctoral candidates per professor (§ (1) lit. o, 1st item, 5th sentence PU-AkkVO). A doctoral course at a private university must last a minimum of three years and show intensive contact between the doctoral candidates and the actively researching academic or artistic staff. Opportunities for cooperation both within and without the university should be ensured. Interdisciplinary doctoral studies require academic or artistic staff with sufficient qualifications in all of the relevant subject areas.

For the further clarification of the requirements for the research environment for doctoral courses, the AQ Austria has also provided a guide with an in-depth discussion of the necessary criteria, which should help provide orientation both for private universities during the application process as well as for experts in the assessment process (cf. Guideline for the Interpretation of § 17 (1) lit o. PU-AkkVO 'Requirements for the Research Environment for Doctoral Studies' from 1.7.2015). This document explains in greater detail the important factors in the establishment of a research environment with regard to the qualification of personnel and the critical size and diversity of the research and institutional infrastructure. Private universities that wish to offer a doctoral program must demonstrate the quality of their research output, using cited publications, competitive third-party funding, research prizes and awards. They must demonstrate the communication of their research activities through non-German publications, publications outside of their own field, interdisciplinary and international cooperation and dissemination activities, as well as maintaining clear rules on how much time academic or artistic personnel may spend on research, whereby according to § 97 and § 100 UG 2002, research and teaching should at least be balanced. Private universities wishing to offer a doctoral program must also have institutional incentives for research, e.g. possibilities for research sabbaticals, start-up funding, or funds for conference participation. Researchers should utilize diverse methods and theoretical principles. There should be room for regular exchanges among all active researchers both within and without the course, and offers of academic conferences and guest lectures at the institution, participation in national and international workshops and conferences, summer schools, graduate conferences, etc.

After having fulfilled the aforementioned prerequisites, a private university can obtain accreditation to offer doctoral studies as well as *Habilitation* procedures. The *Habilitation* procedure at a private university is a private legal procedure, which can lead to the same title as that from a public university if the underlying prerequisites for the procedure correspond to those of the state universities and the assigned titles are supplemented with the words "of the private university … " (§ 4 (3) PUG). Vocational and *Habilitation* procedures must be regulated by a publicly available statute (§ 14 (5) lit. c PU-AkkVO).

The requirements for doctoral studies at universities go far beyond those at state universities. In the Universities Act 2002 (BGBl 2002/120 idF) there are no clearly defined requirements for state universities regarding the qualifications of personnel or the critical size and diversity of research or institutional infrastructure. Further provisions on the supervision and assessment of dissertations should be regulated in the statute (§ 82 (1) UG) that each state university issues (§ 19 (1) UG). A guideline for an appropriate supervision procedure, as outlined in § 17 (1) lit. o PU-AkkVO, is not to be found in the Universities Act of 2002.

The organization of private universities should be oriented towards the following principles: the freedom of scholarship and its teaching; the freedom of artistic expression; the transmission of art and its teaching; the connection between research and teaching; and the diversity of academic and artistic theories, methods and opinions (§ 2 (2) PUG). From these principles, teaching and research staff in particular can claim an entitlement to academic participation that must be guaranteed by the private university (Brünner 2013, p. 9). This entitlement is emphasized again in § 4 (1) PUG, by which each private university must issue a statute establishing the procedural guidelines for the fulfillment of its responsibilities. As it states in the second sentence, this statute must respect the principles of institutional autonomy and conform to the international standards for universities.

Further requirements for the organization of private universities and their activities are defined in § 14 (5) lit. b PU-AkkVO. The organizational structures of private universities meet international standards regarding the bodies of the institution, their appointments, and their responsibilities, as expressed in particular in §§ 20-25 UG 2002 (lit. 5) and guarantee their institutional autonomy, as well as the freedom of scholarship and its teaching, the freedom of artistic expression, and the transmission of art and its teaching. The reference to the Universities Act of 2002 is a clear indication of the necessity of academic participation in the form of three committees (university council, rectorate, senate), whose requirements are specified in detail in a manual issued by the AQ Austria (cf. Guideline for the Interpretation of § 14 (5) lit b PU-AkkVO 'Organizational Structure of Private Universities' from 13.12.2016).

In contrast to state universities, whose organizational requirements are regulated definitively in the Universities Act and whose organs are not subject to civil legal and liability obligations, private universities organizing administrative and supervisory structures are torn between the demands of civil legal requirements and higher education regulations. With regard to the very different legal forms (private limited liability company, foundation, association) and objectives of private universities, a schematic transfer of state university governance models to private universities is impractical (cf. Decision of the VPH Members' Meeting "Corporate Governance," Association of Private Higher Education Institutions of Germany from 11 October

2011). Against this background, private institutions of higher education can develop diverse forms of university governance, ranging from a body of strategic management as a general meeting of the legal entity, extended by legally independent bodies, to a separation of responsibilities between the general meeting of the legal entity and the strategic management body. In accordance with the innovation-promoting plurality of the sector, a certain amount of creative leeway in the design of administrative and supervisory structures at a private university makes sense and is thus to be accepted.

