

Projektbericht
Research Report

Diverse Excellence

Case studies of excellent universities

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David Binder
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Executive Summary

The term ‘excellence’ has gained in relevance in recent years, above all in the political debate on higher education. Several countries have introduced, for instance, excellence initiatives for universities which are oriented on international ranking criteria. This study looks at the use of the term excellence in higher education research, beginning with a brief overview of its use in this context over time. Case studies on different aspects of excellence from six universities are then provided, and their applicability to the situation in Austria is discussed.

A systematic literature review based on searches in relevant databases and using Google shows that while excellence in higher education only gathered force in the German-speaking discourse at a comparatively late date, it has been a topic of debate in other countries since the 1960s. The number of hits peaks thereby in 2011. The main topics discussed under the guise of excellence relate to the functions of higher education (teaching, research, services) whereby teaching has assumed the most importance since the 1990s. In recent years, the focus on access and equality encountered in the 1960s has – along with diversity – (re)gained importance. The database search reveals no indication of a corresponding discourse in the German-speaking world.

Excellence is a highly controversial term with no definitive content of its own. Instead, it is a relational marker that differs from the term ‘elite’ in its detachment from socio-structural connotations. Given this fundamental lack of meaning, images of excellence can – as an analysis of the milestones in the international discourse on excellence shows – only ever be temporarily hegemonic. In the 1970s, the United States grappled, for instance, with the question of how disadvantaged groups or institutions can develop excellence. The US *Commission on Excellence* subsequently linked the excellence debate to schools in particular, while the quest for excellence led to the rise of new public management (NPM) at universities. On an international level, the globalisation and objectification of excellence through league tables and rankings gained prevalence from 2003 onwards. The European Research Council, for instance, principally uses the peer review process to promote excellence in research. Calls to explain high positions in the rankings led to the codification of ‘world-class universities’ (WCUs). WCUs use (abundant) resources, favourable governance and concentration of talent to achieve their three expected outputs: graduates, research results and technology transfer. The focus on this gold standard – albeit often futile due to lack of funding – is frequently criticised by researchers for the conformity it enforces in universities. Since 2005, the topics of equality, fairness and diversity have all regained relevance in the debate. There has likewise been a realisation in recent years that the research excellence measured through rankings does not automatically lead to corresponding excellence in teaching. Growing importance is therefore also being attached to the catchphrase ‘third mission’, a notion frequently used in the higher education context in reference to practices of knowledge transfer to the economy and society, diversity efforts and inclusive approaches. In light of the above and the various meanings that have been/are attached at different times and in different areas to a term that is in principle devoid of meaning, it seems reasonable to view excellence as diverse – as indeed the title of this report suggests.

The six case studies contained in this report demonstrate some of these diverse forms of excellence and how they came about. *Arizona State University* was chosen, for instance, for its regional impact, achieved through purposely established research cooperations with regional enterprises and institutions to study practice-oriented topics. In addition to its focus on applied, regional research, the ‘New American University’ has a loose, inclusive approach to access that stands in contrast to the gold standard of so-called world-class universities.

The *University of Edinburgh*, in turn, uses its endowment fund to promote start-ups and technology transfer. It has been doing so for decades – with lasting success. Several institutions funded primarily by the university have been put in place to handle the diverse needs of start-ups and spin-offs.

Mergers in the higher education sector have been a regular occurrence in the Nordic countries in recent years and have clearly contributed, for instance, to the success of Danish universities in international rankings. However, as our *University of Copenhagen* case study shows, governance reforms (autonomy) and new criteria for the receipt of public funding have also been a contributing factor in their rise up the rankings.

Aalto University was formed by the merger of three major Finnish universities (a technical, a business and an art and design university) and was not established until 2010. Located on the outskirts of Helsinki, its focus lies explicitly on producing innovation, entrepreneurship and a strong start-up culture, thus creating a quasi-world-class university of innovation. This is reflected in all aspects of life and work at the university – from the campus architecture, its numerous initiatives to the involvement of students. To achieve this, Aalto University was established from the outset as a foundation-based university with the necessary seed capital, a very lean governance structure and a focus on a select number of ‘fields of excellence’. It also swapped out much of its teaching staff within just a few years. However, with universities in the Nordic countries hit more recently by some radical austerity programmes (staff cutbacks), it will be interesting to see what the future holds at Aalto in particular.

The *University of Twente* is a good example of how strength in research, cooperation with industry and a high profile in the competition for talent facilitate success in underdeveloped regions. Accordingly, our Twente case study examines in particular the options available to junior researchers. PhD-level education in the Netherlands has been subjected to several rounds of reforms in recent years to make it more structured. In the meantime, the vast majority of the country’s PhD students study at research and graduate schools.

The *University of Duisburg-Essen* (UDE) on the other hand is known above all for its efforts in the field of diversity. It has established a dedicated Vice-Rectorate for Gender and Diversity to coordinate these efforts and has embedded them in central aspects of university strategy. The UDE case study demonstrates that equity and excellence complement each other and are by no means a contradiction in terms.

As far as transferability to the current situation in Austria is concerned, some of the individual initiatives to promote start-ups or manage diversity are of particular interest.

More far-reaching reforms would first require deeper (academic) discourse and core policy decisions. If agreement could be reached on the general direction, i.e. on the needs and opportunities that are specific to Austria – and not just a goal like ‘at least one university in the Top 100’ – the case studies presented in this report provide inspiring examples for actual reform.

1 Introduction

The term excellence has only gained relevance from an education policy perspective in the German-speaking countries at a comparatively late date – essentially since the Social Democrats (under former Chancellor Gerhard Schröder) put it on the agenda in Germany. Elsewhere, and originating chiefly from the United States, the term has been linked from the outset with the democratisation of mass higher education – in particular as a result of the open access to higher education afforded in the USA after World War II by the G.I. Bill. Given that universities were in the beginning clearly a selective institution to favour the social elite, we considered two perspectives, namely the consequences of increasing ‘mass’ participation for the quality and position of the institutions themselves and the contribution that these institutions can make to excellence in favour of the disadvantaged and discriminated groups fighting for increased participation.

However, the actual starting point for examining the political relevance of excellence varies depending on whether a higher education system is differentiated as a matter of course – as is the case in the USA – or whether a homogeneous system of universities can – at least in principle – be assumed. In the former, an elite sector exists with which the other institutions have to contend; in the latter the whole sector is ‘elitist’ (with the absence of differentiation removing any need to address this further). In a strong theorem of higher education research, expansion leads in one case to increased institutional differentiation as a ‘mass sector’ grows alongside the ‘elite institutions’, while in the other (homogeneous) case, the (former elite) universities turn into mass universities in the course of the expansion. In the former, it is first and foremost the mass institutions that strive for excellence (with the elite sector serving as the benchmark), while in the latter a differentiation must occur in the existing sector.

For purposes of scientific validity, a report of this kind must always clarify the terminology used therein. Accordingly, we will look in more detail at what is actually meant by excellence in Chapter 2. Of particular relevance in this regard is the extent to which its use in the field of education policy is based on sound academic underpinnings. This is, after all, a prerequisite for academically-founded policy recommendations. Our clarification is based on a systematic review of the use of the term excellence – and the notion of ‘diverse excellence’ – in relevant publications. In Chapter 3, we will take a closer look at some of these diverse forms of excellence, drawing in the process on six university case studies. Each of these case studies was specifically selected for its relevance to at least one area of importance for the development of the Austrian higher education system: contribution to economic innovation (University of Edinburgh); focus on basic and applied research relevant to the regional economy (Aalto University); reforms in the ‘*tertiary education ecosystem*’ that should lead to improvements in the rankings (University of Copenhagen); design of graduate education (University of Twente); student diversity (University of Duisburg-Essen); new university model as a location factor in a knowledge economy (Arizona State University).

2 The Discourse on Excellence in Research and Politics: A Literature Review

This chapter outlines the conceptual context for the case studies. We have tried thereby both to understand the academic meaning of the term vis-à-vis its primarily political usage and to embed its current usage in our part of the world – i.e. in the German-speaking discourse – into a broader international context. This exercise should also serve to gauge the political dimension of the term, determine whether it makes ‘sense’ from an academic perspective to place it in the higher education policy spotlight and identify any ‘twist’ this might give to politics and policy. It also serves to verify the extent to which our chosen “diverse excellence” approach is supported by the literature.

We conducted a systematic literature review in a publications database and on Google using the term ‘excellence’ in combination with ‘higher education’ and ‘university’. The host countries, regions or cities encountered in the case studies were also explicitly included in this review. This allows us to look at the findings of the case studies in a systematic context and extends our understanding of excellence policy as a whole.

2.1 The Excellence Discourse in the Literature

To obtain the data for our analysis, several international searches were conducted on the EBSCOhost research platform in summer 2017. These searched the articles (the majority of which are published in English) in the database for the terms ‘excellence’ and ‘higher education’ or ‘university’. Parallel searches were conducted in the German peDOCS database using the corresponding German search terms (*‘Exzellenz’, ‘Hochschule’, ‘Universität’*). To focus the results, the searches were restricted to the article titles. The hits were then subjected to a further quantitative keyword search and a qualitative analysis, which looked, for example, at the timeframe for the discourse or the various content aspects and their development over time. Our primary aims here were to develop an overview of the research into excellence in the higher education sector and obtain a systematic insight into the “diversity” of the discourse.

Before proceeding any further, we would, however, first like to mention a number of fundamental aspects that emerged in the initial search. The discourse on excellence – while still relatively new from the German-speaking perspective – dates back in other countries to the 1960s (and in some cases even earlier). It has very clear links to the growth and spread of access to higher education brought about by the expansion movement and so-called ‘mass higher education’, i.e. with the dichotomy of ‘elite’ and ‘mass’. At the same time, *the term excellence has no definitive content of its own*, but is instead a ‘relational marker’ for all possible aspects and dimensions; at any rate, it ‘marks’ differentiations and emphases. There is an ongoing – more or less hidden but thus all the more dogged – *battle for the power to define what constitutes excellence*. The academic profession (some might say oligarchy) is battling to maintain control through the subjective power of definition of the ‘peer’ process: excellence is what we (or the ‘truly’ excellent among us) understand it to be (‘excellence goes hand in hand with modesty, it is not something you talk about’). Rankings, in contrast, have developed in the hands of the political (and administrative) powers; they

give the distinctions and differentiations a transparent and ‘objectified’ appearance and are themselves later subject to academic debate (Lamont 2009).

To determine the context for the case studies more closely, we added their host countries (Denmark, Finland, Germany, the Netherlands, Scotland/UK, USA) and cities/regions (Copenhagen, Helsinki, Duisburg-Essen, Twente, Edinburgh, Arizona) to the search. While this yielded relatively little in terms of hits, we did not want to run the risk of missing any important research relating to the case studies. As a cross-check, we carried out a search which linked the term ‘excellence’ with ‘education policy’ in these countries/regions in order to distinguish the weight of higher education policy from that of other education sectors. Contrary to expectations, this search indicated that the use of the term excellence is by no means restricted to higher education policy but instead also plays a role in the *majority of other sectors or aspects of education*.

To compare the academic discourse with its counterpart in the public domain, we also carried out a series of Google searches both on the general level and by country/region. These searches could only be analysed in a less systematic manner since they lack time references and also contain elements of randomness. The first 50 hits were included in each case.

2.1.1 Timeline for the Academic Discourse

Figure 1 shows the timeline for the hits. The discourse begins in the 1960s, with the number of publications initially rising gradually, hitting a new level in the 1980s and again in the 2000s, only to subside again after 2011. Over the full period, 192 hits were obtained with ‘higher education’ and almost 400 hits¹ with ‘university’, with the publication dates here also starting a few years earlier (1963 compared to 1966).

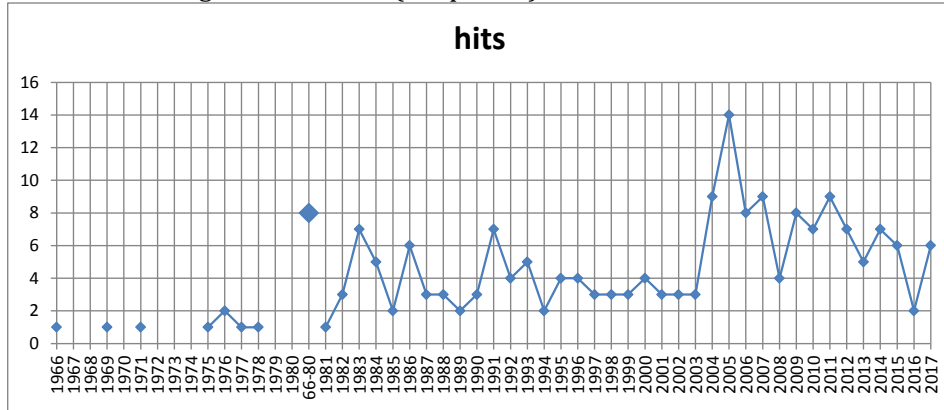
The analysis by country/region (Figure 2) shows very few occurrences of the items (only a few individual years generate more than one hit) and at times different patterns for the terms. Use of the term ‘higher education’ does not appear until the 1980s, with the UK producing the earliest and largest number of hits, followed by the USA; this term does not appear in the other countries/regions until the mid-2000s when it is first encountered in the Netherlands; only sporadic individual occurrences of the regions/cities are obtained. The discourse for the combination ‘university’ and ‘excellence’ begins much earlier in the USA (already in the 1960s) than it does in the European countries, with the USA also dominating here in quantitative terms (almost twice as many hits as all other countries put together). Up until 1971, there are no hits at all in the European countries, while in the period recorded the most hits are encountered in the Netherlands (2005-16) and Germany (2004-12). Denmark and Finland only appear sporadically in the international literature.

¹ Of the total hits, only the periods from 2001 to 2017 and from 1963 to 1971 (the period in which the first hits occurred, thus proving a historical picture) were analysed (the total hits would have exceeded a meaningful volume for the qualitative analysis and would not have produced any additional insights); a total of 220 items were included in the analysis.

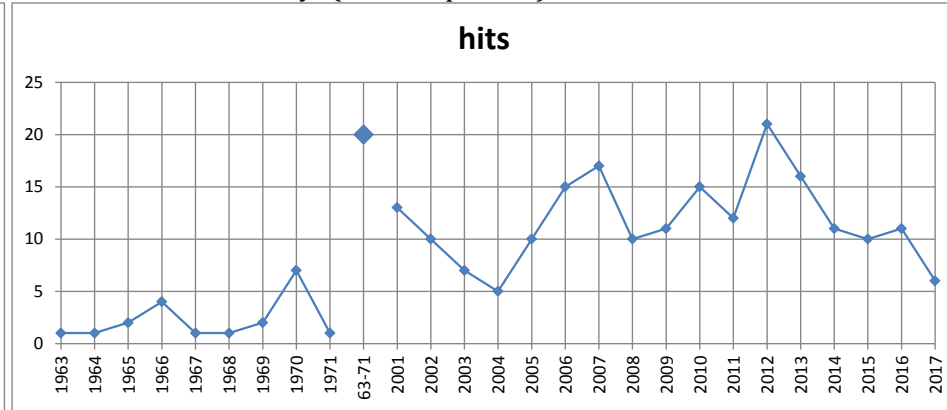
Figure 1: Timeline for the academic discourse

(a) Individual years

Search term: "higher education" (full period)

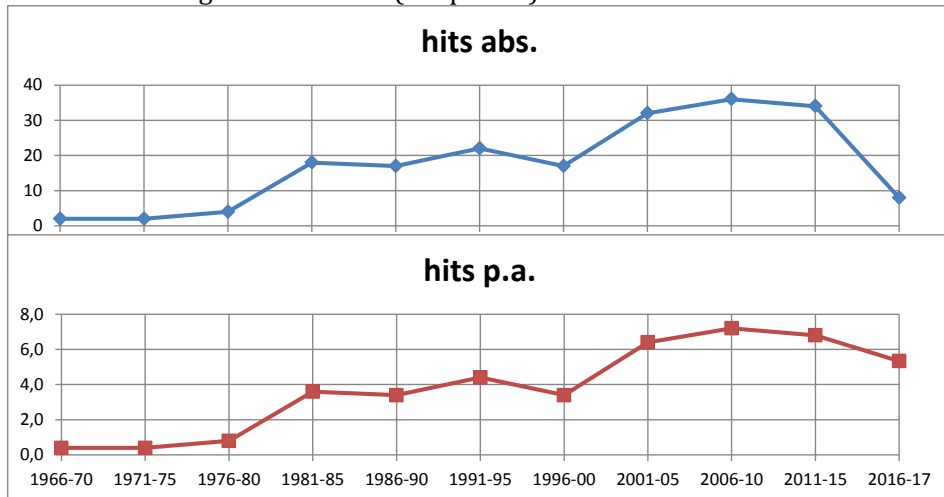


Search term: "university" (selected periods)

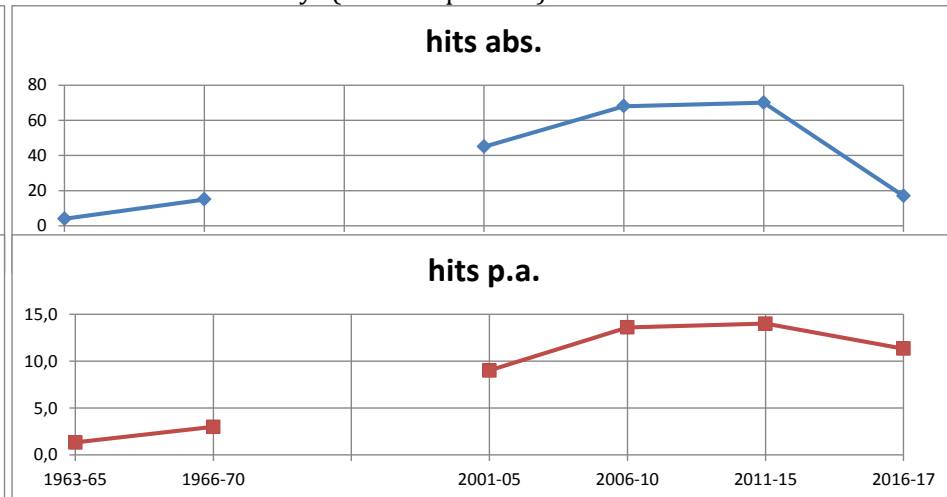


(b) Time periods

Search term: "higher education" (full period)



Search term: "university" (selected periods)

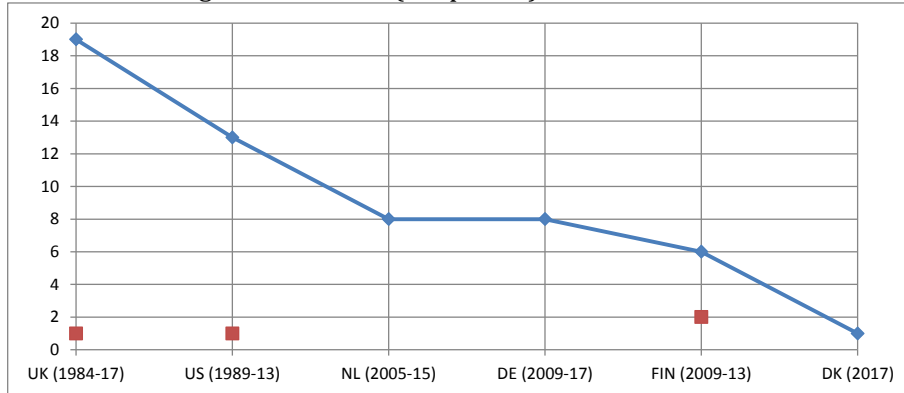


Number of hits when searching for the terms 'excellence' and 'higher education' or 'university'.

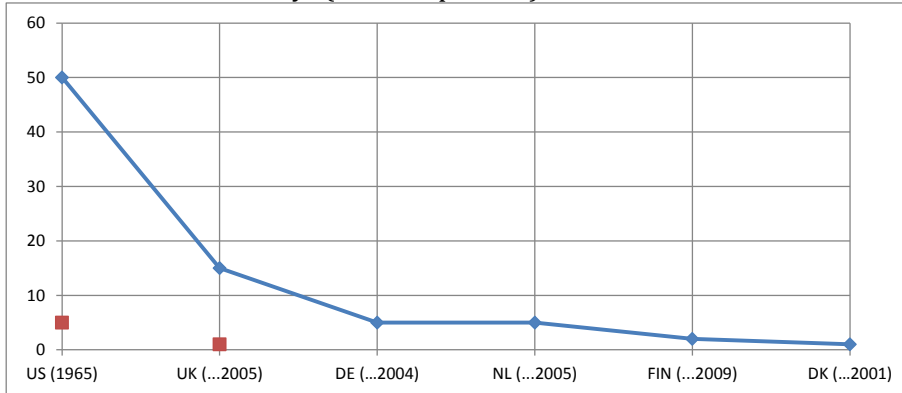
Source: EBSCOhost searches, August 2017

Figure 2: Discourse by country/region

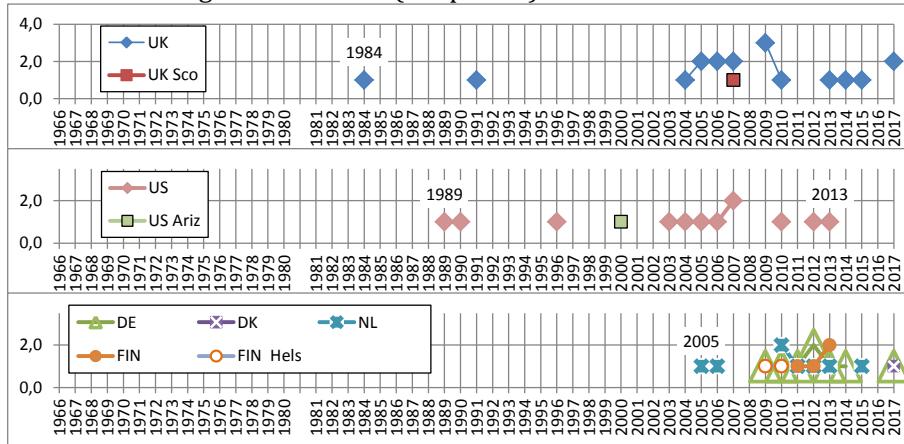
(a) Total by country/region (year of first hit in brackets)
Search term: "higher education" (full period)



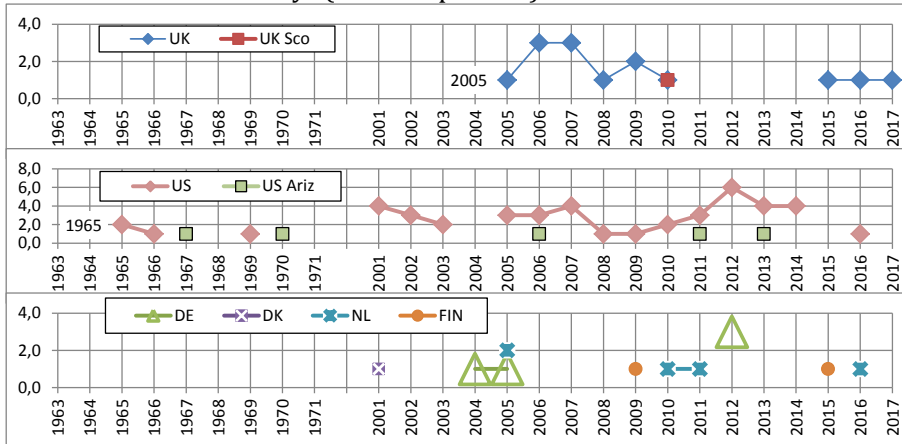
Search term: "university" (selected periods)



(b) Timeline
Search term: "higher education" (full period)



Search term: "university" (selected periods)



Number of hits when searching for the terms 'excellence' and 'higher education' or 'university'.