The need for a balanced approach between the interests and administrative possibilities of the legal entity and the private university, as well as the protection of the private university, its bodies and members from non-academic outside influences, goes without question. In addition to guaranteeing a voice for students (§ 4 (1) Z 4 PUG, § 14 (5) lit. c PU-AkkVO) in academic affairs, matters of academic self-determination or participation for all employees at the private university need to be regulated. The legal bases which constitute the legal entity (for example, the shareholder agreement, the association statutes, the foundation statutes, the business regulations, etc.) must be in accordance with the general rules or the articles of association of the university. In a similar manner to the right of the self-governing body of a private university to actively participate in decisions taken by the legal entity which concern the security of the university's academic interests, the legal entity must also have the right to a justified veto of academic decisions that jeopardize its economic or strategic interests, as it must also ensure financial resources for personnel, buildings and equipment (§ 2 (1) Z 6 PUG). If the goal is to develop private universities into leading institutions of higher education at both the national and international level, then this will only be achieved with close and coordinated cooperation between the legal entity and the academic decision-makers. Conditions will need to be created for a strategic and operational management system coordinated between owners and academic bodies.

The freedom of private universities to set their own course is a valuable asset and must be encouraged. Accreditation procedures with regard to organization and quality management should be oriented towards the leading international universities in general, and not only towards the Universities Act aimed at state universities in Austria. An accreditation decision by the AQ Austria must be approved by the responsible federal ministry before it becomes valid. This approval can be withheld if the decision is either unlawful or is contrary to "national educational interests" (§ 25 (3) HS-QSG). The accreditation and its regular review places high demands on private universities, as demonstrated by a high rate of rejected project applicants and by examples in which accreditations are revoked, or academic programs or private universities are forced to cease operations. However, the quality of private universities results not only from the accreditation regulations in Austria. To an equally high extent, the students' expectations for quality in research and teaching are important for the standards of quality, particularly at those private universities which are financed chiefly by tuition fees. As a consequence, private universities that are funded chiefly by tuition fees cannot afford to neglect quality assurance.

THE CHALLENGES FOR THE PRIVATE UNIVERSITY SECTOR

Private universities are an indispensible part of the Austrian higher education system. They complement or offer alternatives to the state higher education sector. Although their quantitative significance is still relatively low, the development of private universities has been characterized by strong expansion in recent years. As in Germany (Buschle and Haide 2016), this development has been driven by the general trend towards academic credentials and the scarcity of resources in the other higher education sectors. The many possibilities still available for reshaping the laws and directives for private universities can serve the high-quality development of the entire higher education space in Austria. The Austrian Private University Conference, for example, advocates guidelines in the areas of supervisory relationships, teaching loads, and recognition and credit transfer policies, taking into account the sectoral differences and objectives of universities and universities of applied sciences (see "Positions of the Austrian Private University Conference," www.oepuk.ac.at).

Private universities do not currently have the opportunity to offer appropriate courses to accommodate the strong demand for highly career-oriented studies. Until a law on private universities of applied sciences is established in Austria, an amendment of the PUG into a Federal Act on Private Institutions of Higher Education (PHG), as suggested by the Science Council (ÖWR 2016b, p. 46), could provide a possible solution. However, the prerequisite would be that the model of the private university not be called into question, and that the same (simpler) accreditation requirements as for state-funded universities of applied sciences would be applied for science-oriented practical and professional studies at private universities or institutions of higher education. In particular, the directive that at least 50 percent of the teaching volume be covered by academic or artistic staff, who in turn are employed at least 50 percent of the time by the private university (§ 14 (5) lit. h PU-AkkVO) would have to be amended in the context of a Federal Act on Private Institutions of Higher Education.

A Federal Act on Private Institutions of Higher Education should in no way call into question the differentiation of the academic system into subsystems. A university of applied sciences should offer practical and career-oriented training, in which the teaching is oriented towards the short- and medium-term requirements of society. A university should fulfill its academic requirement in research and teaching, and have the freedom and opportunity to deal with questions for which no concrete need (yet) exists. There are both national and international examples, however, that institutions of higher education can, under particular conditions, change their basic objectives and their type of institution. Thus in Austria many state universities were initially founded as a *Hochschule* (a generic term for an institution of higher education) – such as the former *Hochschule* for World Trade, later the Vienna University of Economics and Business; the former *Hochschule* for Agriculture, later the University of Natural Resources and Life Sciences, Vienna; and the renaming of many art academies and *Hochschulen* for art into Universities of Art.

Competition-distorting developments, which result from the different treatment of the various higher education sectors, have high relevance for the question of requirements for future quality assurance in higher education institutions in Austria (Wöber 2014). A particularly tense situation arises when state universities charge for programs of study in line with the possibilities regulated by § 91 (1-6) UG 2002, and in doing so withdraw themselves from the controlling and managing influence of the accreditation authorities and enter into direct competition with the private universities. This is particularly the case for university courses that lead to an academic degree. There are similar cases with universities of applied sciences and the Danube University Krems, when they offer fee-based courses with the same degree titles as the regular courses. The difference lies in the fact that state universities are not subject to the same quality assurance requirements as private universities in this area. Here the boundary often becomes blurred between state education, federal financing and private sector involvement with state funding. The obvious approach would be to subject all fee-based courses at state universities and state-funded universities of applied sciences to the same strict evaluation guidelines as private universities.

Many private universities are also in increasing competition with cross-border educational offerings of international institutions, as well as with Austrian educational institutions offering diverse post-secondary fee-based programs of study in cooperation with foreign universities. Because of Austria's legally unregulated policy for recognizing degrees and credits from these institutions, there is an unprecedented "tertiarization" of diplomas from post-secondary education providers. This is complicated by the fact that cooperation with educational institutions in other EU countries is not subject to Austrian accreditation law. This leads to the fact that well-respected foreign educational institutions often ignore the high quality standards of their own country when cooperating with Austrian education providers. The registration of courses offered by foreign educational institutions in Austria, as provided for in § 27 HS-QSG, is based only on the presentation of complete documents, but not on a substantive review of their contents, as for private universities. The offerings of foreign providers are thus practically legitimized without a determination of whether they fulfill Austrian higher education standards. For the activities of Austrian private universities in foreign countries, on the other hand, the same strict legal provisions and procedures apply as within the country, in addition to any local regulations.

The fact that the registration of cross-border studies is not connected with any determination of equivalency with Austrian studies and their relevant academic degrees, is unfortunately little known by the public and leads to numerous misunderstandings and disappointments among graduates of these educational institutions – particularly when they wish to further their studies at another Austrian higher education institution. A vital step in quality assurance for higher education would thus be to provide for not only a formal check but also a substantive examination of the contents of the programs of study registered under § 27 HS-QSG according to the provisions for private universities and universities of applied sciences.

REFERENCES

Brünner Georg (2013). “Die innere Organisation einer Privatuniversität. Ein Vorschlag”. In: Werner Hauser, Christian Schweighofer (eds.), Neue Hochschulzeitung, Volume 1, pp. 9-11.

Buschle Nicole, Haider Carsten (2016). Private Hochschulen in Deutschland. Wiesbaden: Statistisches Bundesamt. Available at: www.destatis.de.

FWF (2016). Strategische Vorhaben 2017-2020. Vienna: Der Wissenschaftsfonds.

ÖAR (2007). Externe Evaluierung des Akkreditierungsrates. Selbstevaluierungsbericht, 11 May 2007. Vienna: ÖAR.

ÖWR (2016a). Klinische Forschung in Österreich. Stellungnahme und Empfehlungen. Vienna: Österreichischer Wissenschaftsrat.

ÖWR (2016b). Privatuniversitäten in Österreich. Stellungnahme und Empfehlungen. Vienna: Österreichischer Wissenschaftsrat.

Wöber Karl (2014). “Qualitätssicherung and Hochschulen. Anforderungen an die Qualitätssicherung und ihre Wirkungen”. In: AQ Austria (eds.) Beiträge zur 1. AQ Austria Jahrestagung 2013, Vienna: AQ Austria, pp. 119-125.

Zaussinger Sarah, Unger Martin, Thaler Bianca, Dibiasi Anna, Grabher Angelika, Terzieva Berta, Litofcenko Julia, Binder David, Brenner Julia, Stjepanovic Sara, Mathä Patrick, Kulhanek Andrea (2016). Studierenden-Sozialerhebung 2015. Bericht zur sozialen Lage der Studierende. Band 1: Hochschulzugang und StudienanfängerInnen, Vienna: IHS.

SHORT BIOGRAPHY

Univ.-Prof. Mag. Dr. KARL WÖBER is the founding rector of the private MODUL University Vienna and chairman of the Austrian Private University Conference. After completing his studies of business administration, he worked at the Institute for Tourism and Leisure Studies at the Vienna University of Economics and Business from 1988 to 2007. Following several research trips to the USA, he completed his *Habilitation* in 2000 and received the *venia docendi* in business administration.

This report is originally published in German and has been translated into English.

29.

Austrian Universities of Applied Sciences – Different but Equally Valued Institutions of Higher Education

Helmut HOLZINGER

Abstract

The founding of the universities of applied sciences sector in 1994 represents a first important step toward differentiation in the Austrian system of higher education. Universities of applied sciences are equal to traditional universities, but they have a differentiated function. In the realm of teaching, they offer courses of study that are related to professional fields; their research focus is on applied knowledge. Compared with Germany and Switzerland, the universities of applied sciences sector is, at present, small. It is, however, likely to grow. Students attain their degrees at universities of applied sciences faster than at traditional universities, and the drop-out rate is lower. Universities of applied sciences make an important contribution to the permeability of the system of higher education. They attract people without the classic pre-university qualification, known in Austria as the Matura, as well as people who are already employed. Graduates of universities of applied sciences are "job ready" – as attested by the low rates of graduate unemployment, and their rapid entry into the work force after the conclusion of their studies.

Goals of this paper

With the creation of an independent sector of universities of applied sciences in 1994 in addition to the existing universities, the Austrian parliament took an important first step toward differentiation in Austria's system of higher education. Universities of applied sciences differ in numerous dimensions from old-line universities, as well as from other, newer institutions within Austria's higher-education sector such as private universities. All types of institutions of higher education are fundamentally equal. That is made clear through the degrees that they grant. The types, however, differ in institutional, programmatic and functional aspects (cf. Brünner, Königsberger, 2013, p. 88).