Source: EBSCOhost searches, August 2017

2.1.2 Timeline of Topics: Diverse Excellence

In a second step, we analysed the topics by searching for selected keywords in the titles of the identified publications. The keywords relate to different themes and are described in more detail below. Figure 12 (p. 125f.) shows, for example, the results for the combination of ‘excellence’ and ‘higher education’ or ‘university’ in the academic discourse over time. Figure 13 (Page 127ff.) shows a cross-section of the topics in the academic and public discourses.

Function-related topics: the keywords ‘teaching’, ‘research’ and ‘services’ (the latter extended by ‘entrepr’, ‘transf’, ‘applied’) are used to differentiate the three ‘missions’ of higher education and universities (upper charts in Figure 12, p. 125).

The functions follow a characteristic timeline that show a difference between the broader and more general discourse on higher education and its narrower university counterpart. In the *higher education discourse*, the keyword research (1983) appears ten years earlier than teaching (1993). Services, which serves as an identifier for the ‘third mission’, begins to get a few isolated hits from the late 1980s onwards and is the last of the three to gain stable representation (2008). The two traditional functions of research and teaching carry (almost) the same weight between 1995 and 2011, after which the occurrences of teaching increase strongly, and it becomes the most frequent keyword. The keywords relating to the ‘third mission’ carry significantly less weight than the two traditional functions, and no increase in their use is observed. In the *university discourse*, teaching is consistently the most frequently used of the three keywords – and the only one encountered at all in the 1960s – in the excellence context. The keyword research begins to gain some weight in the late 2000s, while the ‘third mission’ plays a minor role.

The two ‘political’ keywords access and diversity were also added to the equation for comparison purposes. These produce very different weightings in the two discourses. In the higher education discourse, access is the only keyword that appears in the 1960s. It remains the most frequent one until into the 1990s, is then encountered to a similar extent as the function keywords research and teaching until the mid-2000s, after which its frequency continues to rise but its relative weighting falls. The keyword diversity is encountered from the mid-1980s onwards, with its weight rising in the second half of the 2000s to the same level as access. In the university discourse, access and diversity play a lesser role than the teaching and research functions. The explanation for this lies in the differentiated nature of the higher education system, where the concept of access tends to be covered by the various forms of colleges, and full universities (should) concentrate on their traditional functions.

Access/equity/fairness: the keywords ‘access’, ‘equal’, ‘equi’ and ‘divers’ are used to determine the weight of the socio-political dimension in the excellence discourse (middle charts in Figure 12, p. 125).

This dimension is far more prevalent in the higher education discourse than in its university counterpart. The strong focus on equity that can already be seen in the 1960s (when it is weighted more heavily than access) persists right through to the present day. The equity discourse has continued to grow incrementally since the 1980s and has clearly gained the upper hand over equality since the 2000s. It also overtook diversity in the late 2000s.

Equity finds its counterpart in the ‘technical’ policy design dimension in the topic of assessment. A parallel can also be drawn with access. Structural parallels can be seen in the *university discourse*, but at different levels: the topic of access clearly plays the largest role here; assessment is represented to a far lesser extent.

‘Technical’ policy design topics: the keywords ‘govern’, ‘leader’, ‘assess’, ‘standard’ and ‘accred’ are used to represent the ‘technical’ policy design dimension (lower charts in Figure 12, p. 125).

The ‘technical’ policy design topics, all of which play a major role in education policy, surface in the first half of the 1980s in a higher education context but are not encountered in a university context until the 2000s. *Assessment* is both the most prevalent topic and the first to be encountered. Governance and leadership play a lesser role, whereby leadership is the more frequent of the two. In the university discourse, there is a notable rise in hits for assessment in recent years (a topic that had had low weight until 2014). The terms ‘quality’ and ‘globalisation’ were added to the search for comparison purposes. The ‘universal’ term quality does not have a particularly high weight in comparison to our specific ‘technical’ policy design keywords, while globalisation plays a surprisingly minor role in the excellence discourse.

2.1.3 Comparison of Topics in the Academic and Public Discourses

Figure 13 (p. 127) shows the cross-sectional distribution of the keywords for all hits as well as the comparisons of the searches in the academic literature source (EBSCO*host*), the open search on Google and the search on Google and Google Scholar for higher education.

The comparison of the *basic dimensions*, i.e. function-related, access-equity-fairness, ‘technical’ policy design and globalisation (Figure 13a), shows that in four of the five searches the keywords for the *function-related dimensions* account for 60-75 % of the hits. The search for academic publications relating to higher education is the only exception; the keywords for *access-equity-fairness* occur most frequently here, and the terms are more equally distributed across the basic dimensions. In this search, the keywords also appear in a larger share of the hits (over 70 %), indicating that they are highly representative of this particular discourse (the level of representativeness is lowest in the Google search with ‘university’, where the hits are also the least conclusive: the title text usually only contains the keywords in combination with organisation or place names). Overall, the keyword *globalisation* has (surprisingly) low relevance in our context and receives a very low weight in all searches (max. 5 %).

The searches in Google Scholar produce very different results to those in the EBSCO*host* database. This is due presumably to the stronger weight attached to the present in Google Scholar, while the EBSCO*host* entries – albeit a better representation of more recent research – are time invariant. While the access and ‘technical’ policy design keywords account for very different shares of the hits in the various searches, the access dimension produces more hits in four of the five searches – a clear indication of its relevance in the discourse.

A breakdown of the **function-related topics** (teaching, research, ‘third mission’; Figure 13b), which are encountered in 15-30 % of the hits, shows that *teaching dominates* over the other two functions in four of the searches (teaching is mentioned in the title in 10-20 % of hits; in absolute terms, it is addressed in more than half of the functional titles). The only exception here is the academic higher education discourse, where the spread is fairly even. The ‘third mission’ keywords are far less prevalent in the excellence discourse (2-8 % of the hits). This underlines what was already shown in the timeline: the excellence discourse has focused strongly on teaching from the outset. This is by no means a new phenomenon and applies to both the academic and to the public discourses.

To some extent, the **socio-political topics** (access, equity, fairness, diversity) constitute an antithesis – or at least a challenge – to the excellence mission (Figure 13c). Since these also find an ‘technical’ policy design counterpart in the topic of assessment, this aspect was also included in the graphics. In four of the five searches, these topics are mentioned in 10-30 % of the hits (the only exception is the Google search with *university*: less than 5 %). There is a big difference here between the university and the higher education discourses in terms of the number of hits and thus also the relevance of these topics: *they assume much less relevance in the university discourse than in the higher education discourse* (14 % compared to 35 % of hits). The of the hits are spread fairly equally across the different keywords. These topics are encountered rarely and with little variation in the public discourse, where the keywords access and equity play no role at all.

The **‘technical’ policy design topics** receive the fewest hits, but do gain relevance over time (Figure 13d). The distribution of the aspects is similar in Google Scholar and the two EBSCOhost searches. As a very general keyword, *quality* is used at times in the academic discourse as a technical term but has a similar weight to the more specific keywords. Assessment and leadership are the most important topics; governance plays a surprisingly limited role in the excellence discourse. The addition of the keyword globalisation for comparison purposes also illustrates its low weight here.

2.1.4 Signs of a Discourse in German-Speaking Countries: Almost Non-Existent

The academic discourse on excellence in the German-speaking world is almost non-existent (see search documentation in Appendix 6.4). A title search for ‘*Exzellenz*’ in the peDOCS Education Portal (*Fachportal Pädagogik*) produces just seven hits between 2009 and 2012; the combination with ‘*Hochschule*’ (‘higher education’) or ‘*Universität*’ (‘university’) as in the English-language searches produces either no hits or just one hit (No. 4 in the general search; see Table 3, p. 141).²

The (sparse) hits obtained from the German search (Table 3) include above all an edition of the education journal *Zeitschrift für Pädagogik* (1990) containing a reflexive and primarily critical discussion of the ‘renaissance’ of the terms elite and excellence in German education policy from an interdisciplinary and international perspective. Some of the other publications found either have a strong link to the school sector or look at the social

² A general search in Google for the English terms *excellence university Germany* produces 336 million hits; a search using the same terms in German – *Exzellenz Universität Deutschland* – only produces 206,000 hits (around 1,600:1); a comparison search with *medicine Germany* and *Medizin Deutschland* produces a less flagrant imbalance of 237 million to 24.2 million (around 9:1).

dimension of gender and care in higher education. One article on teacher education at the Technical University of Munich's (then) new School of Education makes very strong (affirmative and self-evident) reference to the high relevance of entrance selection for excellent universities (a topic already covered by empirical research).³ One review refers to the publications in the *Unbedingte Universitäten*⁴ ('Unconditional Universities') series, which emerged as a reaction and response to the student protests against Bologna 2009.

Two English-language searches on the representation of Germany in the academic literature (yielding a total of 13 hits for the higher education and university discourses together; see Table 4, p. 142) largely produce references to international publications which reflect on the situation in Germany in greater or lesser detail or to US reports on the excellence initiative (Chronicle of Higher Education 2004 and 2005). The isolated publications that relate explicitly to Germany tend to address very specific topics (e.g. the selection of 'high ability' students; 3 hits). Ellen Hazelkorn's (2011) book on rankings, which contains relatively detailed analyses for Germany, gets three hits.

A targeted Google search for our Duisburg-Essen case study finds references to special plans and descriptions of the university as well as to initiatives, projects and individuals trading under the excellence label. It also finds references to publications relating either directly to the European Higher Education Society's (EHEA) 2014 Forum (which was held at the university) or to the conference publication (Pritchard et al. 2015), which contained the word 'excellence' in its title.

2.2 Milestones in the International Academic Discourse on Excellence

In his semantic analysis, Norbert Ricken (2009) demonstrates that the terms excellence and elite differ: the former frees the topic of its socio-structural connotations and adds a 'subjective' aspect by causing those affected (be they individuals, organisations, institutions, etc.) to ask themselves the very valid question 'Am I excellent?' At the same time, it is a distinguishing term that is both devoid of and must be filled with meaning. This constitutes on the one hand the link to power and politics, whose representatives – when the term has gained (or rather: is given) legitimacy – then endeavour to contribute this meaning. On the other hand, and especially if a discursive perspective is adopted, this void also gives the different actors broad contingent scope in their (more or less competing) efforts to fill it more or less successfully with (conflicting) content. The leitmotif of 'diverse excellence' chosen for this study aptly expresses this progression, which ultimately shapes the entire discourse. In other words, certain strong and delineated images of excellence or excellent institutions encountered in the discourse can at best become only temporarily hegemonic and are inevitably differentiated and dissolved in due course.

This is already demonstrated in the argument that while the question of excellence in the higher education sector might initially have been a reaction to expansion and democratisation in the 'chosen elite' vs. 'massification' sense, *appropriate and balanced access ultimately then became a characteristic of excellence*. Ratna Ghosh (2012) relates excellence to both equity/fairness and diversity, which she conceives as key, related political

³ See Pascarella/Terenzini (1991).

⁴ See Diaphanes (2010, 2010 2013); cf. also Heissenberger et al. (2010) for an Austrian perspective.

aspects. In doing so, she also recognises that the emergence of certain institutional norms for excellence can work against fairness, while diversity is an absolute prerequisite for it. This makes ‘preferential action’ both reconcilable with and a requirement for excellence.

This ‘self-destructive’ idea is also reflected in another example. On the one hand, the ‘world-class’ debate and international rankings have together established the American elite research university as the ‘gold standard’ of excellence, despite the fact that this counteracts the criteria of fairness (and often appears unattainable). The excellence ‘mainstream’, on the other hand, advocates dispensing with ‘holistic’ terms and placing the emphasis on the diversity and decentralised notions of excellence and the corresponding initiatives. This is evident both in the many topics addressed in the academic discourse (see above) as well as in the results of our *Google search*, which concentrate for the main part *on the manifold, small-scale initiatives and institutions*, not the major (hegemonic) topics and exhaustive debates. Excellence is basically seen as an antonym to equality and massification and is also used in a variety of contexts: excellence-equ(al)ity-diversity. A difference can be observed here between the *public and (general) political debate*, which tends to adhere to the opposite,⁵ and the *academic discourse*, which gravitates towards critical reflection, relativisation and relationships.

2.2.1 ‘25 years of educational excellence’ (USA 1996)

This is the title of a special issue of the *Journal of the Pennsylvania Black Conference on Higher Education* that was published in 1996 to commemorate the conference’s 25th anniversary (Redfern 1996).⁶ It takes a look back at those 25 years and suggests that the term excellence was not used in this period to emphasise the differences in the competition for position but served instead as the banner under which the battle for equ(al)ity was fought. This is confirmed by the quantitative results of our literature search, which date the start of the discourse back to the early 1960s, i.e. the time of the ‘Great Society’ programmes and the ‘War on Poverty’ (that was regrettably then lost in Vietnam), and shows the clear relevance that was accorded in this period to equity and fairness. In the basic argumentation of the time, excellence did not serve the goal of differentiating and creating/emphasising differences but rather focused on the question of how and to what extent the disadvantaged and ‘weaker’ groups or institutions in the differentiated structure could also be empowered to develop excellence.

2.2.2 Commission on Excellence (USA 1981): ‘Risk’ and ‘Mediocrity’

The US National Commission on Excellence in Education was established under the Reagan administration in 1981 (Goldberg/Harvey 1983)⁷ and attached the term excellence primarily to the school sector. “The second essential message from the Commission is that mediocrity, not excellence, is the norm in American education” (Goldberg/Harvey 1983: 15). The commission’s report was published in 1983, the year for which our quantitative

⁵ Ghosh (2012, S. 353) writes with reference to Hannah Arendt: “What Is Excellence? Excellence can be defined both at the individual and collective levels. The public view of excellence is that it is the opposite of mediocrity. By definition, it is a comparative term: ‘for excellence [...] the presence of others is always required’” For more on the excellence vs. equity-fairness-diversity comparison, see Brink (2009).

⁶ For more on the differences between the USA and Europe on the topic of excellence, see the (perhaps somewhat idealised) interpretation put forward by Lenhardt/Stock (2009).

⁷ See also <http://www.mat.uc.pt/~emsa/PMEnsino/ANationatRisk.pdf> [Accessed 14.09.2017]

analyses show the *first strong increase in the number of relevant publications*. It issued recommendations in five areas: Content, Standards and Expectations, Time, Teaching, Leadership and Fiscal Support. These formed the key points in the outline of the education policy strategy that would later become known as the ‘Global Education Reform Movement’ (GERM) (Adamson et al. 2016) and sought to re-establish education policy as a government priority. Although the report considered excellence and equity as twin goals, its emphasis lay on the former and in particular on “excellent individual performance. For the individual, the Commission defined excellence as performing on the boundary of individual ability in ways that test and stretch personal limits, both in school and in the workplace.” (ibid.: 17).

2.2.3 ‘Search for Excellence’, (Total) Quality Management, New Public Management (1980s-2000s)

Parallel to this, and strongly influenced by the work of Peters and Waterman (1982), the movement for quality and excellence in business and the corporate sector emerged and subsequently began to gain influence in the education sector and its key processes (e.g. assessment) (Spady 1986; Astin 1990; Balderston 1995; Freed et al. 1997; Lehr/Ruben 1999; Ruben 2003). Many organisational management approaches, criteria and methods – along with political efforts to influence them – developed and spread worldwide, including the EU’s approaches to quality assurance and development.⁸ This gave broad and operative *legitimacy to the term excellence*: what it means to be/become excellent was now talked about and modelled. The rhetoric of the ‘*entrepreneurial university*’ can also be seen in this context.

Early examples here include the ‘quality principles’ that were put together by Freed, Klugman and Fife (1996: 6f) from a variety of management concepts, namely vision, mission, outcomes driven; systems dependent; leadership: creating a quality culture; systematic individual development; decisions based on fact; delegation of decision-making; collaboration; planning for change; mobilizing supporters. One influential model (at least in the literature) of the application of business processes in higher education (‘EHE: Excellence in Higher Education’, Lehr/Ruben 1999; Ruben 2003) is based on eight challenges: public appreciation; needs of business; effective learning organisations; integrated approach to assessment, planning and continuous improvement; collaboration and community; recognition of teachers.

2.2.4 ‘War for Talent’ and Differentiation Through the Promotion of Talent (since 2001)

While the ‘talent’ issue only appears on the periphery of our literature reviews on excellence, it can nonetheless be seen as a specific form of excellence strategy that is currently gaining in relevance. The ‘war for talent’ was declared in the 1990s in response to a McKinsey study of leading major companies⁹ and originally denoted the development of explicit corporate strategies to recruit and retain the best ‘executives’ in order to remain competitive in the changing world of business (Chambers et al. 1998). It refers to a turning point in strategy that is – and still can be – attributed to multiple factors, namely the demographic decline of the middle age groups (which began in the USA around 2000), the

⁸ For a current version, see http://www.enqa.eu/wp-content/uploads/2013/06/ESG_3edition-2.pdf [accessed 14.09.2017]; for a critical review of these approaches, see Temple (2005).

⁹ <https://invosights.wordpress.com/2011/11/23/war-for-talent-the-mckinsey-survey/> [Accessed 12.05.2018]

increasing demands posed by growing complexity, the mounting competition between large and smaller firms, the rising mobility of managers and the increasing demands from recruits for more than just material incentives (e.g. decision-making freedom and content). This ‘declaration of war’ has been frequently repeated (Axelrod et al. 2001; pwc 2011; Barriere et al. 2018), intensified (Michaels et al. 2001) and even taken a humanistic turn (Lawler 2008). However, the aforementioned literature focuses on corporate strategies and not on the education system.

Staff differentiation has always been a key point in these corporate strategies. Indeed, “[d]ifferentiate and affirm your people” is one of the five imperatives for winning the war set out by Michaels et al. (2001: 11). This differentiation of and emphasis on talent has become the most important aspect of talent strategies in higher education, where a strong emphasis is also placed on self-selection: the students selected for talent programmes generally apply for a place before they have to prove themselves.

Wolfensberger (2015) carried out a comparative study of *Honours programmes* in European higher education as the most important form of promoting talent. The starting point for the study was the SIRIUS programme in the Netherlands,¹⁰ which explicitly rejected the egalitarian tradition and sought between 2008 and 2016 to establish a new culture of excellence at Bachelor and Masters level by funding programmes to promote the ‘top 5 %’ of students. SIRIUS was based on the Honours programme strategy applied in about half of the universities and colleges in the United States in the 2010s – programmes that now even have their own professional association.¹¹ While encouraging talent had already been an increasing focus of attention in schools since the 2000s (EURYDICE 2006), this strategy did not spread to higher education until a few years later. Wolfensberger’s (2015) study compared Honours programmes in 11 (Benelux, Nordic and German-speaking) countries and studied how these programmes were embedded into their education structures and cultures. The emphasis lay on ideological and political factors, general education philosophies as well as on selectivity and competition between education institutions.

The general findings of this comparison study are that (1) talent development has been gaining relevance since the 2000s and the number of Honours programmes is on the rise, (2) the Netherlands is a front runner in such programmes, which are encountered more frequently in research universities, (3) talent development programmes are more prevalent at school level than in higher education, (4) the structures to promote Honours programmes are usually not in place, and (5) there is a lack of common terminology accompanied by – to different extents – ideological reservations about the terms talent, elite, etc.

There are currently around 70 Honours programmes in Europe, half of which are in the Netherlands (39 programmes spread across three quarters of the country’s universities); in Denmark and Belgium around two fifths of universities have Honours programmes, while in Germany and Austria the figure is lower – at less than one fifth. In addition to the

¹⁰ “This cultural shift in the education sector deserves support, so that talented students may properly and genuinely do their best, showing willingness and motivation, and achieving excellent results accordingly.” <https://www.siriusprogramma.nl/english> [Accessed 12.05.2018]

¹¹ NCHC National Collegiate Honors Council: <https://www.nchchonors.org/> [Accessed 12.05.2018; publishes its own journal and has produced a first international overview of such programmes since 2012.

Netherlands, Denmark and Bavaria in Germany have placed a stronger focus on talent development. In Austria, developments at school level (e.g. ÖZBF, the Austrian Centre for Talent Development and Talent Research)¹² and the Centre for Excellence programme at Vienna University of Economics and Business are mentioned (Wolfensberger 2015: 259, 261). The chapter on Austria refers in particular to the developments in schools; the current government programme places strong weight on increased differentiation and talent development, using the activities in schools in Upper Austria as an example.¹³ In the higher education sector, the ‘Talente-Österreich’ (‘Talent Austria’) association has also been established.¹⁴

2.2.5 Globalisation and ‘Objectification’ of Excellence Through Rankings (international: from 2003)

In the late 1980s and 1990s – and as exemplified by PISA 2000 and Tony Blair’s 2001 speech on ‘education, education, education’ as the grand solution (The Guardian 2001) – globalisation and global competition stepped up the focus on education, not least in the major emerging economies.¹⁵ First compiled to indicate the global positioning of China’s universities, the Academic Ranking of World Universities (ARWU), also known as the Shanghai Ranking, and other such league tables have to some extent *filled the void in the term excellence with new content* to which the various actors in the discourse and practice are now reacting. The analysis conducted by Hazelkorn (2011) seeks both to comprehend the advance of such rankings and take a critical look at their impact and the way higher education institutions react to them. Although their methodological problems and shortcomings are clear, the rankings constitute a (new) – and somewhat paradoxical – reality: in a global knowledge economy, universities as the central institution of knowledge production must be accorded high political relevance and must inevitably also be involved in the processes of global competition. Since they are (still) largely public institutions, and the assessment of their success is mostly not dependent on market processes, a demand for comparative assessments emerges. Rankings are an (imperfect) response to this demand, and the results are used in decision-making both by financiers and benefactors as well as by (managers in) the institutions themselves, irrespective of any far-reaching doubts regarding their validity. Reactions on the institutional side seem to focus more on *influencing the position in the rankings (through ‘gaming’)* than on changing the underlying processes and results. Accordingly, they basically undermine (the explanatory power of) the instruments and at the same time reflect the lack of confidence in their (scientific) validity: more focus is placed on the relevance of excellence (in competition) than on actually working to improve the substrata/contents of excellence.

Two important aspects regarding the rankings in a policy context are their *zero-sum nature* (an institution can only move up if another moves down) and high level of selectivity. Only a small number of higher education institutions are actually represented: of the estimated 15,000 higher education institutions worldwide, only 1,000 or less appear in the rankings. Since attention also tends to focus on the top places, this raises the question of what position an institution has to reach in the rankings to experience a substantial economic

¹² <http://www.oezbf.at/> [Accessed 12.05.2018]

¹³ <https://www.talente-ooe.at/> [Accessed 12.05.2018]

¹⁴ <http://www.talenteoesterreich.at/start.html> [Accessed 12.05.2018]

¹⁵ A brief description of the most important international rankings is provided in the Appendix (Chapter 0).

and social impact. This in turn raises some questions at the system level. *What does having (or not having) a top-ranked institution mean for a country's higher education and research system? And what does this mean for its economy and society in general? How does this localisation fit in with internationalisation and globalisation? If policy focuses on achieving top places in the rankings, what impact does this have on the system as a whole (including those institutions that do not achieve such positions)?*

These questions are all topics of intense debate in academic circles. The *signalling effect* in the competition for investments and talent is an important aspect. A high-ranked institution is clearly an important anchor point for the innovation system; it calls at any rate for substantial investments, which can potentially also have a signalling effect at national level regarding the importance of investments in this area. This tends to be viewed mostly with scepticism at the higher education system level and in higher education research in that the orientation on one specific uniform institutional gestalt limits the diversity that is seen as a necessity.