The following goals are pursued in this paper: Given the current positioning of universities of applied sciences, the differences from and commonalities with traditional public universities and private universities are presented. The status quo is illustrated with reference to the scale of the sector of higher education in comparison with other German-speaking countries and the currently available numbers for universities of applied sciences and traditional universities. To illustrate the functional differentiation between universities of applied sciences and traditional universities, various parameters are examined along their working dimensions. Representative scenarios of development presented by experts, and theses about the positioning of universities of applied sciences within the Austrian system of higher education provide a medium-term perspective from the author's point of view.

CURRENT POSITIONING OF UNIVERSITIES OF APPLIED SCIENCES WITHIN THE AUSTRIAN SYSTEM OF HIGHER EDUCATION

In the following text, the positioning of the universities of applied sciences within the Austrian system of higher education as compared with traditional public universities and with private universities is discussed. Teachers' colleges and the Danube University Krems have been consciously left out of consideration. The reason for this choice is that both types of institutions of higher education have particular characteristics that are very specifically set by law.

Teachers' colleges are institutions for the professional education, continuing education, and in-service training of teachers and additional pedagogical professional groups (Hochschulgesetz [Law on Higher Education] 2005 § 8 and 9).

Danube University Krems is, by law, set up as a university for continuing education. It develops and implements university courses of study and can, after external accreditation, offer doctoral study for its own junior academics, who earn the degree "Doctor of Philosophy" upon completion of their studies (cf. DUK-Gesetz [Danube University Krems Law] 2004).

GOALS AND GOVERNING PRINCIPLES

An analysis of the goals and governing principles, as well as the regulations that derive from them, that parliament has formulated and enacted for universities of applied sciences, public universities, and private universities shows that there are both common elements and contrasting differences.

COMMON ELEMENTS

The common elements of the three types of institutions of higher education concern their core competencies, namely teaching and research (cf. FHStG [Law on Studies at Universities of Applied Sciences], Universitätsgesetz [UG, Law on Universities] 2002, and Privatuniversitätengesetz [PUG, Law on Private Universities]). The degrees from all three types of institutions conform to the Bologna Process for the creation of a unified European Higher Education Area. As institutions of higher education, they are required to respect the fundamental right of "freedom of research and teaching" that is anchored in Article 17, Paragraph 1 of Austria's Basic Law. The degrees from all three types of institutions are classified in the National Qualification Ranking (NQR) at levels 6 to 8. The degree-granting privileges of the universities of applied sciences are already significantly differentiated from those of traditional public universities and private universities in that they are not permitted to award doctoral degrees.

A further common aspect is the possibility of creating and implementing – in addition to the regular courses of study that lead to bachelor's, master's and doctoral degrees – courses of study that are financed by student fees, and in the case of universities of applied sciences, courses of continuing education. (cf. UG 2002 § 56, FHStG § 9 and PUG § 3).

Differences specific to each type of institution

Parliament set no specific requirements for the tasks of private universities. For that reason, it is necessary to assume that the tasks of private universities essentially correspond with the tasks of traditional public universities. The tasks of public universities, as set out in UG 2002, are extensive. They range from "development of knowledge (research and teaching), development and improvement of the arts as well as teaching the arts" (UG 2002 § 3 Paragraph 1) through "qualifying [students] for professional activities that require the application of academic knowledge and methods" (UG 2002 § 3 Paragraph 3) to "education and support of the next generation of academics and artists" (UG 2002 § 3 Paragraph 4).

The goals for universities of applied sciences were already set specifically by parliament at their founding in 1994. In general, the overall goal was formulated as "offering courses of study at the university level that serve to proved an academically grounded professional education" (FHStG § 3 Paragraph 1). In this formulation, education at a university level, the close relation to professional work, and the requirement for permeability in the education system are all central to their parameters (FHStG § 3 Paragraph 1 Parts 1–3). To ensure these fundamentals, the teaching and research personnel are required to undertake "applied research and development work" (FHStG § 8 Paragraph 3 Part 4).

Apprentice programs may be offered at universities of applied sciences, with an important restriction. Universities of applied sciences may only offer "apprentice programs for further education in the fields of study where they also have accredited university-level programs of study" (FHStG § 9 Paragraph 1).

Additional specifications for the universities of applied sciences can be deduced in particular from the goal of supporting the permeability of the educational system. They may set up "target-group specific" courses of study. The prerequisite for these is that the academic and pedagogical approach requires a defined working experience that thus makes it possible to define a corresponding target group as potential students. In this case, the course of study may be shortened by up to two semesters (60 ECTS) (FHStG § 4 Paragraph 4 together with § 3 Paragraph 2).

An additional characteristic that is unique to the universities of applied sciences is the intake of students without a *Matura* or a university entrance examination via recognition of relevant professional qualifications (cf. FHStG § 4 Paragraph 7). Included in this category are not only persons who have completed an apprenticeship or who have a diploma from a vocational secondary school, but also persons who have acquired skills in a non-formal or informal way (AQ-Austria 2016, p. 30ff.).

In summary, that means that not only people with a classic *Matura* or an examination for entry into a profession but also other people can be admitted to courses of study at a university of applied sciences. The prerequisite is, however, that they possess relevant professional qualifications. With regard to the means by which they were achieved, no parameters were set. In this context, the leadership of the program of study has considerable leeway for recognizing qualifications.

Two steps in admissions should be distinguished in the sector of universities of applied sciences. In addition to the admissions requirements detailed above, completion of an admissions process is usually required. Because there is limited space in the universities, the process must always be organized if the number of applicants exceeds the number of spaces available in the first semester of the program. For universities of applied sciences, this is regularly the case.

Parliament found a means for special consideration in the admissions process for persons without a *Matura* or a university entrance examination. Each university of applied sciences must undertake a division of the groups of applicants to every course of study according to their previous education. The minimal requirement is that at least one group must be made up of applicants relevant work qualifications. "It should be provided for that the admissions slots will be divided proportionally among the applicant groups" (FHStG § 11 Paragraph 1). If, for example, 12 percent of applicants for a course of study persons with relevant work qualifications, then 12 percent of admissions should come from this group. This thus prevents the formation of an absolute ranking list of all applicants, regardless of their previous education.

A further difference that is specific to universities of applied sciences is derive from the task of offering courses of study at the university level with direct professional relevance. At traditional public universities and at private universities the development of new course offerings follows the lines of scholarly disciplines. At universities of applied sciences, the logic of the process of developing each new course of study begins with the definition of a professional field and a profile for the qualification. Parliament gave no detailed specifications for the development of new course offerings at traditional public universities and private universities. It did for the universities of applied sciences. The development team that is set up in practice for universities of applied sciences must be comprised of people who are academically recognized, as a rule by means of a post-doctoral achievement known as a *Habilitation*, and representatives of the professional field (FHStG § 8 Paragraph 4).

COURSES OF STUDY

The Law on Universities states that universities may offer courses of study leading to bachelor's, master's, *Diplom* and doctoral degrees. New courses of study must, however, conform to the architecture set up by the Bologna Process. That means that essentially no new *Diplom* courses of study can be set up (UG 2002 § 54). Universities also have the right to set up other university-level courses of study (UG 2002 § 56), as well as pre-university courses of study in preparation for artistic studies at the university level (UG 2002 § 57).

Private universities have the right to set up courses of degree study analogous to those at traditional public universities. That also holds true for other university-level courses of study (PUG § 3).

In the course offerings of universities of applied sciences, there is a significant difference from traditional public universities and from private universities in the area of doctoral degrees. Because of a lack of legal authority, they are not allowed to offer doctoral courses of studies. Parliament only allows them to develop and carry out courses of study that lead to bachelor's, master's and *Diplom* degrees. This is worth noting insofar as the Danube University Krems, as a public continuing-education university, is not allowed to offer bachelor's or master's courses of study and only other university-level programs, but is however allowed to offer doctoral programs if they are externally accredited.

As noted above, universities of applied sciences are allowed to offer apprentice programs in addition to their regular courses of study that lead to bachelor's and master's degrees, or *Diplom* degrees such as *Magister/Magistra* (FH) or *Diplom* Engineer (FH) (cf. FHStG § 6 and § 9).

In evaluating the courses of study offered, one should not only consider the final degrees; it is also necessary to pay attention to the program's organizational form. In this context, the requirement for the universities of applied sciences to contribute to the permeability of the educational system acquires a particular meaning. Permeability should not be understood only as access to university education for people without a *Matura*, but rather in the sense of "life-long learning." As a consequence, it is a matter of course programs that facilitate the compatibility of employment and studying. In addition to distance learning, courses of study that are organized as part-time or work-supporting programs play an important role in enabling working people to take part in university-level studies. Half of the courses of study at universities of applied sciences are (also) offered on work-compatible schedules. More than 40 percent of all students at universities of applied sciences are enrolled in these programs (author's calculation based on bmwfw 2016, table 3.11).

Examination of the portfolio of courses of study at universities of applied sciences (bachelor's and master's programs) according to their content yields the following:

Economics and business: 40 percent
Engineering: 38 percent
Health sciences: 11 percent
Social sciences: 7 percent
Art and design: 2 percent
Natural sciences, defense and security studies: 2 percent
(FHK calculation based on courses of study offered in December 2016)

QUALITY ASSURANCE

Quality assurance for universities of applied sciences was mandated by parliament from the very beginning of the sector's founding in 1994. Even in its original version, the FHStG addressed both internal and external quality assurance. Parliament required evaluations of the universities' courses. The results of the evaluations served for quality assurance and formed the basis for instructors' continuing education (FHStG § 3 Paragraph 2 Part 9). For external quality assurance, the conditions were formulated for the recognition of courses of study at universities of applied sciences by a newly created administrative board for universities of applied sciences. Recognition was limited to five years, and required renewal (Hauser 2013, p. 30ff.).

Private universities, compared with traditional public universities and universities of applied sciences, are the newest type of institution of higher education. Analogously to universities of applied sciences, a new administrative body, the accreditation board, was created for this sector (Markus Grimberger, Stefan Huber 2012, p. 13ff.). Consequently, private universities were also required by parliament to ensure both internal and external quality assurance from their very beginnings.

For the traditional public universities, as the largest and oldest type of institution of higher learning, extensive provisions concerning evaluation and quality assurance were incorporated into the University Law of 2002 (US 2002 § 14).