Two further points that feature in the discourse in this regard are the differentiation between ranking and benchmarking (with the difference that the latter is not a 'zero-sum game') and the differentiation between *institutional excellence* (or quality) and *systemic excellence* (or quality), whereby the latter also considers the role of an excellence policy for those institutions who do not number amongst the 'chosen few'. The diversity of excellence is potentially a way forward here.

2.2.6 The European Research Council as Flagship of 'Academic Excellence' in European Research Policy (2007)

Following the publication of the European Commission's green paper on the European Research Area (EC 2007), the focus in EU innovation policy lay for a long time on improving the exploitation of research results. The basic assumption was that the European universities were good at *producing* knowledge but *exploiting* this knowledge for economic and social purposes represented a major gap that required the intervention of an EU research policy (the 'European paradox'). This situation was also supported by the fact that research had not been one of the EU's original missions. A growing number of EU research framework programmes (FPs) were set up to foster networking between European research groups and ensure that the knowledge produced was better utilized. The promotion of scientific excellence always formed part of this research policy, as did – at least to some extent – the promotion of basic research. The FPs also created a growing and increasingly complex machinery of applications, evaluations, invoices, etc. – accompanied by a low probability of success and selection decisions (made by the European Commission in line with the specified criteria) that were ultimately politically motivated. Some of the (few) applications that did make it through the laborious evaluation process would then be rejected on budget grounds, with these decisions again prompted by political agendas. Calls for applications already specify political requirements that have to be met, and there are also clear stipulations regarding dissemination and utilization.

As a 'counter-programme' to this 'research bureaucracy', calls emerged from the scientific community for the unbureaucratic promotion of basic research based solely on the criteria

of academic excellence.¹⁶ The protagonists also challenged the ‘European paradox’ and called for the funding of basic research to enable Europe to compete with the United States (Pavitt 2000). These initiatives resulted in the creation of the European Research Council (ERC), which is funded by the European Commission and essentially uses academic quality assurance practices, i.e. the peer review process, as the basis for its funding decisions.

Edler and Nowotny (2015) demonstrate the very clear differences between the FP and ERC approaches, showing thereby that the dividing line is not necessarily the focus on exploitation but rather the independent analysis and formulation of the problem based on scientific logic.¹⁷ Given the rising global challenges, such independent search processes conducted in the ongoing competition for ideas are a crucial addition to the politically predefined activities to resolve more or less familiar problems.

The ERC’s goal is to promote excellent research at the ‘frontiers of science’.¹⁸ Funding is provided to young researchers with up to 12 years of post-PhD experience (starting grants, consolidator grants) as well as to established researchers (slightly more lucrative advanced grants), and researchers can take the grants with them to other institutions.¹⁹ Different funding pools are available for bidder consortiums, networks or co-funded Horizon 2020 projects. Grants are awarded for a period of five years. Grant holders can subsequently apply for proof of concept grants to continue working on the market and innovation potential of their research results, while synergy grants are available for small groups of excellent researchers. In 2016, 325 starting grants, 314 consolidator grants, 231 advanced grants and 133 proof of concept grants were awarded. The award rate lies between 10 and 15 per cent (depending on the year and funding pool).²⁰

In his analysis of the establishment of the ERC and its first decade of work, Thomas König (2015; 2016a; 2016b; 2017) carves out the central conceptual and symbolic meaning of the term excellence, which he accords more political than scientific relevance. He shows that there is a very high correlation between a country’s success in obtaining ERC funding and its representation in the most-cited publications.²¹ The successful competition for ERC

¹⁶ Gornitzk and Metz (2014) show that similar ideas to promote research in Europe based on the US-NSF model were quashed in the 1960s by jealous resistance from national interests and their fear of relinquishing resources to the community and ultimately led to the establishment of the European Science Foundation.

¹⁷ Aghion et al (2009, 27) compare the situation in the EU and US and attest the merit-based allocation of additional research funding by the ERC an important effect in enhancing results while at the same time pointing to the low level of funding in the EU compared to the USA: “Our causal analysis demonstrates that, with sufficient autonomy, universities become better at research when the level of funding allocated by merit-based competition is higher. Thus, our findings suggest that raising the ERC budget is likely to be productive. Indeed, with a budget of 7.5 billion Euros for the 2007-2013 FP7 period, the ERC (which is meant to fund all scientific disciplines, from the humanities to the life sciences) only represents about 20 percent of the NSF budget and a much lower fraction of the NIH budget. Even if the structure of university funding in Europe--that is, between the member state and E.U. levels--is not meant to converge fully to that of the U.S. --that is, between the state and federal levels--and even if some of the disciplining effect can come from competition at the national level, increasing the budget of ERC-like institutions seems likely to improve the productivity of European universities through E.U.-wide competition.” However, they also relativise this based on comparisons at US state level, noting that the allocation of such funds depends on the circumstances: “We note that expenditures at research universities do not increase patenting in states that are far from the technological frontier, have low autonomy public universities, and have little competition from private universities. These three circumstances are a bad package for the productivity of research universities.” (ibid.: 28).

¹⁸ EC, Horizon 2020, Excellent Science <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/excellent-science> [Accessed 15.4.2018]

¹⁹ EC, Horizon 2020, European Research Council <https://ec.europa.eu/programmes/horizon2020/node/3> [Accessed 15.4.2018]

²⁰ Around one third of applications for ‘proof of concept grants’ are approved. <https://erc.europa.eu/projects-figures/statistics> [Accessed 15.4.2018]

²¹ Science.ORF.at (27.2.2017) Wie aus EU-Frust ein Erfolg wurde (“How EU Frustration was turned into success”) <http://science.orf.at/stories/2826297/> [Accessed 15.4.2018]

funding raises the prestige of the applicants and thus creates incentives in their countries and research institutions to participate in the promotion of academic excellence through peer review. The German excellence initiative is one such example (Salmi 2009: 49, WR 2018: 10-17).

In practice, excellence in the ERC sense is constituted above all “through competition” (Winnacker 2008). A research proposal is deemed scientifically excellent not by a ‘higher’ body but by proven experts in the field (peer review; cf. Lamont 2009, 2011). Formal assessment criteria focus to an equal extent on the creativity and intellectual ability of the researcher(s) as well as on the innovativeness and relevance of their proposals and methodologies (Hönig 2014). Scientific autonomy and a ‘scientific council’ made up of prestigious and well-networked scientists give legitimacy to the concept of ‘European excellence’ (Gengnagel et al. 2016: 70ff). For the ERC, creating a framework in which peers can make sound decisions is the central task in securing excellence (König 2017: 111). This means that excellence is temporary and is repeatedly redefined by the collective. This role of the peer process in determining excellence is frequently criticised for its conservativeness. Based on 20 interviews with ERC peer reviewers, Luukkonen (2012) concludes that research is assessed chiefly within the boundaries of current knowledge. Since the reviewers seek above all to limit the risk of wrong decisions, potentially groundbreaking but uncertain research proposals are frequently rejected. Another frequently criticised aspect of common funding practices is the preferential treatment given to researchers who have already been granted funding in the past. In line with the Matthew effect, the ‘haves’ get more, while the rest leave empty-handed. This increases the risk of the development of a quasi-monopolistic academic elite (Hönig 2014), while the work of the many rejected researchers is devalued; the creation of excellence through competition also produces losers. Despite this critique, the ERC’s role as the authority for the creation of excellence is rarely called into question (Gengnagel et al. 2016: 72). It has shaped the definition and understanding of excellent research for the long term: the number of ERC grants is now regarded as a transnational indicator for the excellence of national research infrastructures (König 2017: 129).

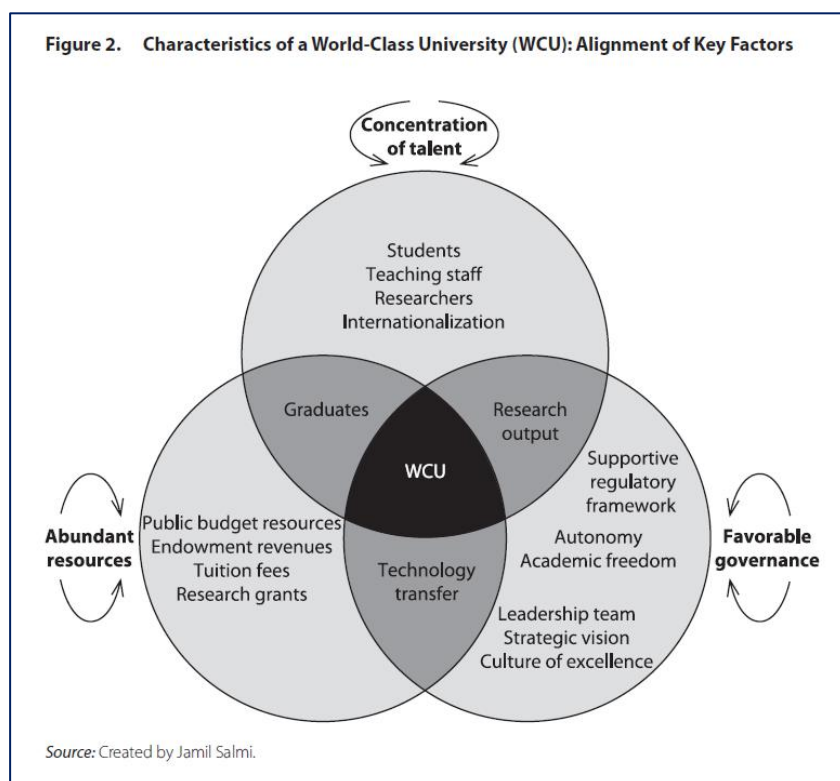
2.2.7 Codification of ‘World-Class Research Universities’ (2009)

The results of the international rankings and the ensuing policy intentions²² in turn raise some reverse questions, which are more of a benchmarking nature: What is so special about the institutions at the top of the league tables? How can their high rankings be explained? Can an institution attain such a position if it seeks to do so? How does it go about this? These and other questions have opened up a new field of research into the so-called world-class research universities (Salmi 2009; Altbach/Salmi 2011; Sadlak/Cai 2009). A WCU model was defined based on the top ranked institutions and a historical analysis of higher education and validated using case studies. Since the top places are all occupied by the US elite universities, and the higher education system in the US was expanded much earlier and

²² “[...] some governments have become concerned that they are/have been under-investing vis-à-vis their competitors. These realizations are leading many countries to restructure their higher education and research systems and prioritize some universities. France, Germany, Russia, Spain, China, South Korea, Taiwan, Malaysia, Finland, India, Japan, Singapore, Vietnam and Latvia – among many other countries – have all launched initiatives with the primary objective of creating world-class universities, inspired by rankings [...]. While the concept of striving has usually been associated with individual institutions, individual US states have also sought to build or boost flagship universities, elevating them to what is known as Tier One status, a reference to USNWR college rankings; Kentucky and Texas are just two examples [...]” (Hazelkorn 2011: 159).

was the first in the world to develop a mass participation structure, these institutions serve as role models for WCUs.

Figure 3: WCU Model by Jamil Salmi



Source: Salmi 2009: 8

The model contains three intertwined dimensions (abundant resources, favourable governance and concentration of talent), each of which has further specific characteristics. Together, these dimensions fulfil the three functions of a university: graduates, research results and technology transfer; the ‘third mission’ in its traditional (early) form is thus an integral component of the WCU. This is not something to be taken for granted, since it is often considered to lie outside the core functions of the university (Lassnigg et al. 2012).

- *Talent*: attracting the best teachers, researchers and students from around the globe; a high share of postgraduate students is advantageous; the high level of selectivity raises equity problems.²³
- *Resources*: the need for a permanent flow of adequate revenues as well as a significant amount of public funding for private institutions;²⁴ additional research grants are a key component, a factor seen as a weak point in Europe.
- *Governance*: places a very strong emphasis on leadership and underscores three functions of autonomy – mobilisation of additional resources, attractive conditions for ‘top academics’ and internationalism in teaching, language and research.

²³ “Emerging research universities also face a variety of equity challenges. Considerable financial resources are required to enforce a needs-blind admission system. Legally imposed affirmative-action programs may distort the meritocratic process. Highly competitive admissions procedures, including high-stakes admissions exams, may engender high levels of private coaching that favor students from richer families.” (Altbach/Salmi 2011: 335).

²⁴ “With an annual spending of about US\$70,000 per student, Pohang University of Science and Technology compares favorably with Ivy League universities in the United States, all of which are private, nonprofit institutions receiving high levels of public funding—in many cases, more than some “official” public universities—through research grants and targeted student aid.” (Altbach/Salmi 2011: 330)

When it comes to ascending the rankings, a difference can be seen between established institutions and those that have been created from scratch. Case studies tend to assign the latter greater potential for climbing the rankings if they have the necessary longevity (the examples refer to a *period of five decades*; e.g. Hong Kong, Altbach/Salmi 2011: 333). Philip Altbach and Jamil Salmi (*ibid.*: 334f) list six factors that accelerate such an ascent, namely:

- Use of the diaspora
- English as main working language
- Focus on niche areas
- Benchmarking
- Significant, innovative curriculum
- Avoidance of complacency

Jamil Salmi also looks at the trajectories and other factors that strengthen the ascension to WCU in another very readable article (Salmi 2013). One such factor is the concentration on niche areas. Two of the successful examples mentioned by Salmi (*ibid.*) – the Swiss state-funded ETH Zürich (Federal Institute of Technology of Zurich) and EPFL Lausanne (Federal Institute of Technology of Lausanne) – are both science and engineering universities.

A further essential element for successful ascension is a functioning '*tertiary education ecosystem*' made up of eight elements that work together (cf. Altbach/Salmi 2011: 336):

- Governance and regulation
- (Financial) Resources and incentives
- Political, social and economic macro environment
- National leadership (vision for the complete system is important)
- Quality assurance (also international)
- Coordination and information
- Location
- IT infrastructure

Appendix 6.2 provides some illustrations of the basic dimensions of the universities analysed by Salmi (2009), which serve to some extent as the role model for WCUs. The average gaps between US and European institutions are also indicated. Their positions in the rankings lie between 1 and 200; half of them are ranked in the Top 50, while one third feature in the Top 10. Considerable differences can be seen here, both with regard to the figures and the correlations between them.

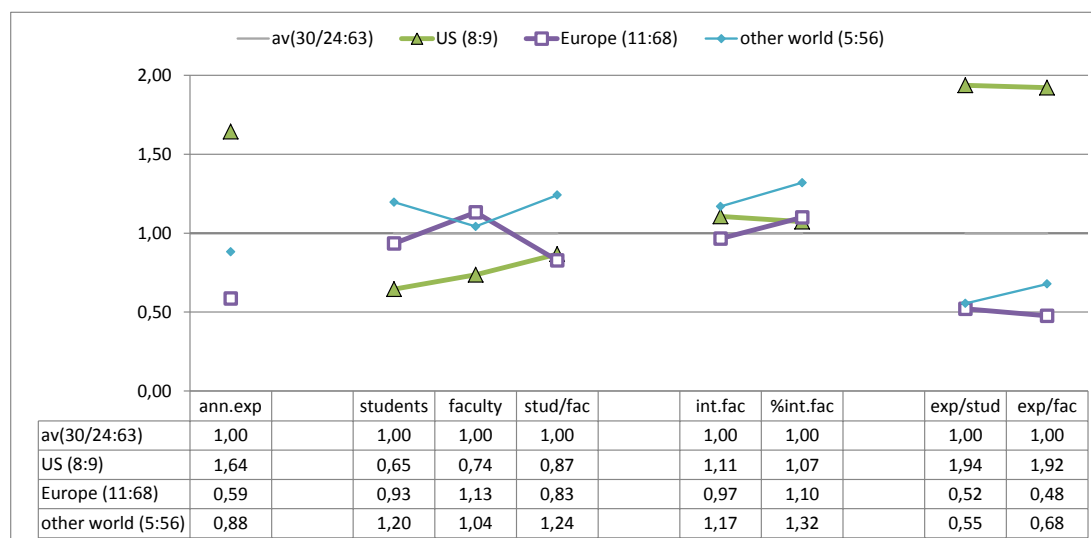
An average institution has an annual expenditure of US\$ 1.2 billion (the range spans from US\$ 500 million to over US\$ 3 billion), 29,000 students (range: 10,000 to 80,000) and 3,300 members of faculty (range: 1,000 to 6,000, with Copenhagen as outlier at almost 9,000). Expenditure per student lies at US\$ 72,000 (range: US\$ 8,000 to US\$ 220,000) and per faculty member at US\$ 530,000 (range: US\$ 106,000 to US\$ 1.8 million). There are 10 students to one faculty member (range: 3 to 20, with Toronto as outlier at 27), international staff account on average for 20 % of faculty (around 600 in absolute numbers).

With considerable variations between the individual rankings, the lower-ranked universities show a downward trend in the financial variables, an upward trend in student numbers and students per member of faculty, and a neutral trend for members of faculty;

this comes as no surprise, because these variables form part of the ranking. What is more interesting – as the scatter diagrams show – is that there are few systematic correlations between the variables (a relatively clear correlation can only be seen between expenditure per faculty and expenditure per student, with MIT and Yale showing comparatively high and Stanford and Berkeley comparatively low expenditure per student).

There are clear and systematic differences between the institutions in the USA and those in Europe (the institutions in the rest of the world are so selective and so broadly spread that their average values are inconclusive; they simply serve to illustrate the overall variation; Figure 4). Expenditure for institutions in the USA is over 50 % (US\$ 2.2 billion) higher than the average, while for those in Europe it is almost 50 % below (US\$ 800 million). Student and faculty numbers in the USA lie at about one third or one quarter of the average (19,000 and 2,400) but are closer to the average in Europe (27,000 and 3,800). The ratio of students to faculty is similar to the average (at eight); figures for international faculty are very similar to the average. Overall, expenditure per student and per member of faculty in the USA (US\$ 139,000 and US\$ 1 million) is almost twice as high as the average for all institutions studied, while in Europe it lies at only half the average (US\$ 37,000 and US\$ 250,000); in other words, expenditure per student/faculty in the US is almost quadruple that of Europe.

Figure 4: Relative differences in annual expenditure, students and faculty between the USA and Europe (overall average=1.00)



Source: Salmi 2009: 93-98. Calculation: IHS.

Note: the numbers shown in brackets in the key indicate the number of universities in the region covered by information (first number) and the total number of ranked universities (second number). Universities included in the average: USA – Harvard, Yale, MIT, Columbia, Chicago, Stanford, Princeton, Berkeley; Europe - Cambridge, Oxford, ETH, Copenhagen, Karolinska, Utrecht, Munich, Helsinki, Milan, Ghent, Trinity Dublin (Karolinska and Milan only in THE ranking); other world – Tokyo, Toronto, Australian National, Singapore, Seoul (see Section 6.2 for further information).

The dimensions of the wealth of the different institutions are illustrated by the endowment capital of selected institutions, which lies namely at between 10 and almost 30 billion dollars in the USA and between three and six billion dollars in Europe (Oxford and Cambridge). The richest US universities receive some US\$ 40,000 in endowment income per

student each year, over a quarter of the total expenditure indicated in the figures used (Salmi 2009: 23).²⁵

2.2.8 Equity, Fairness and Diversity (since 2005)

While differentiation in higher education plays a major role in the excellence context in German-speaking countries – and some other countries in Europe – fair access and diversity are of high and increasing relevance in the USA and in the international discourse. This was confirmed by our quantitative analysis.²⁶ One highly regarded study demonstrates the enduring social reproduction in US elite universities (Bowen et al. 2005), while a US Government Commission addresses the access and cost problems and advocated a systemic approach (“We want a world-class higher education system.”) (U.S. Department of Education 2006). The 2014 EAIR conference in Duisburg-Essen dealt specifically with excellence and diversity (Pritchard et al. 2015; Meyer et al. 2015).

A key topic of discussion in this discourse is the notion that the (hierarchical) differentiation of higher education systems into elite, mass and universal sectors is being reinforced through their expansion, whereby (supported above all by Bologna) an integration and hierarchical restructuring of initially more segmented binary structures is also taking place. A second topic of discussion is that the policy of strengthening excellent institutions (also supported by the rankings) strengthens the Matthew effect and widens the gaps between elite and mass institutions. A third such topic is that the focus on the US world-class universities progressively triggers a homogenization of the field, which ultimately weakens innovative strength.

In the discourse on academic capitalism, a deterioration in teaching is seen as a knock-on effect of the increased orientation on the capitalisation of research and technology transfer as an aspect of the ‘third mission’. In teaching, the competition for position is clearly rising, a situation that is also reflected in the development of ‘elite streams’ (e.g. the Honours programmes in the Netherlands²⁷) at universities (Reumer/Wende 2010). In the UK, teaching excellence has featured strongly on the political agenda for a number of years.²⁸ However, although the teaching dimension has received the most attention in the literature for several decades now, this matter still remains far from clear (Skelton 2005).

2.2.9 Beyond WCUs: Responsible Research and Innovation (RRI) and the Civic or Responsible University (since 2014)

In recent times, criticism of the one-sidedness of the WCUs has been accompanied by some positive alternatives. Goddard et al. (2016; also Goddard 2009) provide a well-founded, synthesised analysis based on a solid concept that combines many fundamental approaches in one simple model. They base their work on the assumption that the dominant concept of (research) excellence – as represented by the WCUs and the orientation on economic competitiveness in general – largely focuses solely on the supply side. A contemporary ‘civic

²⁵ Figures are also available for our Edinburgh case study, where US\$ 3.4 billion in endowment capital is reported, much the same as the figure given for Oxford; Glasgow and King’s College London each have endowment capital of around US\$ 200 million (Salmi 2009: 24).

²⁶ Cf. the detailed and well-informed discussion on excellence versus equity in *The Economist* (2015).

²⁷ Cf. Hostschraeer (2012) for Germany and Singell/Tang (2012) for the USA.

²⁸ HEFCE, The Teaching Excellence Framework <http://www.hefce.ac.uk/lt/tef/> [Accessed 14.09.2017]

university', however, must give equal consideration to societal need – and thus to the demand side in a broader sense. In their view, the demand side is made up of two components in particular, namely the 'grand challenges' of society (global warming, loss of biodiversity, pandemics, poverty, war, fundamentalism, etc.) and the local challenges (loss of industrial base, poor schools, unemployment, urban sustainability issues such as energy, transport, water, waste, etc.).

The civic university builds on public goods and is seen as an alternative to the entrepreneurial university with its focus on economic advance and private goods. OECD studies on the regional importance of higher education institutions view the civic university as an important development and an extension of the so-called 'engaged university' (Watson et al. 2011; cf. also Trippel et al. 2015). Civic and entrepreneurial universities differ thereby in one key organisational aspect:

- An entrepreneurial ('un-civic') university distinguishes between the core functions of teaching and research and the 'peripheral' functions of the 'third mission', and also makes a distinction between teaching and research, whereby the distinguished management and leadership institutions concentrate on the core functions defined through rankings and excellence. 'Policy silos' are created which correspond to the 'policy silos' encountered outside the university.
- A civic university does not distinguish between core/peripheral functions and integrates the 'third mission' as an equal core function in the form of engagement. The organisation thus transcends the fluid borders between 'academia' and 'society'. Positive mechanisms are developed at the points where the three functions intersect (mutual strengthening of research and teaching; widening participation and community work at the intersection of teaching and engagement, and socio-economic impact at the intersection of research and engagement).