In 2011, passage of the Law on Quality Assurance in Institutions of Higher Education followed. This law regulates external quality control at traditional public universities, at universities of applied sciences and at private universities (HS-QSG § 1). At the same time a common "Agency for Quality Assurance and Accreditation Austria" was set up. Previously there had been separate, sector-specific agencies. For universities of applied sciences there had been a board of universities of applied sciences; for private universities there had been the accreditation board; and in addition there was the Austrian Agency for Quality Assurance. The cross-sector law aimed not only to establish a common agency but also to lead to setting common minimum standards for courses of study at the university level (ErläutRV 1222 Blb.NR 24 GP).

Despite these common elements, there are also meaningful differences in the Law on Quality Assurance in Institutions of Higher Education concerning the arrangement of external quality assurance for the three types of institutions of higher education: traditional public universities, universities of applied sciences and private universities.

The traditional public universities were for the first time required to submit to external quality assurance in the form of an audit. This also relied on the university's quality management system. Because traditional public universities are set up by law, they have no institutional accreditation (UG 2002 § 6 Paragraph 2). Similarly, no obligatory accreditation of individual courses of study is foreseen. This also hold true for other university courses of study that they offer.

The most extensive regulations apply to private universities. These must submit to institutional accreditation, which can be done twice for six-year terms, after which it must be repeated every 12 years (HS-QSG § 24). In addition, private universities must submit for accreditation every new course of study and all other courses of study that lead to an academic degree.

The following regulations hold for the universities of applied sciences: new institutions that wish to be universities of applied sciences must submit to both institutional and program-specific accreditation (HS-QSG § 23 Paragraph 2). Analogously with the conditions for private universities, the institutional and program-specific accreditations are valid for two six-year terms (HS-QSG § 23 Paragraph 7). Afterward the university of applied sciences is required to submit every seven years to an audit by the quality assurance system for institutions of higher education. If the audit is passed, the institution remains accredited (HS-QSG § 23 Paragraph 9).

However, a transitional regulation in the Law on Studies at Universities of Applied Sciences released all universities of applied sciences from this requirement, so that each university of applied sciences, as an institution and in its individual courses of study, that had successfully completed an institutional evaluation by 1 March 2012, was granted an unlimited accreditation by the new Austrian Agency for Quality Assurance. An unlimited accreditation for all of the courses of study at universities of applied sciences that were accredited at that point in time was also tied to the completion of an institutional evaluation (FHStG § 27 Paragraph 11). However, all existing universities of applied sciences were required to submit to an audit by the system of quality management. Afterward, the audit must be repeated every seven years.

It is worth noting that since this new legal regime came into force, no university of applied sciences has successfully completed an institutional accreditation. That means that since the passage of the Law on Quality Assurance in Institutions of Higher Education, no new university of applied sciences has been founded. All 21 of the existing universities of applied sciences received unlimited accreditation on the basis of the transitional regulation.

An important change in the area of universities of applied sciences compared with the legal situation before the Law on Quality Assurance in Institutions of Higher Education relates to courses of continuing education covered by § 9 of the Law on Studies at Universities of Applied Sciences. These will no longer be covered by an *ex-ante* evaluation. Universities of applied sciences are required, as noted above, to follow the legal restriction that they may only set up courses of continuing education in the fields of study for which they have received specific accreditation. It is however mandatory that these are included in the institution's internal quality assurance (FHStG § 9 Paragraph 1). The periodic audits include courses of continuing education in their examination (HS-QSG § 22 Paragraph 2 Part 5). Thus the courses of study, as in the traditional public universities, are not required to undergo accreditation.

Research

At traditional public universities, the task "Development of knowledge (research and teaching)" gives research its central importance (UG 2002 § 3 Paragraph 1, cf. Project "Future of Higher Education" – Preamble to a Common Approach). That universities are the most important centers of research in Austria is unquestioned.

For private universities, research is specified as one of the areas to be examined for accreditation both at the institutional level and at the level of individual programs (cf. HS-QSG § 24 Paragraph 3 Part 4 an Paragraph 4 Part 5).

The universities of applied sciences received from parliament no generalized mandate for research; instead, they were charged with applied research (FHStG § 8 Paragraph 4 Part 4 and § 10 Paragraph 7). Applied research is also a relevant element for the audit and accrediting of universities of applied research, as laid out in the Law on Quality Assurance in Institutions of Higher Education (HS-QSG § 22 Paragraph 2 Part 2, § 23 Paragraph 3 Part 4 and Paragraph 4 Part 5).

The universities of applied sciences have, to varying degrees, increased their engagement in applied research as the time since their founding has increased. The research budget of all 21 universities of applied sciences totaled approximately € 104 million in 2015. Since 2002, research and development has grown dynamically at the universities of applied sciences, with an annual growth rate over that period of 16 percent. In 2015, the 21 universities of applied sciences reported approximately € 40 million in income from research and development as proceeds from their participation in particular projects. Universities of applied sciences particularly emphasize their cooperation with small and medium-sized enterprises (SMEs). Out of more than 1450 companies with which the institutions are cooperating in their research programs, 62 percent are SMEs (data from FHK queries at all 21 universities of applied sciences).