An important element of Goddard et al.'s (2006) civic university concept – and indeed their analysis of corresponding case studies²⁹ – is that it takes up and expands the established notion of (research) excellence without compromising quality. This is also seen as a principal challenge in establishing such a university compared to one that focuses on the supply side (a challenge which is however also encountered in an orientation on the narrower economic functions). The concept of the civic university can be seen in this sense as a manifestation of diverse excellence, even if it does itself use the term more in a delineating context.

The concept behind the civic university incorporates the following *seven dimensions*, which also form the guidelines for the corresponding case studies (Goddard et al. 2016: 10-11):

- *Sense of purpose*, i.e. an understanding of the cumulative effects on society and the recognition and treatment of external actors as co-investigators and co-producers of knowledge;
- *Active engagement*, which further emphasises the cooperation with the local community;

²⁹ The second main section of the book contains eight case studies in four European countries: University of Tampere and Aalto University in Finland, Trinity College Dublin and Dublin Institute of Technology in Ireland, the Universities of Amsterdam and Groningen in the Netherlands, and Newcastle University and University College London in the UK.

- *Holistic approach to engagement*, i.e. external engagement is not confined to specific areas, units or persons but is integrated into the core activities and the assessment thereof;
- *Sense of place*, i.e. the close, material integration into the local community, even if the activities have a strong international or global focus, including the sharing with and use of facilities by the community.
- *Willingness to invest* in civil activities and promote ‘boundary spanners’ through assessments and recruiting;
- *Transparency and accountability* in all activities, and especially the civic missions, including benchmarks and performance indicators;
- *Innovative methodologies* (social media, team building) for engagement activities, i.e. entrepreneurship activities *and* other forms of cooperation within/outside academia.

Goddard et al. embed their model of the civic university both in a historical context and in current literature. Two important examples are Arizona State University (ASU) – one of our case studies – and the State University of New York (SUNY). In ASU’s case, one specific aspect highlighted is solution-oriented research (Randles 2017).³⁰ ASU places a very strong emphasis on cooperation with the innovative public sector³¹ and sets strong stimuli for the use of private innovation initiatives in education, above all the integration of new technologies – not only in its own teaching but also in schools. In the case of SUNY, the strong overlap between teaching, research and engagement is underlined (Percy et al. 2006; Syracuse.com 2011).³²

A report for the Global University Network for Innovation (GUNi) applies this concept – in the form of the ‘socially responsible university’ – to the global level (GUNi 2017) and links it with sustainable development goals (SDGs). An important rationale here is the role of the university in linking the global and regional/local levels. Universities are historically seen as one of the first – or even *the first* – *truly global institutions* that can and should serve as brokers across these levels. “Universities can play a vital role in helping to solve problems if they adopt the mission of a ‘civic university’ (Goddard et al. 2016). Walters and James (2017) point out that at present, universities are often acting contrary to the public good, helping to increase inequalities – for example, by celebrating policies of selectivity and neglecting their local or regional commitments – rather than lessening them. In other words, universities can either be part of the problem or be part of the solution.” (ibid.: 504). Put directly, this report represents an important step towards the development and critique of the WCU concept. It accords socially responsible universities the following basic responsibilities (ibid: 504-505):

- to champion the public good;

³⁰ “ASU can be differentiated from other universities by the extent to which it focuses on interdisciplinary, solution-driven research, tackling areas of strategic importance including global challenges around sustainability, health and wellbeing, the natural environment, energy and natural resources, life and health sciences, and the role and impact of new technologies such as ICT on society. The interpretation of the Responsible University under this definition is one which mobilizes its resources and effort to be responsive and relevant to societal needs, and to address pressing societal problems and challenges. In Samarasekera’s words, solution-driven research.” (Randles 2017: 281)

³¹ Cf. the annual Innovation Summits in collaboration with GSV Global Silicon Valley (<http://gsv.com/about-gsv/>), Speeches 2016: https://www.youtube.com/channel/UCRcHDNWSvYi9aL90Q5FSoNg/featured?disable_polymer=1, Speeches 2017: <https://www.youtube.com/playlist?list=PLlxIt1uiA-hh-yuIKCo7HT19a5doI7BSP>; Announcement 2018: <https://www.asugsvsummit.com/> [all links accessed 16.4.2018]

³² “[...] as the primary educator of teachers and doctors, it seeks to ‘own the problem’ of educational disadvantage [...] or poor health and nutrition in neighbouring communities.” (Goddard et al. 2016: 301)

- to implement the SDGs through research, education, practical capacity development and knowledge production;
- to provide a deep understanding of reality; and
- to safeguard the necessary and effective education structures for universal access.

The report emphasises the European ‘Regional Smart Specialisation through Research and Innovation’ and ‘Europe 2020’ strategies as global role models for the responsible university and stresses the diverse ways and forms in which universities can contribute to development (GUNi 2017: 519). These are by no means restricted to excellent research or to the contribution to economic development (through the multinational, monopolistic groups) and through science and technology, but instead also extend to many other social and SME-related economic aspects in their respective region.³³

2.3 The Current Discourse on Excellence in Austria

The Austrian Council for Research and Technology Development (RFTE) has contributed significantly in recent years to the qualified discourse on Austrian innovation, research and higher education policy. Indeed, its publications have sought to infuse the national discourse with much of the best knowledge produced at global level on these topics (RFTE 2015; RFTE 2017). Yet the broader political debate leads us largely to the conclusion that while there is a need for this qualified input, the corresponding demand for it is unfortunately lacking. Essentially, little more reaches the public debate than the notions that more funding is needed for higher education or that more selection is needed to reduce student numbers and improve teaching. As far as excellence is concerned, election manifestos have called for – and promised – better places in the international rankings.

2.3.1 University Excellence in Innovation Policy

The book *Designing the Future* (RFTE 2015) looks at economic innovation, which it analyses and presents as a practical process in which knowledge inputs play a role, but where the focus lies on the processing of this knowledge and the corresponding framework in which this is done. A tentative, but by no means systematic, review of this book interestingly shows that the articles only address excellence in universities to a very limited extent. Indeed, they hardly mention it at all. *Friedrich Stadler* and *Bastian Stoppelkamp* examine the relationship between universities and the knowledge society from a historical perspective and demonstrate a) that the latter is a far older phenomenon than is claimed today and b) that the universities played a very inconsequential role in the formation of the knowledge society and indeed of modern science in general. They speak of a “double defeat for the universities” (RFTE 2015: 69). *Ulrike Felt* also primarily discusses the external influences on transformations in science, rarely mentioning the university as an institution; economic exploitation, managerialism, the project format and efficiency imperative will force new qualities upon it that restrict its reflective potential.

³³ “Universities have a range of mechanisms at their disposal to transform knowledge into development and wealth. These include providing counselling and services to small and medium-sized enterprises (SMEs), public administration and non-governmental organizations (NGOs), ensuring employment for graduates, incubating spin-offs in science and technology parks, setting up networks of research and business clusters, connecting research requests with research groups and students through Science Shops, meeting the needs of the qualification market for local/regional work, among others.” (GUNi 2017: 519)

The essay by *Stephen Ezell* and *Philipp Marxgut* on innovation cultures centres on the ‘innovation ecosystems’ that surround the process of creative destruction and looks at the various theories and facets of culture as a dimension that influences behaviour. Ezell and Marxgut emphasise the embedding of science in broader culture as a key ingredient. They do not mention the role of education in this regard, characterising the research policy inspired by Vannevar Bush more strongly via the Defence Agency, Bell Laboratories, Xerox PARC, RAND and DARPA than via universities. Indeed, they only mention in passing at the beginning of their description of Silicon Valley – a ‘region’ roughly the size of Austria – that it is “replete with five world-class research universities” (ibid.: 185)

Marina Ranga and *Ludovit Garzik* use the ‘triple helix’ model of innovation to analyse the system in the Austrian state of Salzburg and provide a fine-grained description of the higher education system based on available research and teaching indicators (including ranking and financial information). Ranga and Garzik deem the regulations – and also the innovation activities, research and innovation indicators – to be inadequate. The ‘knowledge space’ is more developed than the ‘innovation’ and (political) ‘consensus’ spaces, but the system overall is weak in comparison to other domains in Austria.

The essay by *Philippe Aghion* looks from a competition and growth policy perspective at the various factors that increase competitiveness. Investments in universities, especially in graduate education, increase the productivity of firms working at the ‘frontier of innovation’. Investments in vocational education, in turn, increase the productivity of firms working in less innovative areas. In this Schumpeterian model, investments in education are one factor among other horizontal policies (above all product market, labour market and trade policies) and anticyclical fiscal and financial policy (whereby the latter can, in turn, foster innovation investments in R&D or education).

Jakob Edler and *Helga Nowotny* look explicitly at academic excellence and formulate an alternative to the prevailing (EU) discourse on innovation – which views it primarily as an entrepreneurial activity – and one that – drawing on the ERC approach – focuses on demand-oriented innovation based on academic excellence and responsible research and innovation (RRI). Their emphasis also does not lie on the universities but on the establishment of a suitable framework in the innovation system that facilitates both coordination and openness.

K. Matthias Weber and *Jean-Claude Burgelman* emphasise a process of re-contextualisation of science in conjunction with the increasing relevance of innovation, growing (potential) opportunities for the public to exert influence (and voice objections), new organisational forms like Service Centres and stronger political influence. This trend goes hand in hand with a “loss of autonomy” and “a growing rationalisation and planification of science”. As Weber and Burgelman note: “While this may help reduce risks and increase the societal relevance of science, it also constrains the possibility of surprise.” It has also “imposed a heavy burden of bureaucratisation” (ibid.: 486).

2.3.2 Excellence and the Tasks of Universities

The anthology *Prospects and Future Tasks of Universities* (RFTE 2017) contains a number of different – and even conflicting – positions on excellence, whereby only a minority of the articles actually deal with the concept of excellence. Since the anthology was originally published as a contribution to the Austrian discourse, this reflects the low relevance of the excellence concept in the German-speaking discourse. In the six articles on the “Development, Importance and Tasks” of universities in the first part of the book, excellence only plays a very peripheral role in the article by *Felt et al.* The authors consider governance by indicators to restrict the actual creative tasks of universities and characterise it as a selling of science (ibid.: 36). *Günther R. Burkert* and *Barbara Weitgruber*, in contrast, accord strong relevance to the concept of responsible research and innovation (ibid.: 91-92).

The articles by *Michael Stampfer* and *Georg Winckler* take a positive, affirmative look at the ranking systems. Stampfer avoids the term excellence but uses the Times Higher Education World University Ranking (THE) as a mirror for the quality problems in comparison to other small European countries. He is particularly critical of the defensive stance taken in regard to the rankings by the Austrian Universities Conference in its vademecum (uniko 2017) to avoid having to deal constructively with the issues of quality and competition. Winckler uses the rankings to provide a historical comparison of the US higher education system and its European counterparts, focusing thereby on the positive effects of private funding and competition. He also avoids any specific reference to excellence in his article.

Antonio Loprieno, in contrast, deals explicitly with excellence and confronts it with the terms ‘relevance’ and ‘critique’. In an interpretation of Donald Stokes’ four quadrant taxonomy of research activities that differs quite significantly from the original, he contrasts excellence (knowledge acquisition) on the x-axis and relevance (application) on the y-axis, thereby creating four typical strategic positionings of a university:

Education – classic university
 Relevance – university of applied sciences
 Research – world-class university
 Innovation – university of technology.

In the discourse, a movement from the classic university towards the three other quadrants is postulated. The movement on the x-axis is designated excellence and seen as more valuable than the movement on the y-axis (relevance). The institutions are therefore torn between the competition for excellence in science and the demand from society for relevance in the innovation sense. Many different facets and examples of “two university cultures” (ibid.: 136) are postulated between continental Europe and the USA, and the different developments have led to calls for a “critical university” (ibid.) as conceived by Geoffrey Boulton and Colin Lucas (2008) in the Newman and Humboldt tradition. An adaptation to the WCU model is considered unrealistic, yet there are also calls for the establishment of globally competitive universities and the maintenance of diversity: “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 [...]. 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.” (ibid.: 137). *Peter Scott* likewise argues for “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” (ibid.: 273).

If we contrast the findings from the literature review with the statements in the Austrian discourse, we find two phenomena that are particularly striking: the almost total lack of references to the higher education institutions and their excellence in the discourse on innovation on the one hand and the very narrow, one-dimensional reference to excellence in the discourse on the future of higher education on the other.

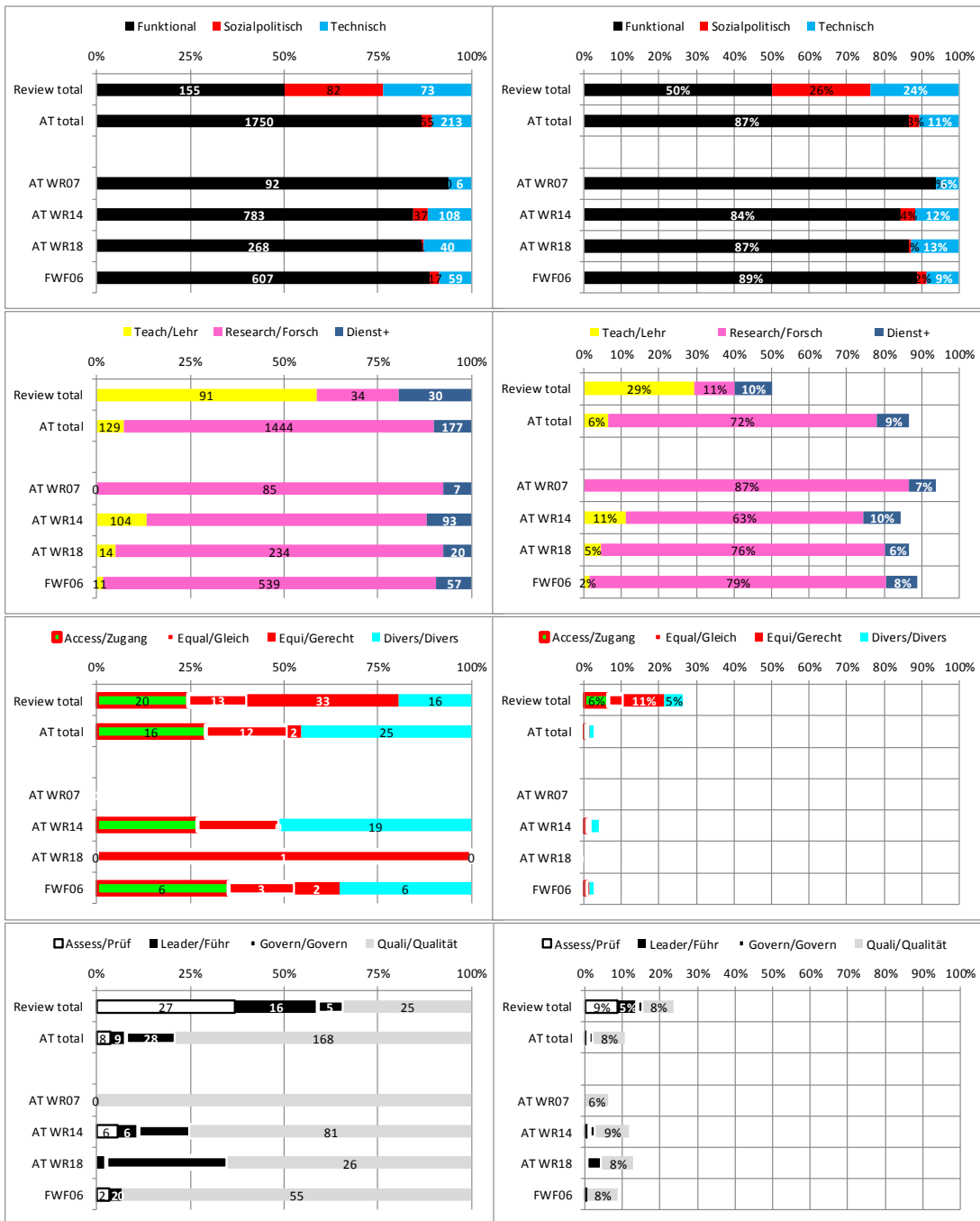
2.3.3 Analyses and Positions of the Austrian Science Board

The *Österreichische Wissenschaftsrat*³⁴ (Austrian Science Board) contributes to the discourse on excellence in multiple position papers and publications between 2007 and 2018 (WR 2007; WR 2014; WR 2018). The Austrian Science Fund (FWF) was commissioned in 2006 by the then Federal Ministry for Education, Science and Culture (BMBWK) to produce a detailed analysis of the conditions and possibilities for an excellent science initiative (FWF 2006).

An analysis of these publications using the keywords for our international literature review clearly reveals a very different structure to the discourse (see overview below). The function-related terms account for almost 90 % of hits, thus dominating over the socio-political and ‘technical’ policy design aspects (which together account for around half the hits in the international discourse). Of the function-related dimensions, research is clearly the dominant topic in Austria, while teaching is most prevalent in the international discourse, with the two other functions together (research and services) each making up about half of the remaining hits. Hence, the socio-political and ‘technical’ policy design aspects only feature to a limited extent in the Austrian discourse. The weightings within these aspects also differ somewhat: diversity has a far higher weighting in the socio-political discourse in Austria than access and equality or fairness (which interestingly play almost no role in the WR 2014 conference report). Of the ‘technical’ policy design aspects, the keywords assessment and leadership have only slightly less weight in the international discourse than their undifferentiated counterpart quality, which accounts for almost 80 % of hits in this dimension in Austria. Overall, this comparison indicates a structure that concentrates almost exclusively on research; socio-political aspects only play a very limited role, while the ‘technical’ policy design discourse focuses above all on the undifferentiated aspect of quality and accords almost no role to concrete aspects like assessments or leadership. However, this focus on research excellence was to some extent already predetermined by the questions posed by the ministry.

³⁴ <http://www.wissenschaftsrat.ac.at>

Overview: Comparison of keywords in the Austrian Science Board publications with the international discourse



Review total = total keywords in international analysis (see figures in Appendix 6.1); AT total = total keywords in the Science Board publications on excellence (WR 2007, 2014, 2018 and FWF 2006).

The Science Board’s 2007 position paper responded to questions from the Federal Minister, namely (1) What constitutes excellence in research?, (2) Where can excellence be seen in Austrian research and where is there further potential for such excellence?, and (3) How can such excellence and potential for excellence be encouraged and advanced? (WR 2007 1).

The definition of excellence is paraphrased by international (global) top performance and uncharted scientific territory; high quality is seen as a prerequisite for excellence; there

should be a balance between competition and collaboration, institutional frameworks should establish a visible climate of excellence that can both attract and maintain the latter.

The Science Board's assessment of the status quo – which builds explicitly on an FWF concept paper (FWF 2006) – cites many areas where excellence could potentially be achieved. However, it also points to the lack of a sound knowledge base (absence of methodologically sound studies into excellence; WR 2007: 4; problem of reliable identification; WR 2007: 5). Overall, a need to develop instruments to identify existing excellence or potential to develop excellence is determined (FWF 2006: 5), with reference also made in this regard to existing evaluations, prizes, awards and FWF projects.

Various Austrian initiatives are mentioned as examples for the future (e.g. the FWF Excellence Cluster, BMWF Excellence Strategy 2006 or RFTE Strategy 2010), while the German excellence strategy at the time, which led directly to a 'climate of excellence', also gets a positive mention (WR 2007: 8). Finally, the assessment also emphasises some key points that it considers important for promoting excellence, namely the triumvirate of pure basic research, applied basic research and product-oriented applied research (WR 2007: 8), the adequate consideration of bottom-up basic research à la ERC model (WR 2007: 9) and the consideration of inter- and transdisciplinarity.

In the foreword to its 2013 conference report, the Science Board notes that it has thus joined in a discussion that now extends to the entire international academic system and in which institutional aspects – the excellence of research institutions like universities and non-university research centres – play a key role (WR 2014: 3), thereby misjudging the fact that the international academic discourse on excellence was at that time already on the decline (as our literature review shows).

The conference papers seek to define and paraphrase the term excellence, adopting thereby a primarily critical position but also including some positive aspects of excellence strategies and programmes. The over-publicising of the term is criticised on several occasions (e.g. with reference to 'excellence inflation' in Germany) and it is paraphrased as 'excelling' over the environment; given an explosion in research costs (seen, for example, in the high debts of leading universities), an exaggerated pursuit of excellence could lead to a 'race to the bottom' in which profile-building might be a possible way forward³⁵; problems of adequate assessment and the underlying target dimensions (acquisition of knowledge vs. use) of excellence in research are raised: excellence should be seen as the consequence not the goal of good research (this also applies to the calculability of excellence); the background to excellence policy is strongly criticised using the example of the German excellence strategy (the competition for visibility between institutions and the resulting horizontal and vertical differentiation of higher education systems might conceivably help the successful institutions but not the system and society as a whole, the Matthew effect would be enhanced, while the orientation on rankings and strategic management would comprise the traditional goals of the university); one paper looks for an alternative approach to excellence at the 'excellently taught practices' level and defines excellence as

³⁵ According to the report, these developments must lead to fears that the international competition for excellence could develop into a race to the bottom. This in turn raises the question of how universities – and governments – can get themselves out of this dilemma. The only alternative appears to be profile-building. In future, only a very few universities worldwide will be able to raise the necessary resources to be excellent in all areas. (WR 2014: 27)

communication between the different forms of knowledge³⁶; a differentiation between quality assurance and the promotion of excellence is needed along with a bridge between basic and applied research, both of which can contribute to excellence; quality would be a more adequate goal for Austria than excellence; Harnack's principle of the researcher personality and an absolute commitment to excellence is important; there is the risk that too much teaching could compromise research excellence; Austria is currently at a 'crossroads' when it comes to the need for the continued funding and advancement of qualified young researchers; the necessary funding has to be found and priorities set; the relevance of institutional size and 'critical mass' is repeatedly emphasised (setting up of collaborations, risk of too big institutions); the effort required for evaluation and ratings is counterproductive (temporary 'stop on evaluation'); evaluations can encourage 'inner-disciplinarity', yet innovation calls for interdisciplinarity, excellence can stand in the way of innovation and creative milieus should be encouraged.

To obtain additional information for its latest recommendations (WR 2018), the Science Board compared excellence strategies in six countries (Austria, France, Germany, the Netherlands, Switzerland, UK). These recommendations begin with a critical interpretation of the term excellence and the selection of an agenda that 'promotes high quality research' (and dismisses excellence as a 'label'). The conclusions drawn on the basis of this comparison (WR 2018, 49-50) differentiate between a focus on promoting research ('thematic-disciplinary approach') or promoting institutions ('institutional approach') as well as the need to establish the necessary infrastructure and additional funding for such programmes over and above the regular budget for universities. Value-added is seen for Austria in the thematic-disciplinary approach; the institutional approach is rejected. According to the recommendations, setting up an (commensurate to Austria's size) 'excellence university' that encompassed a broad range of disciplines and the majority of their faculties would require an incommensurate use of resources (WR 2018: 51). Excellence clusters can be designed decentrally, bottom-up and 'by researchers for researchers' (WR 2018: 52). Important keywords used are basic research and competitive funding, with the former promoted through clusters of excellence clusters (in line with the special research area model), future professorships to support researchers and as a career option for excellent young academics, as well as the establishment of research infrastructure; a separate systematic governance concept should likewise be established.

The concept of excellence sits as it were 'between' the individual universities, and possible conflicts are seen between excellence strategies on the one hand and their 'normal operations' on the other. Creating parallel organisational structures can lead to conflicts. As the German example shows, the administrative effort required for successful excellence projects at or by one institution is usually underestimated – this work cannot be smoothly integrated into regular university operations (WR 2014: 49-50). At the same time, the report emphasises that excellence must be built on high quality and indicates the magnitude of the investment involved: 100 million euros per year for three programme parts, 7-12 clusters of excellence for 5-7 years and up to 50 future professorships for 5 years – in other words, an additional 600 million euros in 6 years.

³⁶ "This paper suggests that excellence could be considered in terms of distinct – though not necessarily separable – scholarly practices. With illustrations from the field of geography, major re-orientations are sketched in the scholarly practices of theoretical and critical thought, of education and pedagogy, of analytical research enquiry and of potential applications in the context of problem resolution [...] XXI century scholars face fresh challenges regarding 'excellence' in scholarly practices, especially those of bridging insights across the fields of bio-physical and human sciences." (WR 2014: 78).

3 Case Studies of Excellent Universities

In this chapter, we present six different universities that are each considered excellent in at least one aspect. In a first step, we will elaborate the choice of these universities based on the discussion of the term excellence in the previous chapter. To provide an insight into the higher education context and the discourse on excellence in which our chosen institutions are sited, each case study will be accompanied by analyses of a systematic review of literature on education policy in their respective countries and/or regions and on the public and academic visibility of their respective excellence (see Chapter 3.2).

We apply a twofold approach in the case studies. First, we carried out various searches to identify the selected institutions and their regional and/or national settings. This provided us with a comparative impression of important aspects of excellence policy and its political relevance. It also provided us with an overview of important relevant academic sources and materials (and ensured no key materials were overlooked in the institution-specific search). Second, we conducted targeted institution-specific searches for the various aspects of ‘diverse excellence’ or excellence policy. The information on how excellence is handled at the respective locations over time obtained from targeted Google and Google Scholar searches was also incorporated into the case studies (see Appendix 6.5).

3.1 Selection of the Case Studies

In our literature review in Chapter 2, we endeavour to provide an impression of the term excellence, its embodiment in education policy and the academic perceptions of its use. In doing so, we also point out the diffuse and multi-layered character of both the use of the term and of excellence policy. The term itself has little scientific basis, is essentially devoid of meaning, and is used primarily in a political context. The current hegemonic external view of excellence is oriented above all on university ranking criteria (see Appendix 6.6) and the gold standard of the world-class universities. While there is at least some research evidence for this homogenised excellence (e.g. Altbach/Salmi 2011), equity and diversity are also regaining relevance in the debate, and it is becoming difficult to define diverse excellence in uniform terms (see the milestones in Chapter 2.2).

The excellence measured by international university rankings (above all using bibliometric methods) is limited to a small – heavily simplified for global comparability – subsection of higher education that does not consider national and institutional parameters (uniko 2017: 13; for more precise details see Appendix 6.6). Hazelkorn (2011) attributes *the competitive policy of visibility* in the rankings to the changes – and competitive conditions – in the global knowledge economy and society. She also takes a very critical look at this policy, emphasising the stark contrast between the limitations and fallibility of the rankings that are known to the actors and the opportunistic behaviour of the higher education institutions, who – despite knowing better – orient themselves on improving their positions in the rankings and also consider manipulative strategies thereby to be more or less inevitable. As an alternative to this excellence policy based on rankings, she proposes an improvement to the ranking policy itself to give it a

stronger ‘*systemic perspective*’ (as opposed to a perspective on individual institutions): What does excellence mean in a higher education system rather than individual (flagship) institutions? It should be noted that so far only a small proportion of the 15,000 higher education institutions worldwide actually feature in the international/global rankings. There are also calls for more specialised and subject-oriented (instead of ‘general’ overarching and institution-wide) rankings.

The orientation on the standards of the global elite, who dominate the rankings with their often multi-billion assets, has – as we have shown – been compared from the outset in the higher education discourse on excellence with other forms of excellence. This ‘diverse excellence’ can be understood in different ways and can be seen quite frankly either as a substitute or a complement to the ‘world-class’ policy. Instead of focussing solely on research, consideration is often also given to the quality of the teaching. The ‘third mission’ puts the spotlight on other functions of a university, primarily a redefinition and repositioning of knowledge transfer practices to business and society, especially in the local area. The ‘third mission’ adds a new element to the tasks of higher education institutions and considerably changes their relationships with their stakeholders. It dispenses with the traditional linear model in which other institutions ‘downstream’ took over the functions and tasks of applied research and development. The ‘third mission’ implies that *the excellent research universities* themselves also engage in transfer with their environment. Increased attention is likewise paid to concepts of the ‘inclusive university’ or diversity management, which gain even greater relevance the more higher education and university systems expand.

The selection of our case studies is based above all on those topics that are currently – or will in future be – most pressing for the development of the Austrian higher education system: realising the capacity for innovation in the form of start-ups (Edinburgh, Chapter 3.4) and a strong focus on both basic and applied research with links to the local economy (Aalto, Chapter 3.5); structural reforms that bring improvements in the international research rankings (Copenhagen, Chapter 3.6) and a reorientation of postgraduate teaching, particularly at PhD level back towards a genuine symbiosis of teaching and research (Twente, Chapter 3.7). And all this against the background of increasing heterogeneity in the student population and its alignment to the heterogeneity of society as a whole as a goal of the EU and the Bologna process (Duisburg-Essen, Chapter 3.8). In light of globalisation and the ease with which knowledge can now be transferred, the regional embeddedness of universities gains more and more relevance as their research activities and graduates turn them into an increasingly important location factor in a knowledge economy (Arizona State University, Chapter 3.3).

3.2 Excellence at Higher Education Institutions and Universities in the Selected Regions

3.2.1 Excellence and Education Policy in National/Regional/Local Academic Discourse (Literature Analysis)

In order to obtain an overview of the (different) discourses in which the universities in our case studies are embedded, we conducted a multi-level literature search for their specific countries and/or regions. Our aim thereby was to identify documents whose titles contain the expression ‘education policy’ and which contain additional references to the countries and/or regions as well as to ‘excellence’ and ‘higher education’ (see Appendix 6.5). This would give us an impression of the weight attached to forms of ‘excellence policy’ in education policy and the extent to which they are actually concentrated on higher education policy.

While the volume of academic literature on education policy expands from the 2000s onwards, this goes hand in hand with a decrease in the share of publications addressing higher education. There are differences between the countries in our case studies, which appear to follow certain patterns in line with their corresponding welfare regimes: the weight attached to ‘higher education’ in education policy literature falls significantly in the liberal countries/regions (Arizona/USA, Scotland/UK) and moderately in the Nordic countries (Finland, Denmark) but rises slightly in their continental European counterparts (Germany, the Netherlands).

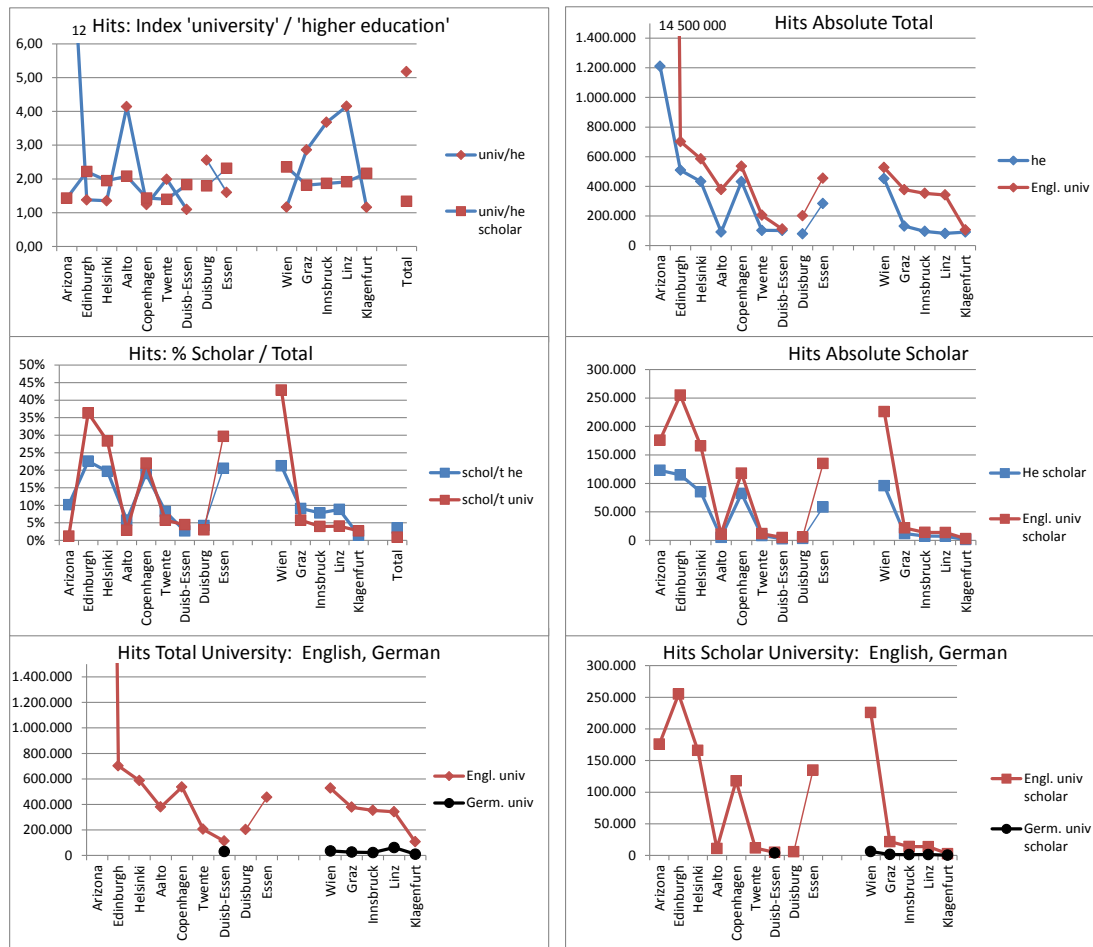
The term excellence plays a minor role in the documents found, which are *by no means restricted to higher education policy documents*. ‘Excellence’ is encountered in the education policy hits for only four of the six countries (there were no hits for Denmark and Germany) and only for one (Scotland) in multiple periods. In almost all cases, excellence does *not* appear in higher education policy documents but rather in documents relating to more general education policy topics (in Finland and Scotland in 2017 with ‘special education’; in Scotland in 2012 with health education; in the other cases in general education policy documents, including one from Scotland in 2010 with a focus on higher education policy). These findings support the impression obtained in our literature review (Chapter 2) that there can be no talk on a more general level of an evidence-based excellence policy in the higher education sector.

3.2.2 Visibility of the Case Study Regions/Institutions in the Google Search

A decisive factor in excellence policy is the global visibility of institutions. A Google³⁷ search without regional specification produces 334 million hits with the keywords ‘excellence’ and ‘university’ and significantly fewer (64.5 million) in the combination with ‘higher education’ (the corresponding searches in Google Scholar produce 3 million and 2.3 million hits respectively).

³⁷ The Google searches contain a certain subjective personalised component as a result of the search histories. However, the rough analysis applied in our case means that this can essentially be discounted. Indeed, some of the searches were repeated on different computers for validation purposes with stable results.

Figure 5: Visibility of the regions/institutions

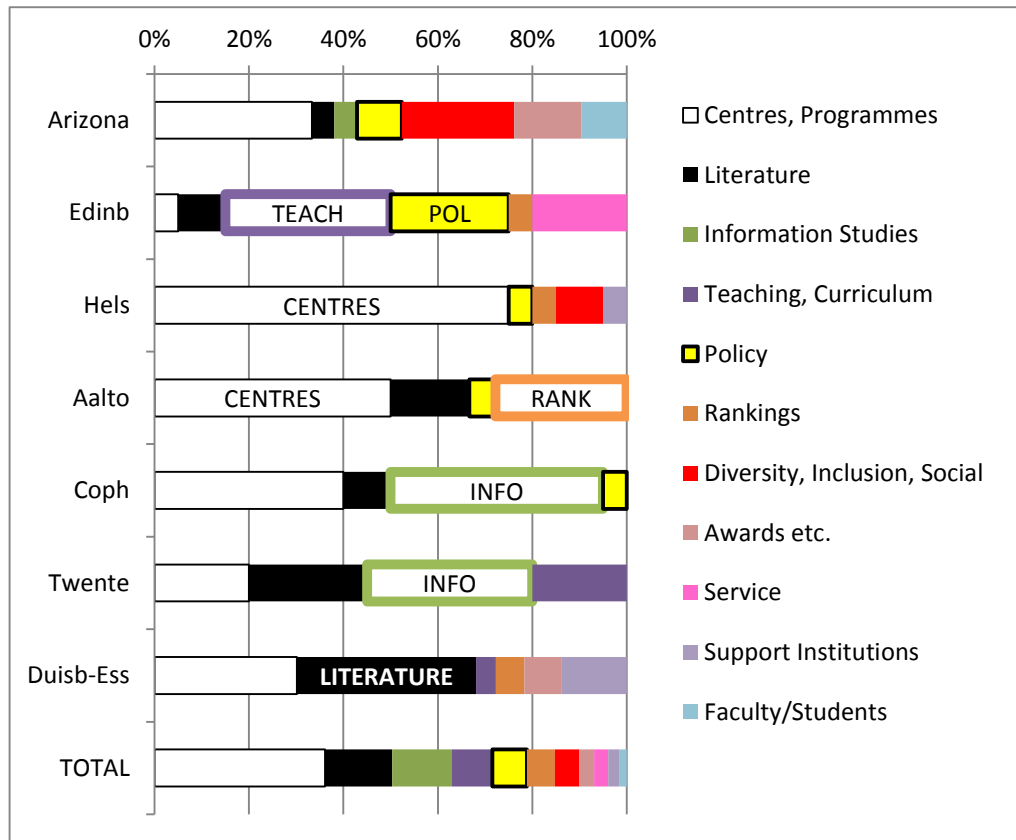


Keywords 'excellence' and 'higher education' or 'university' by selected regions (in the case of Helsinki, we also searched for Aalto; in the case of Duisburg-Essen, we also searched for the two cities separately)
 Source: Google and Google Scholar searches, August 2017.

When the regions are added as keywords (Figure 5), more hits are also obtained with 'university' than with its more specific counterpart 'higher education', whereby the relation between the two is slightly different (hits from higher education research on excellence policy are found above all with the keyword 'higher education'; hits with the keyword 'university' very often include institutional designations, e.g. centres of excellence, and also frequently indicate cooperations with or cooperation partners in these institutions).

The search results for the selected regions/institutions (Figure 5) were contrasted with the most important university cities in Austria. When combined with the keyword 'university', Vienna produces a similar number of hits as Copenhagen and Helsinki (Edinburgh and especially Arizona obtain more hits). The other Austrian cities lie on a par with Aalto, while Twente and Duisburg-Essen exhibit the lowest level of visibility for this combination. In the Google Scholar search, which affords a stronger indication of academic visibility, Vienna lies in the ballpark of the leaders, Edinburgh, Arizona and Helsinki. The rate of Google Scholar hits to total hits is different: it is high for Edinburgh, Helsinki, Copenhagen and Essen in particular (and also for Vienna). It is noteworthy that the search for the German translations of the keywords in the German-speaking regions produces a very low number of hits (which can be seen as an expression of global interconnectedness).

Figure 6: Regional focus topics in the general Google search



Source: Total search in Google, August 2017

An examination of the content of the entries on the first page of hits for the general Google search (Figure 6) reveals a cluster of centres of excellence (and their related programmes). The individual regions/institutions show further specific clusters of themes: diversity and inclusion for Arizona, teaching for Edinburgh, numerous centres for the two Finnish locations with Aalto also showing lots of hits for rankings, information about studying for Copenhagen and Twente, and literature references for Duisburg-Essen (due in part to it having hosted the 2014 EAIR Annual Forum – whose theme was Higher Education Diversity and Excellence for Society – and the subsequent publication of the forum report).

Table 1 provides an overview of pertinent literature that appears in the hits for the general Google searches and can thus be assigned a certain degree of popularity. Most of these works were also found in the literature database searches described in Chapter 2 and are analysed there as well. Table 1 is intended only as an example to provide an insight into the popular representation.

Table 1: Literature in Google search, total

Questioning Excellence in Higher Education, Michele Rostan, Massimiliano Vaira, Springer Science & Business Media, Rotterdam, 2012

Enhancing Quality in Higher Education: International perspectives, Ray Land, George Gordon, Routledge, Abingdon, 2013

A Handbook for Teaching and Learning in Higher Education: Enhancing Academic Practice, Heather Fry, Steve Ketteridge, Stephanie Marshall, Routledge, London, 2003

Built to be excellent? The Aalto University merger in Finland, Janne Tienari, Hanna-Mari Aula & Timo Aarrevaara, European Journal of Higher Education Vol. 6, Iss. 1, 25-40, 2016

Rankings and the Reshaping of Higher Education: The Battle for World-Class Excellence, Ellen Hazelkorn, Springer, Basingstoke, 2015

Fairness in Access to Higher Education in a Global Perspective: Fairness in Access to Higher Education in a Global Perspective Reconciling Excellence, Efficiency, and Justice, Heinz-Dieter Meyer, Edward P. St. John, Maia Chankseliani, Lina Uribe, Springer Science & Business Media, Rotterdam, 2013

Diversity and Excellence in Higher Education: Can the Challenges be Reconciled? Rosalind M. O. Pritchard, Matthias Klumpp, Ulrich Teichler, Springer, Rotterdam, 2015

University Excellence and Efficiency, Matthias Klumpp, Logos Verlag Berlin GmbH, 2012

International Perspectives on University Efficiency, Matthias Klumpp, Stephan Zelewski, Naciye Akca, Logos Verlag Berlin GmbH, 2015

Information Management for Business and Competitive Intelligence and Excellence: Proceedings der Frühjahrstagung Wirtschaftsinformatik '98, Wilhelm Hummeltenberg, Springer-Verlag, Braunschweig, 2013

Excellence in Dutch Higher Education: Handle with Care, Franciscus Kaiser, Johan J. Vossensteyn, in Structuring Mass Higher Education, The Role of Elite Institutions, Editors D. Palfreyman, T. Tapper, Routledge, Taylor and Francis Group, New York / London, 169-18, 2009

Higher Education Excellence and Local Economic Development: The Case of the Entrepreneurial University of Twente, Luciana Lazzeretti & Ernesto Tavoletti, European Planning Studies, Volume 13, 2005, Issue 3, 475-493

Internationalisation of Higher Education and Global Mobility, Bernhard Streitwieser, Symposium Books Ltd, Oxford, 2014

Leadership for Social Justice in Higher Education: The Legacy of the Ford Foundation International Fellowships Program, T. Bigalke, M. Zurbuchen, Springer, New York, 2014

Enhancing Educational Excellence, Equity and Efficiency: Evidence from evaluations of systems and schools in change, Roel J. Bosker, Bert P.M. Creemers, Sam Stringfield, Springer Science & Business Media, Dordrecht, 2012

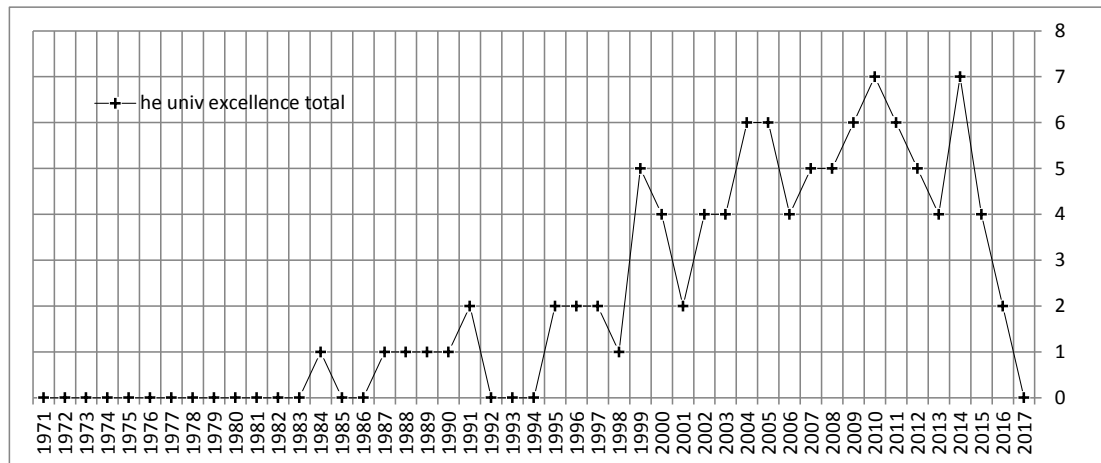
Source: Google search, August 2017

3.2.3 Academic Publications Relating to the Regions/Institutions (Google Scholar)

An analysis of the hits for a current cross-sectional region-based search for 'excellence' and 'higher education' or 'university' in Google Scholar by year of publication shows that the number of hits rises from the 1990s to 2010, then falls gradually each year with the exception of 2014. The reason for this rise and fall could be the time lag until new research enters the Google Scholar discourse). However, the very latest research is also usually not accessible for policy-makers (Figure 7).

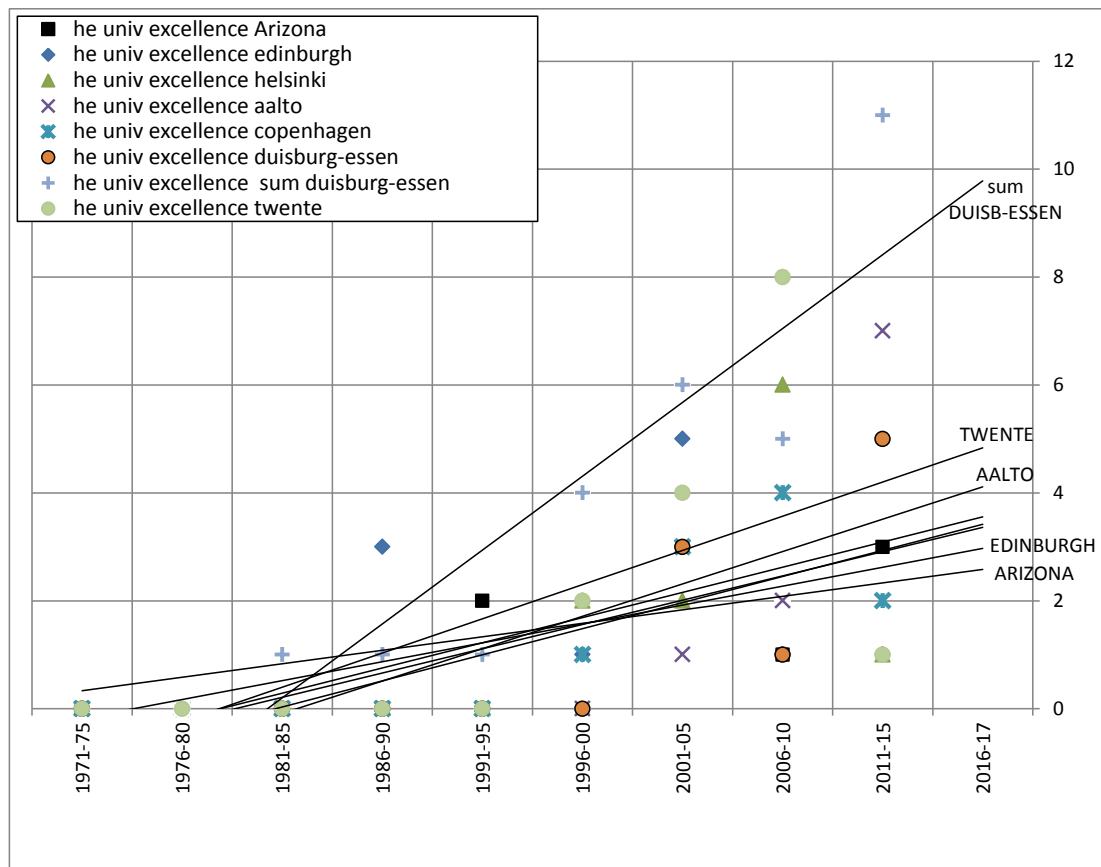
From a time perspective, different patterns can also be seen for the different regions. The trend lines for Arizona and Edinburgh lie at the lower end, while the comparatively 'new regions' of Aalto and Twente lie at the upper end in this analysis (separate searches were also carried out for Duisburg-Essen, producing higher numbers of hits for Essen, but a stronger rise for Duisburg; the sum of these searches rises most rapidly; see Figure 8).