Status Quo

Scale of the sectors within higher education

Compared with Germany and Switzerland, Austria's sector of universities of applied sciences is small, based on the number of students. While in Austria the share of students at universities of applied sciences as part of the total number of university students (at traditional public universities and universities of applied sciences) reaches 14.6 percent, with total enrolment of 48,051 students, the comparable numbers in Germany and Switzerland are significantly higher. In Germany, approximately 965,000 people study at universities of applied sciences. That corresponds to 35.6 percent of all students at both traditional public universities and universities of applied sciences (data for Austria are from uni:data, data from Germany are from https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/BildungForschungKultur/Hochschulen/Tabellen/StudierendeInsgesamtHochschulart.html).

In Switzerland, there are approximately 64,000 students at universities of applied sciences. That corresponds to 31.7 percent of all students at both traditional public universities and universities of applied sciences (https://www.bfs. admin.ch/bfs/de/home/statistiken/bildung-wissenschaft/personen-ausbildung/tertiaerstufe-hochschulen.assetdetail.246190.html).

IMPACT

The impact of the universities of applied sciences can be illustrated with examples regarding certain points of their tasks and goals.

Compared with students at traditional public universities, students at universities of applied sciences take less time to earn their degrees. In the academic year 2014–15, 12,721 out of 13,114 graduates from universities of applied sciences completed their studies within the expected period of time. The comparable values for the same year at traditional public universities are 10,949 our of 34,539 within the expected period of time (uni:data).

An additional strength of the universities of applied sciences can be seen in its lower drop-out rate. The rate for all starting students at universities of applied sciences from the academic year 1998–99 through the winter semester of 2015 is 22.5 percent (special evaluation by AQ Austria on the basis of data supplied by the universities of applied sciences). The rate of success for regular (domestic) students at all traditional public universities from the academic year 2009–10 through 2014–15 was 62.8 percent (uni:data).

Universities of applied sciences and their campuses are active regionally and are distributed in locales throughout Austria. They are also an internationally active and recognized segment of higher education. In the academic year 2015–16, 3837 international students were registered an Austrian university of applied sciences. The comparable figure for traditional public universities is 8475 persons (uni:data). The ratio of total number of students between universities of applied sciences and traditional public universities is 1:6. That makes the attractiveness of the universities of applied sciences for international students clear; international students are overrepresented in their student bodies.

Universities of applied sciences also attract more students from non-academic backgrounds. In the 2014–15 winter semester, the probability factor that a student at a university of applied sciences came from a non-academic background was 1.8; for a traditional public university it was 2.7. A factor of 1.0 would mean that the share of a given group among students was the same size as the share of that group in the general population (Studierendensozialerhebung 2016, p. 38). With their courses of study that are designed to be compatible with work, the universities of applied sciences make a double contribution to the permeability of the educational system. On the one hand, the approach contributes to reaching the goal of "life-long learning," in that the organization of studies at universities of applied sciences make it possible to combine university-level studies with a career. With a rate of 90 percent, students in part-time courses of study at universities of applied sciences show the highest rate of employment of any type of higher education (Studierendensozialerhebung 2016, p. 61). On the other hand, this type of organization attracts more persons without a *Matura* than any other type of higher education. The usual path to regular university studies (nearly 90 percent of all domestic students) is now, as in the past, via the *Matura*. Twenty-one percent of new students in part-time courses of study at universities of applied sciences do not hold the *Matura*. That is the highest share of any segment of higher education in Austria (Studierendensozialerhebung 2016, p. 41).

It is also worth noting that the share of persons who receive scholarships for persons who have been previously self-supporting that are enrolled in full-time courses of study at universities of applied sciences was 15 percent, and at traditional public universities (not including universities of the arts) was 6 percent (Studierendensozialerhebung 2016, p. 96). Because these scholarships are typically intended for people who, prior to their admission to higher education, have been self-supporting for at least four years with an income of at least € 7272, it is an indication that people who were previously employed full-time are attracted to the course of study.

If one considers employment statistics then it is clear that the universities of applied sciences are living up to their commitment of offering university-level studies with close relations to career fields and good chances in the job market. Within 18 months of earning a master's or *Diplom* degree at a university of applied sciences, an average of 77 percent of graduates are employed full-time; the comparable figure for traditional public universities is 53.5 percent (http://www.ams.at/_docs/001_spezi althema_0516.pdfaccessedon5January2015). The number of unemployed university graduates confirms the image of the employability of graduates of courses of study at universities of applied sciences. In November 2016, the unemployment rate of university graduates including graduates of universities of applied sciences was 3.7 percent. If one looks only at graduates of universities of applied sciences, the unemployment rate was 2.39 percent (author's calculations based on data from AMS).

POSITIONING AUSTRIAN UNIVERSITIES OF APPLIED SCIENCES – DEVELOPMENT SCENARIOS

In current political discussion about institutions of higher education the goal has been formulated that the share of students at universities of applied sciences should increase compared with that of students at traditional public universities (Project "Future of Higher Education" – Preamble to a Common Approach).

In 2011 a report had already been published titled "The Development and Dynamization of the Austrian Landscape of Higher Education – An External Perspective." A chapter of the report, "Relieving the Strain on the University System – Extend the System of Universities of Applied Sciences" recommended 60:40 proportion between students at universities of applied sciences and traditional public universities over the medium term (Report by Antonio Loprieno et al. 2011, p. 42).