Figure 7: Google Scholar search for 'excellence' and 'higher education' or 'university'



Search by region, hits on page 1 (approx. 1-10), hits in higher education research/higher education policy (the keywords 'excellence' and 'university' produce almost only discipline-specific scientific hits, predominantly from the field of Medicine)
 Source: Google Scholar search, August 2017.

Figure 8: Google Scholar search, trend lines for hits for 'excellence' and 'higher education' or 'university' by region



Search by region, hits on page 1 (approx. 1-10), hits in higher education research/higher education policy
 Source: Google Scholar search, August 2017

A first important finding from this analysis is that there is no common body of literature in the overlap between relevant literature and regions/institutions (Table 2). There are almost no overlaps between the literature hits and the regional/institutional hits on the one hand,

and also only very isolated links between the selected regions/institutions on the other. Interestingly, Copenhagen features in all such links (overlapping with Arizona, Helsinki, Twente and Essen), while Essen is the only other location which overlaps on two occasions (Edinburgh and Aalto do not overlap with any of the other regions/institutions in the literature hits). Overlaps are even very rare between the two sub-regions Duisburg and Essen. Furthermore, multiple overlaps between the searches for 'higher education' and 'university' are likewise only encountered for two regions, namely Duisburg-Essen and Twente.

Table 2: Google Scholar search; overlaps between regions/institutions

ARIZ-CPH-ESSEN [BOOK] Rankings and the reshaping of higher education: The battle for world-class excellence 2015

HELS-CPH Changing structures of the higher education systems: The increasing complexity of underlying forces 2006

CPH-ESSEN [BOOK] Transforming Higher Education. 1996

CPH-TWENTE Student recruitment strategies in higher education: promoting excellence and diversity? 2010

[DUI-ESS-DUI Diversitätsgerecht Lehren und Lernen 2014]

Search by region, hits on page 1 (approx. 1-10), hits in higher education research/higher education policy

Source: Google Scholar search, August 2017

Another interesting finding is that our searches identified very few publications that deal specifically with excellence policies in the selected regions/institutions. We found one case study on Twente that focuses on the formation of a regional entrepreneurial university, while Copenhagen was included in a Nordic study that compared 'flagship universities'. A third observation is that the one overarching publication that features in the hits is Hazelkorn's (2011) critical study on rankings (for more on this study see Chapter 3.1).

3.3 Arizona State University: Research Excellence, Diverse Mass Access and Strong Regional Impact

Established: 1885, accredited since 1958

Type: Public university

Location: Phoenix Metropolitan Area, Arizona (United States of America)

Specific characteristics: No Faculty of Medicine

Students: 98,146; approx. 81 % Bachelor; approx. 75 % full-time; approx. 34 % from minority backgrounds (autumn 2016)

Tuition fees: Yes; clear differences depending on place of residence (residents vs. non-residents), subject, college, etc.

Placings in selected international rankings:

Times Higher Education World University Ranking 2018: 126

Shanghai Ranking 2017: 101-150

Leiden Ranking 2017: 146

QS Ranking 2018: 206

Other notable rankings:

U.S. News and World Report – Most Innovative National Universities 2016, 2017: 1

Association for the Advancement of Sustainability in Higher Education (AASHE) – Sustainable Campus 2016: 1 and *Sustainability Initiatives 2017:* 3

Arizona State University (ASU) was established in the 1880s as a teachers college and received full university status in 1958.³⁸ With around 100,000 students (autumn 2016)³⁹, it is now one of the largest state universities in the USA. It has five distinctive campuses - Tempe, Downtown, Polytechnic, West and Thunderbird - which are distributed throughout metropolitan Phoenix.⁴⁰ About half of ASU's funding comes from tuition fees, 14 % from research grants and contracts, 13 % from the state and the rest from companies, private donors or other sources (ASU 2016: 21). With US\$ 270 million in annual funding from the Arizona Science Foundation since 2006, the university has more money to invest in excellent research than most comparable states in the USA (Altbach/Salmi 2011: 85ff).

In the early 2000s, the university landscape in Arizona was underdeveloped and relatively undifferentiated (Winckler 2016). In 2002, ASU changed its development strategy under new rector Michael M. Crow and has since followed its own ideal of a "New American University".⁴¹ The basic idea behind the transformation process at ASU is to provide sustainable and socially responsible science as well as (excellent) academic research with local impact and ties to society that offers future-oriented solutions, i.e. to be "an egalitarian institution committed to academic excellence, access and maximum societal impact" (Crow 2010a: 36). This 'vision' and its implementation caused a sensation in the USA and was

³⁸ <https://www.asu.edu/asuweb/about/history/> [Accessed 11.07.2017].

³⁹ <https://facts.asu.edu/Pages/Enrollments/Enrollment-Trends-by-Campus-of-Major.aspx>. There are three state universities in Arizona: ASU in the centre, Northern Arizona University in Flagstaff in the north (<https://nau.edu/>) and the prestigious University of Arizona in Tucson in the south (<http://www.arizona.edu/>); there are also a number of private universities, including the University of Phoenix (<http://www.phoenix.edu/>), which made (negative) headlines as a distance learning university [all links accessed 16.4.2018]; Aghion et al. (2009) provide some comparisons between the different US states, which also in part illustrate the position of Arizona.

⁴⁰ <https://campus.asu.edu/> [Accessed 11.07.2017].

⁴¹ This concept to transform the prevalent university model in the USA was formulated in the book *Designing the New American University* (Crow/Dabars 2015).

praised, for example, by Bill Clinton and Jeb Bush for its innovativeness and its contribution to increasing the competitiveness of the region and the country (Crow/Dabars 2015: 1). ASU was ranked in first place in the latest rankings of the most innovative US universities⁴² (retaining its previous year's position) and in third place in the higher education sector in the worldwide sustainability initiatives rankings.⁴³

Broadly speaking, the focus of the transformation concept lies on three strategic themes: academic excellence, open access and entrepreneurship in teaching and research (Crow/Dabars 2015). The idea thereby is to drive economic and cultural development in the region, e.g. through the establishment of a start-up-friendly environment. Since ASU is the only research university in the Phoenix metropolitan area, its responsibility to society is especially high (Crow 2010b: 218f).

3.3.1 Academic Excellence

The first strategic goal of the “New American University”, academic excellence, is no different to other universities, but gained in importance at ASU in the course of the reorientation process. Expenditure on research in the last decade rose continuously from US\$ 152 million in 2004 to US\$ 518 million in 2106.⁴⁴ This was accompanied by a rapid increase in its budget: in the first six years of Crow's rectorship, the university doubled its budget (Theil 2008); since then budget growth has been slower due to massive cutbacks in state grants. The increased relevance of research has borne fruit in the research and prestigious rankings: ASU is ranked among the world's Top 150 universities in the Times Higher Education Ranking, the Shanghai-Ranking and the Leiden-Ranking. ASU is particularly strong in engineering and IT research (Winckler 2016: 114). While ASU achieved an above-average rise in total number of articles published compared to similar universities, it only recorded a moderate rise in frequently-cited articles published in the most prestigious journals (Fischman 2014).

Particular focus is placed on transdisciplinarity in teaching and research as well as on collaboration with social partners. ASU's philosophy here is that socially relevant solutions are more likely to be achieved when teaching and research do not stick to traditional subject boundaries but are instead oriented on the actual problems themselves. It therefore has a large number of transdisciplinary faculties, centres, institutes and other academic units and has closed down some “more traditional” departments (Theil 2008). The share of cross-departmental projects among all externally-funded research projects rose from 18 % in 2003 to 26 % in 2014 (Fischman 2014).

Many of the university's research topics are oriented on current local problems: the *Center for Sustainable Tourism* (formerly: *Megapolitan Tourism Research Center*) looks at the important area of tourism for the region; the *Office of Latino Projects* studies the needs of the large Latino community in Phoenix. The *Hartford Center of Gerontological Nursing Excellence*, founded and run in partnership with other universities, focuses on the challenges of the large share of elderly people in the region (Goddard/Kempton 2015: 24).

⁴² <https://www.usnews.com/best-colleges/rankings/national-universities/innovative> [Accessed 11.07.2017]

⁴³ <https://stars.aashe.org/institutions/participants-and-reports/?sort=rating> [Accessed 11.07.2017]

⁴⁴ <https://facts.asu.edu/Pages/Research/Research-and-Development-Expenditures.aspx> [Accessed 11.07.2017]

The proximity to corporations and public sector bodies that goes hand in hand with this focus on current regional problems and regional development has also attracted critique: Atkinson (2015) notes out that this orientation on current problems leaves fewer resources available for basic research that could produce fundamental innovations. Some professors express fears that ASU could develop into a “‘corporate university’ that focuses on spin-off revenue instead of academic learning” (Theil 2008), whose key areas of research are set ‘top-down’ and are influenced by external donors, sponsors and politicians (Goddard/Kempton 2016: 25f). Winckler (2016: 114), in contrast, is convinced that the stronger focus on the actual problems and potential social impact has attracted many top researchers and encouraged the core characteristics of curiosity and creativity that are so important for science and innovation.

3.3.2 Open Access and Innovative Teaching Methods

In contrast to most universities, which seek to attain the gold standard of the Ivy League universities⁴⁵, ASU explicitly does not strive for ‘Harvardization’ (Crow/Dabars 2015: 250). Instead, it distances itself from the exclusivity and selectivity associated with the Ivy League Colleges:

“Rather than extrapolate from or replicate historical models representative of the gold standard, Arizona State University has sought to reconstitute itself as the foundational prototype for the New American University model – an institution predicated on accessibility to an academic platform underpinned by discovery and knowledge production, inclusiveness to a broad demographic representative of the socioeconomic diversity of the region and nation, and, through its breadth of functionality, maximization of societal impact.” (Crow/Dabars 2015: 60)

Crow argues that the success of those students who manage to get accepted by elite universities is already guaranteed and that it is more valuable to advance those who are not so certain of success (Theil 2008). At the centre of the ‘New American University’ concept lies the goal of providing different societal groups equal access to higher education, increasing the admission capacities of universities and promoting diversity. ASU orients itself in this regard on the admission guidelines at the University of California, Berkeley and California State⁴⁶ from the 1950s and 1960s (Crow/Dabars 2015: 251f). Partnerships are also entered into with “community colleges and local school districts” to increase interest in university education (ibid.: 252). Tuition fees differ depending on the student’s origin; increases in recent years primarily applied to students from out of state.⁴⁷ These measures are reflected in the clear rise in student numbers, greater diversity in the student population, higher freshmen persistence and above-average rise in graduation figures. The number of students in 2016 is 70 % higher than in 2003.⁴⁸ A particularly strong rise has been achieved in the number of students from ethnic minorities:⁴⁹ their share has risen

⁴⁵ The so-called Ivy League universities are Brown University, Columbia University, Cornell University, Dartmouth University, Harvard University, Princeton University, Pennsylvania University und Yale University. They are all prestigious private universities with highly selective admission criteria.

⁴⁶ “California’s Master Plan for Higher Education (1960) [...] set tuition at zero and quality at an unknown upper bound. High levels of public funding were to make possible the novel idea of mass quality.” (Newfield 2015b)

⁴⁷ <http://www.azcentral.com/story/news/arizona/politics/2015/01/16/arizona-higher-education-braced-cut-state-funding/21881559/> [Accessed 11.07.2017]

⁴⁸ <https://facts.asu.edu/Pages/Enrollments/Enrollment-Trends-by-Campus-of-Major.aspx> [Accessed 11.07.2017]

⁴⁹ Minority Students – “A person classified as Hispanic, Black, Asian or Pacific Islander, or American Indian or Alaskan Native regardless of the person’s citizenship.” <https://www.asu.edu/aad/manuals/:///policyarchives/ACD/July2007/acd002.html> [Accessed 11.07.2017]

from around 22 % to around 35 % of all ASU students.⁵⁰ The number of students from low-income families (annual income under US\$ 60,000) has likewise risen sharply (Winckler 2016: 114).

There has, however, also been some critique especially in recent years of how the concept has been implemented (Newfield 2105b): to balance out the cuts in public funding, both tuition fees (which doubled in Arizona from 2006 to 2011 and also rose considerably at ASU in the same period)⁵¹ and the number of students have been raised. According to Newfield, ASU thus opens itself up to accusations of using the income generated from tuition fees to subsidize “showcase research”. He also claims that the share of expenditure on research (37 %) lies well above the national average of 20 % – money that is lacking in other areas (Newfield 2015a).

To handle the growing student numbers, several teaching innovations have been introduced at AUS, three of which we will now describe in further detail. The *eAdvisor* is an electronic advice and ‘degree tracking’ system for students, which helps them to select their major and accompanies them throughout their studies. *eAdvisor* provides students with access to a range of services to assist them in maintaining an overview of their schedule, progress and success, achieving their defined targets or getting back on track. Examples of these services include: search machines to identify and select a major, status and progress reports, reminder emails with information on progress and status updates. If students go “off track”, e.g. drop out of a course, they are required to attend a counseling session before they can enrol in other courses.⁵² To identify at-risk students, the program can also access financial data as well as reports from student dormitories or the campus police (Dräger 2016). Since the adoption of its ‘New American University’ strategy, ASU has recorded a rise in freshmen persistence rates and an above-average rise in the number of degrees awarded.⁵³

The *Knewton* adaptive learning platform has been used at ASU since 2011 to help students at the start of a degree in Mathematics to balance out any potential knowledge deficits (Knewton 2017). *Knewton* assesses individual learning behaviour and performance and adapts the learning content accordingly. By identifying knowledge deficits and providing a corresponding personalised learning process, the failure rate is reduced:

“When Arizona State University started using Knewton-powered developmental math courses, pass rates rose by 17% [from 64% to 75%⁵⁴], course withdrawals dropped by 56%, and 45% of students finished four weeks early.” (Knewton 2017)⁵⁵

The *Global Freshman Academy* facilitates free participation in freshman courses worldwide. The first year of college can be completed online without admission restrictions, with no costs involved until examinations have been passed (Dräger et al. 2017: 271).

⁵⁰ <https://facts.asu.edu/Pages/Enrollments/Enrollments%20by%20College.aspx> [Accessed 11.07.2017]

⁵¹ <https://catalog.asu.edu/tuitionandfees-archive/> [Accessed 11.07.2017]

⁵² <https://asunow.asu.edu/content/new-initiatives-advance-asus-efforts-enhance-student-success> [Accessed 11.07.2017]

⁵³ The number of students has risen by approx. 46% (from 67,082 in fall 2008 to 98,146 in autumn 2016) and the number of graduations by 52 % (from 14,444 in the 2007/08 academic year to 21,953 in 2015/16).

<https://facts.asu.edu/Pages/Degrees/Degree-Trends-by-Campus.aspx> [Accessed 11.07.2017]

⁵⁴ <https://www.knewton.com/assets-v2/downloads/asu-case-study.pdf> [Accessed 11.07.2017]

⁵⁵ <https://www.knewton.com/results/> [Accessed 11.07.2017]

Dräger (2016) advocates, subject to clear data protection provisions, approaches like the *eAdvisor* since these have reduced drop-out rates, particularly at mass universities where students frequently lack orientation. But the use of digital technologies does not always meet with approval. Warner (2015) criticises the extensive use of digital technologies in teaching and advising (“advising driven by data mining”) as “dystopia, rather than a model for the future”. He warns that the *eAdvisor* also uses characteristics like ethnic background and family structure in its calculations for the choice of major. Newfield (2015b) is of the opinion that to actually support non-traditional students “small-scale instruction, creative mentoring practices and other activities that can’t often be standardized to cut expenses” are required.

Teaching at ASU is closely intertwined with research – even Bachelor students are involved in research activities (Shapira 2015:5). This is a topic of heated debate since little is known in the USA concerning the benefits of such research (Christ 2015, Newfield 2015a).

3.3.3 Entrepreneurship, Innovation and Regional Development

ASU’s focus on entrepreneurship and innovation manifests itself in a range of different projects, programmes, competitions and initiatives. Since 2013, the ASU subsidiary **Arizona Technology Enterprise (AzTE)** has, for instance, been responsible for managing the university’s intellectual property and technology transfer and thus also for many of the initiatives described below. These are frequently targeted not just at university staff and students but are instead accessible to all interested parties in the region.⁵⁶

Curricula

Entrepreneurship is part of most curricula at ASU, while some of its **entrepreneurial degrees** focus on innovation development and the activities involved in starting a company. These include the Bachelor in *Technological Entrepreneurship and Management* or *Biotechnology and Bioenterprise* or the Masters in *Creative Enterprise and Cultural Leadership*.⁵⁷

The **ASU Startup School** offers a series of facilitated workshops on the basics of entrepreneurship. These workshops are held in ASU’s Entrepreneurship Outreach Network member libraries and are open to all interested parties.⁵⁸

The transdisciplinary **InnovationSpace** education and research laboratory established as a cooperation project by the Faculties of Design, Engineering and Business seeks to encourage sustainable product developments. Its goal is “to teach students how to develop products that create market value while serving real societal needs and minimizing impacts on the environment [...in other words] to create products that are progressive, possible and profitable [and...] have a meaningful impact on the daily lives of ordinary people.”⁵⁹

⁵⁶ <http://www.azte.com/about> [Accessed 11.07.2017]

⁵⁷ <https://entrepreneurship.asu.edu/learn> [Accessed 11.07.2017]

⁵⁸ <https://entrepreneurship.asu.edu/asu-startup-school> [Accessed 11.07.2017]

⁵⁹ <https://innovationspace.asu.edu/> [Accessed 11.07.2017]

Support for Start-Ups

Incubators are intended to provide support to start-up founders. Students at ASU can apply, for instance, for support from the **Edson Student Entrepreneur Initiative**.⁶⁰ Selected groups of students are provided with space, mentoring, core funding and courses at the *ASU Startup School*. Over the last twelve years, the school has provided such support to around 1,200 students. According to the university, Edson teams have generated US\$ 2 million in income, registered 30 patents and hired more than 150 people in the last three years.

Core funding for new companies is always awarded through regional and global industry-financed **competitions** such as the US\$ 300,000 *CISCO Global Problem Solver Challenge*.⁶¹

Mentoring programmes are offered for students, teaching staff or members of the community looking to start a company, e.g. through the **ASU Mentor Network**: “The mission of the network is to catalyze the entrepreneurial success of founders by connecting them with Entrepreneurship Experts who hold office hours and Venture Mentors who provide regular, ongoing support to founders and their teams.”⁶²

In the **ASU Startup Village**, apartments are provided to full-time students with good academic results who are interested in founding their own companies (entrepreneurial experience is not a prerequisite).⁶³ The ‘residents of the village’ have access to a broad range of training programmes, mentoring and support services and regular get-togethers with (aspiring) entrepreneurs. The participating students are expected to complete the **ASU Startup School** (“a series of facilitated workshops in which entrepreneurs learn how to develop a successful venture”) and participate in an **ASU Startup Weekend** (“a 54-hour event where students of all majors come together to share ideas, form teams, build products and launch startups”). The residents also hold regular surgeries to support other students with entrepreneurial aspirations. In 2014, there were six start-ups ‘in residence’ in the ‘village’.

One subject-specific programme is the **Innovation Advancement Program**, in which students at the College of Law offer legal services to young enterprises in order to gain experience in their chosen profession and ensure that the participating enterprises are based on sound legal foundations.⁶⁴

Promotion of Innovation in Specific Groups

The **SparXX Initiative**⁶⁵ is a series of programmes and activities that focuses on providing support to women who are seeking to found their own companies or need support for their existing business. The **SparXX 20** programme offers female entrepreneurs the opportunity to participate in six interactive workshops (“led by [ASU] faculty and industry experts”) during which they learn how to build their business and increase their profits. Participants are also provided with mentors in their respective areas of business.

⁶⁰ <https://entrepreneurship.asu.edu/launch/edson-student-entrepreneur-initiative> [Accessed 11.07.2017]

⁶¹ <https://entrepreneurship.asu.edu/launch> [Accessed 11.07.2017]

⁶² <https://wpcarey.asu.edu/research/entrepreneurship/mentor> [Accessed 11.07.2017]

⁶³ <https://engineering.asu.edu/livehere/startup-village/> [Accessed 11.07.2017]

⁶⁴ <https://www.law.asu.edu/experiences/clinics/iap> [Accessed 11.07.2017]

⁶⁵ <https://entrepreneurship.asu.edu/community/sparxx> [Accessed 11.07.2017]

The **Prepped**⁶⁶ programme supports “main street food entrepreneurs”, especially women and Afro-Americans. As part of the programme, a member of faculty and industry experts organise weekly classes, mentoring sessions and peer learning activities for food business owners and provide them with administrative support in the start-up phase.

The **Inno-NATIONS** initiative supports entrepreneurs from indigenous groups in Arizona to do business sustainably by modernising their traditional trade networks:

*“We do this through leveraging partnerships and bringing together resources from ASU, the tribal community, and other community organizations. Additionally, we offer the noted ‘First Innovations’ culturally competent entrepreneurial curriculum for small business owners offered as a community training and as a two-semester course in American Indian Studies with a forthcoming undergraduate minor certificate program.”*⁶⁷

Partnerships with Industry and Knowledge Transfer

The **SkySong Innovation Center** provides entrepreneurs with support in the form of advice, training courses, access to various technologies, office space and collaborations with students and researchers at ASU. Being close to other innovative enterprises and the university should serve to help the companies in the growth phase (SkySong 2017).⁶⁸ Through partnerships with various stakeholders, SkySong creates strong stimuli for economic development in the region.

The **ASU Startup Accelerator**⁶⁹ is targeted at entrepreneurs who have recently established firms in Arizona or are contemplating a move to the state. The programme provides them with access to professional mentors, training courses and co-working spaces at the university.

Partnerships with the City and the Region

ASU works not only with companies but also with the city and the regional authorities. In the early 2000s, numerous partnerships were established between the university and the Phoenix metropolitan area. These include research projects on topics like affordable living, sustainable urban construction or the development of criteria to use porous cement in car park construction. The fact that the university’s structure is more closely linked to real issues than to traditional subject boundaries and the central location of some of its campus sites encourage partnerships with extramural institutions. City employees teach at ASU, attend courses there and sit on the university council (Friedman 2009: 94ff).

Value Creation at Arizona State University

The benefits of the engaged university policy for the region are difficult to quantify. Value creation analyses attempt to put at least some of these effects into numbers: as employers and through employee and student spending, universities have a strong influence on the regional economy. ASU itself employs almost 17,000 people, a further 30,000 jobs are secured through the spending by the university, its employees and its students (Hill 2017: 4). This income generates some US\$ 207 million in annual tax revenues for the state of Arizona and local governments in the region (ibid: 8).

⁶⁶ <https://entrepreneurship.asu.edu/community/prepped> [Accessed 11.07.2017]

⁶⁷ <https://aipi.clas.asu.edu/inno-nations> [Accessed 11.07.2017]

⁶⁸ <http://skysong.com/about-skysong/overview/> [Accessed 11.07.2017]

⁶⁹ <https://publicservice.asu.edu/content/asu-seeks-arizona-entrepreneurs-accelerator-program> [Accessed 08.05.2018]

The value added is even higher when the earnings premium of Arizona residents with a college degree is included in the equation. Around 55 % of the students who graduated in 2010 and around one third of those who graduated in 1990 still work in Arizona. The net effect on Arizona income amounts to around US\$ 2.1 billion per year (ibid.: 14f).

The economic benefits of university research are difficult to measure but accrue in the long run “largely to consumers in the form of lower prices and a greater variety of products available” (ibid.: 17). However, since academic knowledge is in many cases tacit and difficult to transform into industrially exploitable know-how, such research and developments frequently take place in and around universities (ibid.). The initiatives described above and ASU’s strengths in engineering suggest potential here for large local impacts (Hill 2017: 18).

3.3.4 Categorisation in the Analysis

Arizona State University was designed by its architects to be a ‘New American University’. However, this aspect is hardly encountered in our systematic literature search for excellence (see Table 5, p. 143). An overall assessment of the ‘New American University’, which has been described as “one of the most radical redesigns in higher learning since the modern research university took shape in 19th-century Germany” (Theil 2008), is therefore difficult to provide. ASU’s restructuring is difficult to compare because it is so unique, explained former Executive Vice President Elizabeth Capaldi to *Nature* magazine: “If you are unique – compare yourself to yourself” (Macilwain 2007: 970). Shapira (2015: 7) laments the lack of detailed independent analyses of the ‘New American University’. The academic interest in the project that prevailed in the 2000s has significantly dwindled; ASU is in the meantime rarely a topic in higher education research. Indeed, our comparative Google Scholar analyses indicate that the weight of higher education in education policy has reduced in the long term. There are indications that aspects of diversity and inclusion – as well as policy debates – are playing an increased role in this region. In various comparative sources, Arizona does not stand out for the specific characteristics of its ‘tertiary education ecosystem’, while state policy documents emphasise the higher education (and education in general) as a key priority.

In its pursuit of excellence, ASU does not orient itself on the ideals of the world-class universities (see Chapter 2.2.7). In contrast to the elitist understanding of excellence represented by these universities, ASU orients itself on more recent excellence discourses (see Chapter 2.2.8). Instead of focusing its efforts on the elite, ASU continues to regard itself as a mass university.

Crow’s CEO-like approach and measures to reorganise ASU (Theil 2008) have undisputedly and quantifiably raised its research output and graduate numbers. The university’s new innovation policy and engagement have also stimulated the regional economy (Goddard/Kempton 2016: 25). In his more in-depth analysis of the transformation processes, John W. Mitchell (2011: 148f) also positively emphasises the increased graduation rates, the clearly intensified social engagement and the entrepreneurial culture at the university:

“The culture of the university has changed and has integrated the ideas of entrepreneurship, social embeddedness, and excellence well beyond where these ideas were a few short years ago.” (Mitchell 2011: 149)

These successes led to Crow being ranked among the '10 Best College Presidents' (Fitzpatrick 2008). In his critique of Crow's book on the 'New American University', Newfield (2015b) welcomes its “anti-elitist goals” but questions how new these goals actually are. He contends that the problems of social inequalities cannot be resolved without a significant increase in state funding and a reduction in tuition fees to implement the ambitious ASU model. He also critiques that the high increase in student numbers, which is the main reason for the university's increased budget, has led to overcrowded classrooms (Warner 2015) and increased pressure on faculty members:

“On the loss side of the equation, many faculty interviewed felt that there is a loss of collegiality among the professors due to the increased workload required of the professors. This increased workload also accounted for many concerns voiced about the quality of instruction at ASU as class sizes have increased with the increased student population of the university. As most US universities have no rigorous outcome testing mechanism, it is difficult to compare how the learning outcomes have been impacted by this increased workload.” (Mitchell 2011: 149)

The strong research focus indicated by the comparatively high corresponding expenditure (Newfield 2015a) comes at the expense of teaching, and critics maintain that underfunding in this field cannot be compensated through the strong use of eLearning. While ASU rejects the WCU way of thinking with regard to access to higher education, it does orient itself more on one decisive (and easier to measure) aspect of the rankings – research excellence and technology transfer – and less on teaching. The strong use of eLearning is, moreover, an important innovative asset in the debates on university development.

In their regional economic impact analysis, Tripple et al. (2015) differentiate four ideal types of university engagement over and above research and teaching to support regional development. While an *entrepreneurial university* concentrates on commercialisation activities like patents and spin-offs, an *RIS university*⁷⁰ augments these through formal collaborations with extramural institutions and firms (as ASU does in projects like the *SkySong Innovation Center*). In addition to the characteristics of the *entrepreneurial* and the *RIS universities*, Arizona State's formal structure also reflects the third ideal type, namely the *Mode 2 university model*, in which research is cross-discipline or transdisciplinary and oriented on actual social challenges. It also fits the fourth model – the *engaged university* – and adapts its engagement to industry and society in the region, thereby helping to create regional identity. Examples here include the *Prepped* and *Inno-NATIONS* initiatives. Accordingly, Arizona State University meets all the criteria that go to make up not only an entrepreneurial university but also one that is highly engaged in regional development. In more recent research, a distinction is also made between an entrepreneurial university and a civic or responsible university, whereby ASU is a good example of a responsible university (see Chapter 2.2.9 and Randles 2017).

⁷⁰ According to Kuffner (2016: 38), an 'RIS university' is embedded in regional innovation systems, serves as an interaction partner and knowledge source for innovative firms and fosters cooperation with the region.

3.4 University of Edinburgh: Start-ups and Technology Transfer in an Affluent Research University with a Long History

Established: 1582

Type: Public university

Location: Edinburgh, Scotland (United Kingdom)

Specific characteristics: Merger with Edinburgh College of Art in August 2011

Students: 37,500; approx. 80% full-time; approx. 64% Bachelor; 43% international students; approx. 60,000 applications per academic year; ratio of applications to admissions (2015/16): 10.5:1.

Tuition fees: Yes, differ greatly depending on regional origin (EU/overseas); tuition fees for undergraduates from Scotland and the EU Member States are covered by the Scottish Government; no remission for postgraduate students

Placings in selected international rankings:

Times Higher Education World University Ranking 2018: 27

Shanghai Ranking 2017: 32

Leiden Ranking 2017: 101

QS Ranking 2018: 23

The University of Edinburgh was founded in 1582 and is one of the seven so-called *ancient universities* founded in Britain and Ireland before the year 1600. It is also one of the most renowned universities in the United Kingdom. The university receives around 60,000 student applications each year, around 10 % of which are accepted. Some 37,00 students study at the university's three colleges and twenty schools. With its Colleges of Arts, Humanities and Social Sciences, Science and Engineering and Medicine and Veterinary Medicine, the University of Edinburgh is a classic full university. The undergraduate and postgraduate courses offered at the University of Edinburgh can be studied on a full- or part-time basis. With around 13,600 employees and a budget of £ 890 million, the university is one of the largest universities in the United Kingdom (UoE 2016a). With similar endowment assets to the University of Oxford, the University of Edinburgh is also one of the UK's wealthiest universities (2009: US\$ 3.4 billion; Salmi 2009: 24).

The University of Edinburgh has a strong research tradition and an excellent international reputation. This is reflected in the current prestige rankings: it ranks among the Top 30 universities in the world in the THE Ranking and the QS Ranking and occupies 32nd place in the Shanghai Ranking. According to the 2018 THE Ranking, the University of Edinburgh is particularly strong in international comparison in the Arts and Humanities, Informatics, Health and Biological Sciences.

The University of Edinburgh defines local and global impact, partnerships with industry and business, and digital transformation as central goals of its mission and vision for teaching and research (UoE 2016b:3). The topics of entrepreneurship, innovation and technology transfer assume an important role in its partnerships with industry and thus also in its strategic focus.

3.4.1 Entrepreneurship and Innovation at the University of Edinburgh

To support the research activities⁷¹ and entrepreneurial aspirations of its students and staff, the University of Edinburgh operates a number of specialised bodies and launches many diverse initiatives.

By far the most important organisation for the transfer and commercialisation of academic research and technology at the University of Edinburgh is ***Edinburgh Research and Innovation Ltd.*** (ERI). *ERI's* history dates back to the 1960s, when the university formed a commercialisation office – *The Centre for Industrial Consultancy & Liaison* – in 1969. The goal of this wholly-owned subsidiary of the University of Edinburgh was to promote and encourage collaboration between the university and industry. In the years that followed, this initial centre produced a number of initiatives like *UnivEd Technologies*, *Quantum Fund Ltd.* or the *Edinburgh Technology Transfer Centre*, which focused on collaboration with industry and business, funding academic research projects with market potential and incubation activities. *ERI* itself was established in 1998 through the merger of *UnivEd Technologies*⁷² with the university's *Research Support Office* (cf. ERI 2009). In 2014, the *Edinburgh Technology Transfer Centre (ETTC)* was subsumed within *ERI* to better meet the needs and demands of the founders of start-ups (The City of Edinburgh Council 2014).

With a total of 135 members of staff (ERI 2015: 12), *ERI* has set itself the goal of exhausting the commercial potential of academic research and innovation. Its focus lies on helping to achieve this potential through funding, cooperation partners, licencees or investors. A central goal thereby is to strengthen the collaboration between businesses, industry and the university and to facilitate partnerships via technology transfer services.

The initiatives and bodies at the University of Edinburgh (many of which were initiated by *ERI*) described below all aim to provide support to founders of start-ups and/or facilitate the commercialisation of academic research and the promotion of technology transfer.

LAUNCH.ed is an initiative by the University of Edinburgh that is run by *ERI* and partly funded by the *Scottish Higher Education Funding Council* (LAUNCH.ed 2017). Established in 2006, this programme offers all University of Edinburgh students and graduates (up to two years after graduation) free, personal and confidential advice and support in their entrepreneurial aspirations. Up to 2011, a total of 125 start-ups were founded with the support of this initiative. *LAUNCH.ed* offers consulting sessions and mentoring, organises workshops, boot camps and competitions and endeavours to equip students with the entrepreneurial skills needed to found spin-out or start-up enterprises with ties to the university. In some cases, *LAUNCH.ed* can support the founders of start-ups in raising funding for services like IP protection, prototyping, market research, legal costs or customer development.⁷³ Free workshops on bookkeeping, tax and legal aspects are also offered. In collaboration with the University of Edinburgh, *LAUNCH.ed* also supports international

⁷¹ The University of Edinburgh is a member of the *British Russell Group*, the *Coimbra Group*, the *League of European Research Universities* (LERU) and the international university network *Universitas 21* (UoE 2017).

⁷² *UnivEd Technologies* was founded in 1983 as a subsidiary of the University of Edinburgh "in response to evidence from industry that companies felt more comfortable dealing with another corporate body. UnivEd would aim to market the University's expertise through industrial research contracts, consultancy services, short training courses and technology transfer – through licensing new technologies and software." (ERI 2009)

⁷³ <http://www.launch.ed.ac.uk/launch-ed-services/> [Accessed 11.07.2017]

students currently studying under a Tier 4 visa who need to secure an alternative visa if they wish to start a company in the United Kingdom:

"The University of Edinburgh is a partner university for the Tier 1 (Graduate Entrepreneur) visa endorsement scheme operated by UK Visa and Immigration. The University can endorse up to 20 international graduates each year to apply for the Tier 1 Graduate Entrepreneur Visa to enable them to develop a business in the UK. [...] The endorsement route is designed for students who have a genuine and credible business idea and are committed to developing their idea on a full time basis. The University of Edinburgh has established clear guidelines and criteria for potential applicants with LAUNCH.ed [...] providing a platform for independent assessment of the business proposal." (LAUNCH.ed 2017)⁷⁴

A further initiative to support start-ups is the **Higgs Centre for Innovation**. Established in 2016, the centre is supported by CERN (2016:58) and is a joint venture between the University of Edinburgh and the Science and Technology Facilities Council (STFC). The centre, which is currently being constructed at the Royal Observatory in Edinburgh, will support start-up enterprises by creating new market opportunities, especially in big data and space technologies, and facilitate knowledge transfer between industry and the STFC's *UK Astronomy Technology Centre*. Its focus will lie on connecting start-up founders to experts at the University of Edinburgh and creating access to facilities for small and medium-sized enterprises (SMEs). "Connecting engineers, academics and PhD students with small businesses will help boost their entrepreneurial experience at the start of their research careers." (UoE 2016c)⁷⁵

One final example is the **Edinburgh Technopole** science and business park, "a joint venture with the University of Edinburgh, Angelo Gordon and Trinity Investment Management" (MSZ 2017). The park was established in 1990 on the initiative of the University of Edinburgh to facilitate cooperation between research and business. *Edinburgh Technopole* offers office space and infrastructure both for start-ups and for established enterprises. It actively encourages the shared use of resources and exchange of ideas between companies. Its partnership with the University of Edinburgh creates networking opportunities with experts as well as access to support and advisory services: "The partnership with the University of Edinburgh allows companies to gain introductions to the science, business and financial communities of Edinburgh and the Lothians and access to top quality legal, financial and commercial advice through a network of visiting or on-site professionals" (MSZ 2017).

3.4.2 Technology Transfer Activities

To promulgate its research activities and promote the transfer of academic findings and innovative technologies, the University of Edinburgh (via *ERI*) runs various projects and enters into partnerships with industry, state institutions and other education establishments. In the 2014 *Global University Venturing TTO Rankings*, *ERI* and its technology transfer activities (patents and licence agreements) were ranked in 17th place (Bayes-Brown 2014). Some of these initiatives are described in more detail below.

⁷⁴ <http://www.launch.ed.ac.uk/visa> [Accessed 11.07.2017]

⁷⁵ <http://www.ed.ac.uk/news/2016/higgscentre-270116> [Accessed 11.07.2017]

The *Click-thru Licensing System* developed by University of Edinburgh researchers offers access to standard licence agreements and an automated “click through” order and payment process for technology licences. The online platform makes it easier for interested parties to licence and purchase materials (biological materials, software and copyrighted materials) available under licence from the university.⁷⁶

Open Technology is another initiative launched by *ERI* to promote knowledge exchange between the university and world of industry and business. It provides companies, industry and the general public with free access to some inventions by researchers at the University of Edinburgh. The technologies available can either be best developed further through open access, cannot be patented, or take the form of software that is made available as an open source licence. Examples of the technologies that are currently being made available include a *high-resolution bioclimate map of the world*, a *low power solution for wireless communication*, *polymers for binding or repelling bacteria*, and the *production of biodegradable plastics from renewable materials* (ERI 2017).⁷⁷

ERI is also one of the founding partners of *University Technology – Invented in Scotland* – a joint initiative between Scottish universities aimed at simplifying and strengthening the technology transfer process and collaboration with the universities. The *University Technology* initiative facilitates access to innovative technologies from various sectors, e.g. the Aerospace, Aviation & Transport, Chemical, Creative Industries, Electronics, Sensors & Photonics, Energy & Renewables, Healthcare & Pharmaceuticals or Information & Communications Technologies sectors. Examples of the technology opportunities currently available include an *in vitro bacterial infection diagnostic test*, *chiral rotational spectroscopy*, and a *new method of detecting endoscope position* (University Technology 2017).

3.4.3 Digression: Teaching

In the regional literature reviews, the University of Edinburgh received a comparatively high number of hits for teaching. Accordingly, we also took a closer look at this topic in this case study. This is an interesting aspect, not least because teaching played a big role in the literature reviews on excellence, a role it is not accorded in the political discourse. What therefore are the most important topics in the teaching and excellence context?

The University of Edinburgh publishes the **reports of the Quality Assurance Agency (QAA)**⁷⁸ but declines to participate in the UK Teaching Excellence Framework (TEF) for political reasons; the Students’ Association supports this decision, because the TEF contributes to the commodification of higher education.⁷⁹ The Scottish government and other universities do however participate in the TEF.⁸⁰ The QAA activities are based on peer reviews and qualitative assessment/improvement, while the TEF follows the logic of the

⁷⁶ <https://licensing.edinburgh-innovations.ed.ac.uk/> [Accessed 08.05.2017]

⁷⁷ <http://www.research-innovation.ed.ac.uk/Working-With-Us/Open-Technology> [Accessed 11.07.2017]

⁷⁸ 2016 report: <http://www.qaa.ac.uk/en/ReviewsAndReports/Documents/University%20of%20Edinburgh/University-of-Edinburgh-ELIR-Outcome-15.pdf>; see also the Quality Enhancement Framework in Scotland (QEF) <http://www.qaa.ac.uk/about-us/scotland/development-and-enhancement> [Accessed 12.05.2018]

⁷⁹ Statement by university: <https://www.ed.ac.uk/news/students/2017/teaching-excellence-framework>; statement by students: <https://ucuedinburgh.wordpress.com/tag/tef/> [Accessed 12.05.2018]

⁸⁰ <https://www.universities-scotland.ac.uk/strong-performance-scotlands-universities-tef/>

rankings and produces rankings of universities.⁸¹ The TEF will be revised in 2017/18.⁸² In 2008, the Edinburgh University Students' Association (EUSA) set up the first **Teaching Award Scheme** organised by students (for an analysis thereof see Lubicz-Nawrocka 2017).⁸³ The university has a **Quality Framework** that is based on the Scottish Quality Enhancement Framework (QEF).⁸⁴ This is also forms a basis for the revision of the TEF.

All in all, there is extensive discourse in the United Kingdom on the topic of excellence in teaching, a discourse in which the University of Edinburgh plays a highly active role (for more on this debate in the academic sector see Broughan et al. 2018). In July 2018 the global **Teaching Excellence Summit** will be held in neighbouring Glasgow, with the main topics of discussion ranging from the 'Balancing Act Between Research and Teaching' through to 'Teaching, Assessment and the Accompanying Problems of Measurement' or the 'Role of Digitalisation'.⁸⁵

3.4.4 Categorisation in the Analysis

Edinburgh builds on the traditions of the Scottish Enlightenment, was already firmly established as a world-class university at the beginning of the 20th century, and is one of the richest universities in the world. Its systematic innovation policy dates back to the first wave in the 1960s and has since been steadily expanded. There are indications of a national support policy (including some prominent political strategy documents) and a (current) strong focus on teaching and service excellence (see Table 6, p. 144).

As Ben Spigel's (2016) analysis shows, universities in Edinburgh (especially the University of Edinburgh) are important components of the local entrepreneurial ecosystem. He analysed programmes to support potential founders ('entrepreneurial support organisations') in the city, their relevance for the entrepreneurial ecosystem and the results they produce:

"Edinburgh, Scotland is one of the most successful areas for growth-oriented, technology-based entrepreneurship in the UK. It ranks in the top ten of British cities in terms of the number of firms founded, patents per capita and percentage of the population with higher education qualifications (Tech City UK, 2015). The city boasts a major research university, the University of Edinburgh, as well as two other universities with strong engineering, business and life science programs. Along with its traditional strengths in finance the city boasts strong concentrations of leading firms in software industries, creative services and life sciences." (Spigel 2016: 149).

Spigel's analysis emphasises the role of the start-up programmes operated by the universities (and explicitly mentions *LAUNCH.ed*). He concludes that it is almost impossible

⁸¹ See the summary in <https://www.timeshighereducation.com/sites/default/files/table.pdf>. There is also a broad public discourse on these results; for examples from 2016 and 2017 see <https://www.telegraph.co.uk/education/2016/06/23/top-universities-for-teaching-but-where-are-oxford-and-cambridge/>; <https://www.independent.co.uk/news/education/education-news/top-uk-university-rankings-gold-silver-bronze-oxford-cambridge-tef-teaching-excellence-framework-new-a7801681.html> [Accessed 12.05.2018]

⁸² For more on the new regulation see http://www.hefce.ac.uk/media/HEFCE.2014/Content/Pubs/2016/01603/EFCE2016_03.pdf [Accessed 12.05.2018]

⁸³ <https://www.eusa.ed.ac.uk/representation/campaigns/teachingawards/shortlist2018/> [Accessed 12.05.2018]

⁸⁴ <https://www.ed.ac.uk/academic-services/quality> [Accessed 12.05.2018]; the elements of the quality framework are Roles and responsibilities; external examining; monitoring and review; enhancement-led institutional review (ELIR); enhancement themes (the next enhancement theme is evidence-based enhancement; the previous was student transitions); student representation – information for staff; accreditation and collaboration; quality code.

⁸⁵ <http://www.theworldsummitseries.com/events/the-teaching-excellence-summit-2018/agenda-5d1f0ada43d742f78f9cf1faac07c7f0.aspx> [Accessed 12.05.2018]

for a start-up support programme to cover the diverse needs of all start-up founders. The high number of such programmes with different areas of focus is thus an advantage but does require better coordination between these programmes (cf. Spigel 2016: 154ff).

The importance of the University of Edinburgh both for the Scottish economy in general and for the entrepreneurial ecosystem in the capital is also indicated in the value-added analysis by *BiGGAR Economics* (2012). This shows that the University of Edinburgh makes a significant contribution to the national and international economy especially through its commercialisation activities (in the sense of start-up and spin-out enterprises as well as patent and licencing agreements).

“BiGGAR Economics has estimated that the combined impact of the University’s licencing activity and new company formation supports approximately 3,600 jobs around the world, including 2,400 in the Scottish economy. Of the 262 spin-out and start-up companies formed at the University since the 1960s, a remarkable 81 per cent of these companies remain active today, generating more than £158 million to the global economy and employing in excess of 2,700 staff in industries such as electronics, bio-technology, engineering and tourism. Research activity is also translated into economic activity through licensing agreements between the University and industry. The University of Edinburgh holds licence agreements with 71 different companies and organisations for technologies around the world. In 2010/11, the total value of licence income and royalties was £3 million.” (UoE 2013: 6)

A comparison of the commercialisation outputs (disclosures, licence agreements, company formations and licence fees) of the eight best Scottish universities (including the University of Edinburgh) and selected US universities shows that the Scottish universities and the University of Edinburgh in particular perform in part considerably better than their counterparts in the US (Smith 2013).

“As in previous reports, the commercialisation outputs from the Scottish University system continue to compare very favourably with our counterparts from the US. More new licences and spinouts were produced by Scottish Universities on average, when research income is normalised, compared to the US. More disclosures were produced compared to the top 11 US Institutes. As in previous years, the US system produces more royalty income from their licence deals and also filed more patents.” (Smith 2013)

The average number of start-up companies formed each year at the University of Edinburgh has remained relatively constant over the last few years (academic years 2009-2015). In the 2015/2016 academic year, a total of 35 start-up companies were created and 43 revenue-bearing licences were signed (UoE 2016a: 2). In the *Spinouts UK* project’s database⁸⁶, the University of Edinburgh is ranked in first place among all higher institutions in the United Kingdom for start-ups and in fifth place for spin-outs.