In 2012 the Austrian Science Board published an expert report on universities of applied sciences. The report presented various scenarios for extending them. To approach, over the long term, the 40 percent share of students at universities of applied sciences that was proposed as a desirable size in the 2011 expert report, the number of places for students starting at universities of applied sciences would have to be raised by 1000 annually. In this case, it would be possible to reach approximately 116,000 students at universities of applied sciences by the year 2030, and by 2040 to have approximately 160,000 students and reach the share of 40 percent studying at universities of applied sciences.

Theses on positioning universities of applied sciences within the Austrian system of higher education

The general population's opinion of traditional public universities and universities of applied sciences is characterized by a limited overview of the courses of studies. Traditional universities set themselves apart from the universities of applied sciences through academic research and as a place for discussion and (international) exchange. In the view of the general population, universities of applied sciences offer practical education and have strong points in the subjects that they choose to emphasize and the good prospects for employment that they offer. Slightly more than half of the population considers the courses of study on offer as sufficient; a little more than a third is of the opinion that they should be extended further. Considerably more than 60 percent could understand extending the courses of study offered at universities of applied sciences in order to reduce the burden on traditional universities (Einstellungen zu Universitäten und Fachhochschulen 2016). It would thus be possible to summarize these views by noting that knowledge in the general Austrian public about the courses of study offered by traditional public universities and universities of applied sciences could be expanded. People who have an overview tend to have a relatively clear picture of the profiles of the traditional universities and the universities of applied sciences. Expanding the universities of applied sciences to reduce the burden on traditional public universities is understood and accepted.

The following theses about future positioning of the universities of applied sciences as a sector can thus be formulated:

- Expanding the universities of applied sciences includes new areas of focus. That will further sharpen the independent profiles of the universities of applied sciences and the traditional public universities, thus supporting cooperation "at the same level."
- Increased expansion of the universities of applied sciences will increase the employability of graduates of the system of higher education as a whole. This will necessarily be tied to the improvement of social permeability and strengthened implementation of the principle of "life-long learning."
- Universities of applied sciences are set up regionally and globally embedded. They are thus intimately tied to their locations while simultaneously making a contribution to internationalization.
- Via the tie between teaching and applied research, the universities of applied sciences are important actors in Austria's system of research, technology and innovation. Strengthened performance in applied research will raise the visibility of the universities of applied sciences. The opportunity to offer doctoral programs, after external accreditation, will make an important contribution to this effort. The Aus-

trian government will support the universities of applied sciences in their role in applied research by providing a model of sustainable financing.

REFERENCES

Brünner, Christian and Georg Königsberger, "Zur Position der Fachhochschulen im Hochschulsystem" in Walter Berka, Christian Brünner, and Werner Hauser (Eds.) *20 Jahre Fachhochschul-Recht*, Vienna and Graz, 2013.

Grimberger, Markus and Stefan Huber, *Das Recht der Privatuniversitäten*, Vienna and Graz, 2012.

Hauser, Werner, "Die wesentlichen Inhalte der Stammfassung und der Novellen zum FHStG" in Berka, Brünner and Hauser (Eds.) *20 Jahre Fachhochschul-Recht*, Vienna and Graz, 2013.

Loprieno, Antonio, Eberhard Menzel and Andrea Schenker-Wicki, "Zur Entwicklung und Dynamisierung der österreichischen Hochschullandschaft – eine Außensicht. Rahmenkonzept für einen Hochschulplan," 2011.

Bundesgesetz über die Organisation der Pädagogischen Hochschulen und ihre Studien (Hochschulgesetz [Law on Higher Education] 2005-HG).

Bundesgesetz über die Universität für Weiterbildung Krems (DUK-Gesetz [Danube University Krems Law] 2004)

ErläutRV 1222 Blb.NR 24 GP

Fachhochschul-Studiengesetz [Law on Studies at Universities of Applied Sciences], FHStG BGBl 1993/340 idgF

Hochschul-Qualitätssicherungsgesetz, HS-QSG

Privatuniversitätengesetz [Law on Private Universities]

Universitätsgesetz [Law on Universities] 2002

AQ-Austria – Agentur für Qualitätssicherung und Akkreditierung Austria, *Anerkennung und Anrechnung non-formal und informell erworbener Kompetenzen*, Vienna, 2016.

bmwfw, *Statistisches Taschenbuch*, 2016

Einstellungen zu Universitäten und Fachhochschulen. Eine Studie von GfK im Auftrag des bmwfw, Presentation to the meeting of the Conference of Higher Education [Hochschulkonferenz] on 6 December 2016.

Materialien zur sozialen Lage der Studierenden, 2016

Österreichischer Wissenschaftsrat, *Fachhochschulen im österreichischen Hochschulsystem. Analysen, Perspektiven, Empfehlungen*. Vienna, 2012

uni:data

"Zukunft Hochschule" Präambel zur gemeinsamen Vorgangsweise

SHORT BIOGRAPHY

HELMUT HOLZINGER was born in 1955 in Vienna. After he earned a PhD at the University of Vienna, he worked as an educator and then as a senior manager in adult education. Since the beginning of 1998, he has been Managing Director of the University of Applied Sciences BFI Vienna. Since November 2010 he has been president of Austria's Association of Universities of Applied Sciences. From November 2011 to October 2016 he was Chairman of the Board of Trustees of the Agency for Quality Assurance and Accreditation Austria. He has published widely on topics concerning universities of applied sciences.

This report is originally published in German and has been translated into English.