⁸⁶ The *Spinouts UK* project produces a database containing current data and information on spin-outs and start-ups formed at universities and other higher education institutions in the United Kingdom. For further information, see <http://www.spinoutsuk.co.uk/news/2015/05/07/spinouts-uk-database> [Accessed 16.4.2018]

3.5 Aalto University: Strong Focus on Innovation and Entrepreneurship in a Newly-Established WCU

Established: 2010

Type: Private foundation

Location: Espoo (Finland)

Specific characteristics: Merger of three previous universities – the Technical University of Helsinki, the Helsinki School of Economics and the Helsinki University of Art and Design

Students: 10,819 (Bachelor and Masters), 1,294 (PhD)

Tuition fees: None for students from the EU/EEA/Switzerland; students from third countries: € 12,000 (BA), € 15,000 (MA)

Placings in selected international rankings:

Times Higher Education World University Ranking 2018: 190

Times Higher Education Young University Ranking 2016/17: 27

Shanghai Ranking 2016: 401-500

Leiden Ranking 2017: 342

QS Ranking 2018: 137

Aalto University was established in 2010 through the merger of the Technical University of Helsinki, Helsinki School of Economics and Helsinki University of Art and Design. Its name pays homage to the life and work of the architect Alvar Aalto. The merger formed part of a major reform of the university system in Finland (cf. the case study in Raevaara et al. 2006).

In the 1990s, universities of applied science were formed in Finland (at a comparatively late date as in Austria), usually through the upgrading of existing schools. The dominant theme at that time was still the “regionalisation of higher education” (Nokkala et al. 2016). By the turn of the century, the effects of globalisation and the competitiveness of the Finnish (IT) industry had replaced regionalisation as the main topics of debate.⁸⁷ The merger of the three universities was first proposed in 2005 by the rector of the University of Art and Design, Yrjö Sotamaa.⁸⁸ He made this proposal on the basis of many years of positive experience with joint, interdisciplinary programmes.

“Universities need to rethink how they teach, do research and become aware of what kind of problems they are engaged with. The urgent need for change and my positive experience of the interdisciplinary programs encouraged me to think bigger: merging three excellent universities into a new «innovation university». The time was right for a radical new idea and we were able to use the «window of opportunity». For the first time universities, the government, the industry and various organizations worked side by side to build the flagship of Finnish University reform. I am sure that a similar idea would not be possible today. Times have changed.”⁸⁹

⁸⁷ In 1998, Nokia became the world’s market leader for mobile phones, In 2007, Apple launched its first iPhone, which de facto triggered Nokia’s decline since the latter had reacted too late to the smartphone trend. In 2011, Samsung replaced Nokia as market leader for mobile phones, and Nokia closed the fiscal year with a huge loss. The change in perspective towards globalisation thus coincided with Nokia’s high; the 2010 university reform with its collapse.

⁸⁸ Professor Sotamaa was later also involved in the development of the Austrian Science Fund’s (FWF) PEEK Programme for Arts-based Research: <https://www.fwf.ac.at/en/research-funding/fwf-programmes/peek/>. [Accessed 24.4.2018]

⁸⁹ See interview with Professor Sotamaa: <http://www.designagenda.me/dialogues/where-science-art-meet-technology-business-yrjo-sotamaa-interview/> [Accessed 24.4.2018].

His proposal came at a time when the government had begun discussing a major reform of the higher education system, not least because the many smaller higher education institutions had been criticised as an inefficient use of resources. A 2004 government-commissioned report⁹⁰ deemed that what was needed instead were excellent institutions and above all a world-class university. In 2006, the government presented a discussion paper, which foresaw a reorganisation of the distribution of resources, the creation of stronger and larger units and a focus on image building. The higher education institutions were then called upon to propose structural reforms based on these guidelines (Nokkala et al. 2016). Three potential mergers were proposed as a result, including the one that led to the formation of Aalto University. The business community also played a vital role in this process (Tienari et al. 2016, Nokkala et al. 2016). In its manifesto (2007), the new Finnish government that was elected shortly afterwards formulated the international attractiveness of the Finnish higher education system as one of its strategic goals, to be achieved in part through excellence clusters, world-class expertise, concentration of resources, clear image building and more effective higher education institutions (Nokkala et al. 2016). A reduction in the number of universities from 20 to 15 by the year 2020 was another target. The necessary resolutions were formulated in 2007 and 2008, and work on the mergers began – in Aalto’s case with the nomination of the founding rector in 2008. The following year, a new Universities Act was passed, which came into force on 1 January 2010⁹¹, the day on which the new (merged) universities were officially founded.⁹²

The 2009 Universities Act established the universities as independent legal entities for the first time, with 12 of them set up as public universities and two – Aalto and Tampere – as *privately-funded foundations*. All universities are named explicitly in the Act, meaning that any changes also require a legislative amendment. The university governance structures were also redesigned, with some differences here between public and foundation-based universities. The Act regulates the public universities in more detail, while the foundation-based universities enjoy greater autonomy. Overall, the Act accorded all universities more procedural autonomy and independence from the state apparatus and budget. They became, for example, the employers of their staff, and all civil servants became private sector employees.

The major differences in the governance structures of public and foundation-based universities relate to the board, i.e. the university council. At public universities, up to 60 % of board members stem from the actual university community (professors, non-academic teaching staff and administrators, students) and are elected by the respective “Curia”, while at least 40 % must be external members with *extensive expertise* in the university’s areas of activity. The external board members are elected by the collegium, i.e. the senate. The board is responsible for the university’s basic direction and strategy, agrees its budget, elects the rector, creates the internal rules of operation, approves the performance agreements with the ministry and decides (since 2011) on the number of students to be admitted.

⁹⁰ “Weltklasse-Uni.at” [“World-Class-Uni.at”] was also the motto for the university reforms at the turn of the century in Austria, that culminated in the Austrian Universities Act 2002 and a new public sector employment act.

⁹¹ <http://www.finlex.fi/en/laki/kaannokset/2009/en20090558.pdf>

⁹² In addition to Aalto, there were mergers between the Universities of Kuopio and Joensuu (University of Eastern Finland) and the University of Turku and Turku Business School. The Academy of Fine Arts and the Theater Academy were later also merged into the University of the Arts Helsinki. Finland thus currently has 14 universities. The planned alliance involving the University of Tampere (which foresees the merger with the Technical University of Tampere and Tampere University of Applied Sciences; cf. Sotarauta 2016) was abandoned in the interim, but is currently being revived (cf. <https://www.tampere3.fi/en>).

The board at a foundation-based university is made up of seven external members with *superlative national and international expertise* in the university's areas of focus. They are nominated by the university's 'multi-member administrative body' (the counterpart to the collegium at public universities), three of them from a shortlist submitted by the founding members (with the exception of the Finnish state).⁹³ The tasks of the board are described in far less detail than for the public universities: strategic issues, financial and operative matters and the election of the president (whose tasks are comparable to those of a rector). Foundation-based universities have more autonomy in the division of operative matters between the board, the presidium and the collegium. In Aalto's case, the board also elects the vice president(s), deans and heads of the administrative units.

Both public and foundation-based universities can own land and real estate; to a large extent, the state transferred such ownership to them in the course of the university reforms. Aalto established a real estate company to manage its buildings. The state initially held a one-third share in this company, with full ownership transferred to the foundation in 2015. The company owns the majority of the buildings used by the university.

To establish the Aalto university foundation, the government committed to providing 500 million euros in foundation capital if an additional 200 million euros in funding could be raised from private investors (at favourable tax conditions) within two years (which was the case). At the end of 2016, the foundation capital lay at 948 million euro. The income remaining after administrative costs and inflation can be used to finance the university's operations; so far, however, it has appropriated the larger part of this income to equity.⁹⁴

Aalto University has successively relocated to Otaniemi, a district of Espoo, Finland's second largest city and located in Greater Helsinki.⁹⁵ Espoo (population: 270,000) is an agglomeration of several smaller towns and at times thinly-populated areas. Otaniemi is the part of the city that borders directly on Helsinki. Espoo is Finland's high-tech centre and is also operated and marketed under the 'Espoo Innovation Garden' brand. Many large companies have headquarters there, with the ICT and forestry sectors strongly represented. These include Nokia Networks (the core of Nokia's current activities) as well as some 200 international companies. Around 25 research facilities (including VTT, Finland's largest technical research institution with 2,400 employees⁹⁶), research funding agencies (e.g. TEKES, the innovation funding agency⁹⁷) and business incubators are likewise located in the city, which is – all the more since the founding of Aalto University – also the start-up capital of Finland. Around 44,000 people live in Otaniemi, and the city has approximately as many jobs, including 16,000 in the ICT sector and 5,000 in research (Rissola et al. 2017). Around half of Finland's R&D activities take place on the 4 km² that make up Otaniemi (Rissola et al. 2017). By 2021, all university units (including its halls of residence with accommodation for 2,000 students) should have moved to the new campus, which will soon also be reached from the centre of Helsinki in less than 15 minutes via a new metro line.

⁹³ The founding members are: the Finnish government, the Finnish Technology Industry Association and one of its foundations, the Foundation for Economic Education, the Finnish Industry and Employers Association, the Association of Engineers and the Association of Graduates of the School of Economics.

⁹⁴ Aalto University: 2016 Annual Board Report

⁹⁵ See the detailed analyses in Lassnigg et al. (2012; Section 2.2.4.a, p. 45-63) for more on the political developments in this region and a critical evaluation of Finland's innovation policy; see also MoE/MoE (2009) as an important source of information on the political environment in Finland.

⁹⁶ <http://www.vttresearch.com/about-us>

⁹⁷ <https://www.tekes.fi/en/tekes/>

In its first year, Aalto was still organised into three ‘Schools’ that corresponded to the merged universities; since 2011, the university has been organised into six Schools: Arts, Design & Architecture, Business, Chemical Engineering, Electrical Engineering, Engineering, Science. In the set-up phase from 2008 onwards, the competence areas for the (future) university were defined in collaboration with the academics.⁹⁸ This profile-building process led to a concentration on certain areas, while others were dropped. By 2015, around 80 % of the universities academics were working in the defined areas of competence. New hires are only made in these areas.

Aalto University was also the first university in Finland to introduce a tenure track system based on the US model. There are three levels to this system: Assistant Professor (fixed-term), Associate Professor (fixed-term or tenured) and Professor (tenured). At the start of 2010, the university had 230 professors, 4 % of whom were international appointments. In 2016, it employed 386 professors, 228 (59 %) of whom under the new tenure track system. In other words, in just six years 60 % of its professors were new appointments, i.e. there were as many new hires as there had been professors at the date the university was founded. 20 % of the professors or 30 % of the newly-appointed professors were not Finnish citizens. Of these, around 25 % are women.

In 2016, there were around 11,000 Bachelor or Masters students and around 1,300 PhD students (full-time equivalents; in actual numbers, this corresponds to around 15,000 Bachelor and Masters students and 2,500 PhD students).⁹⁹ This makes Aalto the second largest university in Finland after the University of Helsinki. Since the university reforms came into force in 2010, student numbers in Finland have fallen by 7 %, also in Aalto. However, while the number of Bachelor students dropped significantly (by 22 % nationwide and by 31 % in Aalto) and the number of Masters students rose sharply (by 31 % nationwide and by 62 % in Aalto), the number of PhD students remained fairly constant. At the same time, the number of new students has remained relatively constant since 2012 (no figures are available for previous years): nationwide Bachelor -3 %, Masters +17 %, PhD -11 %; Aalto Bachelor +/- 0 %, Masters +15 %, PhD -16 %. However, these changes can only be seen from 2016 onwards. In Aalto, all Masters and PhD programmes are taught in English¹⁰⁰ while at Bachelor level English is only the teaching language in the International Business programme.

3.5.1 Focus on Multidisciplinary, Innovation and Entrepreneurship

Aalto’s aim is to be *the* university for innovation in Finland, if not the whole of Northern Europe. According to the university, around 70 companies are founded in Aalto each year. The university’s stated mission is as follows: **“Shaping the future: science and art together with technology and business.** We are building competitive edge by combining knowledge from different disciplines to identify and solve complex challenges, and to educate future visionaries and experts.” Its vision is one of an “innovative society”.¹⁰¹

⁹⁸ These are 1. ICT and digitalisation, 2. Materials and sustainable use of natural resources, 3. Art and design knowledge building, 4. Global business dynamics. They are supplemented by three integrative multidisciplinary themes that focus on challenges that are important both globally and for the Finnish economy: 5. Advanced energy solutions, 6. Human-centred living environments, 7. Health and wellbeing. <http://www.aalto.fi/en/research/strengths/>

⁹⁹ All figures taken from: http://www.stat.fi/til/yop/tau_en.html

¹⁰⁰ The only exceptions are a few theatre and film study programmes, which are taught in Finnish (or even in Swedish), but have such a high share of English that it still possible to complete them without extensive Finnish language skills.

¹⁰¹ <http://www.aalto.fi/en/about/strategy/>

Repeated emphasis is placed on the university's multidisciplinary, since "breakthrough discoveries deeply integrated with design and business thinking" should lead to systemic solutions and accelerated innovations. This mission and vision are found not only on paper and on the university's homepage, they were also specifically woven into its 'design'. Important examples of this are the architecture of the campus itself, its so-called 'factories' and the incorporation of student activities. According to Rissola et al. (2017: 38):

"Aalto University does not (only) generate new knowledge in isolation, but strongly engages in its research with industry and society. Its new campus was designed in a way that facilitates personal contact and interdisciplinary exchange (e.g. all ground floors conceived as open-innovation spaces/labs). SMEs and start-ups are offered free office space (e.g. Aalto Industrial Internet Campus), in an attempt to bring them to the campus. In line with the prominence given to personal interaction, the concept of space management as a service is implemented on the Aalto University campus. (...) Examples of this are the Urban Mill, a privately operated space within the campus shared with the City of Espoo and with companies willing to contribute to innovation projects related to urbanism and especially Espoo challenges/needs, or the Startup Sauna, a space offered to students to promote start-up creation. There are also plans to share some of the campus facilities with primary and secondary schools, as well as kindergartens and services for elderly people in order to enhance liveability and encounters in the area."

The **Aalto Design Factory (ADF)** was the first building on the new campus in Otaniemi. Its roots date back to projects at the end of the 1990s. In its own words, *ADF* is a place for "fruitful interaction between students, researchers, and professional practitioners"¹⁰² where multidisciplinary teams work mostly on externally-funded design projects. The Design Factory's primary target groups are students and start-ups (who can also establish their headquarters there). Various spaces, media labs, (3D) printing facilities as well as an 'ElectroShop' and a 'MachineShop' for developing prototypes are all available to its 'clientele'. *ADF* also employs four researchers, who serve as the anchors between the platform and other researchers at the university. The 'factory' also organises about 40 courses each year for students. A network of 'factories' based on the *ADF* model has since been established on all continents of the globe. At Aalto University, *ADF* served as the model for a Media Factory (now known as Aalto Studios) and a *Health Factory*.

The *Media Factory* "weaves together *the players of the creative economy*: designers, filmmakers, youtubers, game developers, performing artists, educators, angel investors, public-sector operators and more" and sees itself as the "*media center of the future*, where teaching, research and product development can measure up to the challenges of the rapidly evolving digital society".¹⁰³ It also offers a film production service for all campus partners (incl. start-ups). The *Health Factory* is operated by the School of Electrical Engineering and focuses primarily on medical technology with the aim of filling the gap between research and innovation.

Aalto **Urban Mill** is a joint venture between the university and the city of Espoo that follows a similar concept to the 'factories'. *Urban Mill*'s focus lies on urban development and pressing urban problems. It also offers co-working space for start-ups but serves primarily as a platform which brings developers, local authorities and residents together. To date,

¹⁰² <https://designfactory.aalto.fi/#story>

¹⁰³ <https://studios.aalto.fi/about-us>

Urban Mill has assisted around 50 “proto/demo/startups”.¹⁰⁴ The *impact iglu*, in turn, provides support to entrepreneurs working in the field of social change. In the first two years since it was founded, *impact iglu* has concentrated on organising events, building up networks and providing space for ‘social business’ activities.¹⁰⁵

The *Startup Sauna* is a co-working centre developed and run by students and a business accelerator with access to a pool of over 70 coaches to help transform new ideas into start-ups. While its focus initially lay on Finland and Northern and Eastern Europe, Asia has also become an increasingly important area for the *Startup Sauna* in recent years. According to its website, the *Startup Sauna* has coached 222 start-ups since 2010, received over 4,500 applications for its accelerator programme to date and helped to generate more than US\$ 200 million in venture capital. In 2017, it organised 25 selection events in various locations from Turku in Finland to Budapest in Hungary and Singapore (the majority in Finland and Eastern Europe). The teams selected then spend several weeks in the *Startup Sauna* (‘accelerator’). The programme is free to potential start-up founders, who can choose between a € 1,000 grant or free accommodation while participating in the programme. A highlight is the annual ‘Slush’, which is open to the ‘winners’ of previous events. Slush claims to be the largest start-up event in the world, with 17,500 attendees and around 1 million livestream viewers: “Slush is a student-driven, non-profit movement originally founded to change attitudes toward entrepreneurship. In 2016, Slush was organized in Tokyo, Shanghai and Singapore. (...) In [Helsinki] 2016, over 2,300 startups, 1,100 venture capitalists, and 600 journalists from over 120 countries came to Slush to drive business, and to experience the phenomenal atmosphere.”¹⁰⁶

In addition to those described above, there are *another ten* such initiatives at Aalto University that focus on entrepreneurship and start-ups, several of which are run by students. There is also the *Aalto Ventures Programme* and the *Aalto Startup Centre*. The student projects, for example, arrange internships at start-ups in California or Asia and create communication platforms for alumni who have founded or work in start-ups and current students. Another start-up hub, *A Grid*, opened at the end 2017 with capacity for over 100 start-ups. The Aalto University library is also designed to be a learning centre: it hosts numerous events, serves as an exhibition space and is also home to the *Aalto FabLabs* – “open access digital fabrication labs” (with 3D printers, cutters, CNC milling machines, 3D scanners and electronics labs) that can be used by all members of the university, e.g. to develop prototypes. Outposts of the library in the various schools and departments are referred to as learning hubs since they also offer space to study and work in smaller groups. With a prior booking, most of the facilities on the Aalto campus mentioned here – especially the learning hubs – are available 24 hours a day.

Aalto University’s innovative spirit is also evident in the way it describes its courses and appeals to future students: it is looking for “game changers” who want to change the world. With the slogan “At Aalto University you get more than a degree”, the university highlights

¹⁰⁴ <https://urbanmill.org/english/>

¹⁰⁵ <http://impactiglu.org/>

¹⁰⁶ <http://www.slush.org/>

its strong international network and open environment that empower students to break boundaries. It also places key emphasis on its strong student-led start-up scene.¹⁰⁷

3.5.2 Decrease in Funding

In recent years, the Finnish government has introduced some major austerity measures to get the state budget back on track. Neither the universities nor the research funding agencies that are so important for Aalto were spared by these measures. Government contributions to Aalto were reduced by 11 % between 2014 and 2016, while contributions to TEKES (the funding agency for applied research) were reduced by a far greater amount. As a result, Aalto's expansion strategy was abruptly halted, and the university had to reduce its workforce in 2015/2016 by around 600 full-time equivalents (-12 %).¹⁰⁸ These cutbacks affected all categories of staff with the exception of professors. Their effects on the future development of Aalto University will, however, only be seen in future years.

3.5.3 Categorisation in the Analysis

There are clear strategies in place to make (Greater) Helsinki one of the leading 'world-class' regions; the University of Helsinki is very strong, while Aalto is an attempt to establish a WCU based on the US foundation university model. The two institutions complement each other well. Despite the enormous resources, the dimensions are still small in comparison to the top-class WCUs. Increased attention to the rankings can be seen in the literature review (Table 7, p. 145), and there is a strong emphasis on various forms of centres of excellence in the Helsinki region, some of which also form a part of the national research strategies. The university sector in Finland is clearly defined as an elite sector, with polytechnics also being established since the 1990s (in parallel to Austria, but not on a comparable scale). Given its short history, Aalto is difficult to gauge.

In their study of the Espoo Innovation Garden, Rissola et al. (2017) take stock of Aalto University's development and accord key importance to its central focus: "*Aalto University plays an active role in developing relatively applied scientific knowledge contributing to the further development of the innovation ecosystem.*" (ibid.: 38). However, as they also point out, its research output cannot be ignored, since the innovation performance of a university depends above all on the strength of its basic research:

"Over the past five years one observes a notable improvement in Aalto University's research performance both in terms of the quantity and scientific impact of its scientific research output. We observe that the total output has increased by 60% and that the average output paper receives between 20% and 86% more citations than the world average. For comparison, the Field Normalised Citation impact lays around 1.35 for Finland as a whole, indicating that Aalto University did not yet systematically outperform the average output of the Finnish research system in terms of citation impact. In spite of its staff reductions the university expects the number of articles and their impact to develop positively as it continues to implement its strategy." (ibid.: 15)

According to Rissola et al. (ibid.), the conclusions that can be drawn from the development of Aalto for other regions in Europe are as follows:

¹⁰⁷ <http://www.aalto.fi/en/studies/>

¹⁰⁸ Aalto Annual Report 2016.

“Other universities in Europe may learn from this experience in the sense that even without great investment of financial resources university leadership can be in the position to play an important facilitating role for students' entrepreneurial activity. The entrepreneurial spirit and participation of all actors (including students and citizens) is actually seen as crucial by leading organisations in the local context. It is important to realise that this was not a given in the Finnish context, in which the national culture was long considered to be unsupportive of risk taking and entrepreneurship. The main aim of most students used to be to work for government or big multinational companies such as Nokia. There had been also little tradition in entrepreneurship education in the universities that were merged to form Aalto University, as these had focused primarily on catering for the large tech firms (Graham, 2014). Since its inception however, entrepreneurial education has become very important in Aalto University and not just in terms of start-up companies. It is more understood as something that encourages people to take responsibility and exercise leadership (entrepreneurial mind-set) in the execution of tasks and projects. (...) The ability of the university governance to listen to the students' opinion and ambition has paved Aalto University's way to success.” (ibid.: 40ff)

They also note:

“Experts argue that it could have been faster if the university, a key driver, would have had more resources for activities related to entrepreneurship and commercialization. Indeed, Universities' funding models in Finland includes very weak incentives for that, a weakness partially mitigated for several years by Tekes funding of Aalto University entrepreneurial structures and student's bottom-up initiatives. This funding source was dramatically cut recently. For Aalto University, the experiment has also faced challenges which broadly relate to the tension between building a scientifically highly rated institution whilst at the same time engaging with the wider society, as there might be dangers of the former ambitions driving out the latter.” (ibid.: 43f)

This final sentence is decisive, above all for potential emulators: how Aalto's specific combination of purely academic research and innovation-driven teaching, research and development activities will develop needs to be closely observed. At present, a balance appears to have been found between the two, which interlocks them and allows them to grow together. However, the effects of the financial cutbacks on its academic research and on Aalto as an internationally attractive employer and research facility remain to be seen. Negative consequences for academic research would also be likely to have negative consequences on the innovation activities at the Otaniemi campus in the medium term.

3.6 University of Copenhagen: Rapid Rise up the International Rankings

Established: 1479

Type: Public university

Location: Copenhagen (Denmark)

Specific characteristics: Oldest and largest university in Denmark; merged with two other universities in Copenhagen in 2007; a GRI¹⁰⁹ was integrated into the university in 2004; two further GRIs were incorporated indirectly as parts of one of the merged universities

Students: 38,615, 56 % of whom are Bachelor students

Tuition fees: None for students from the EU/EEA/Switzerland; € 10,000 per year for students from other countries; no differentiation between subjects

Placings in selected international rankings:

Times Higher Education World University Ranking 2018: 109

Shanghai Ranking 2016: 30

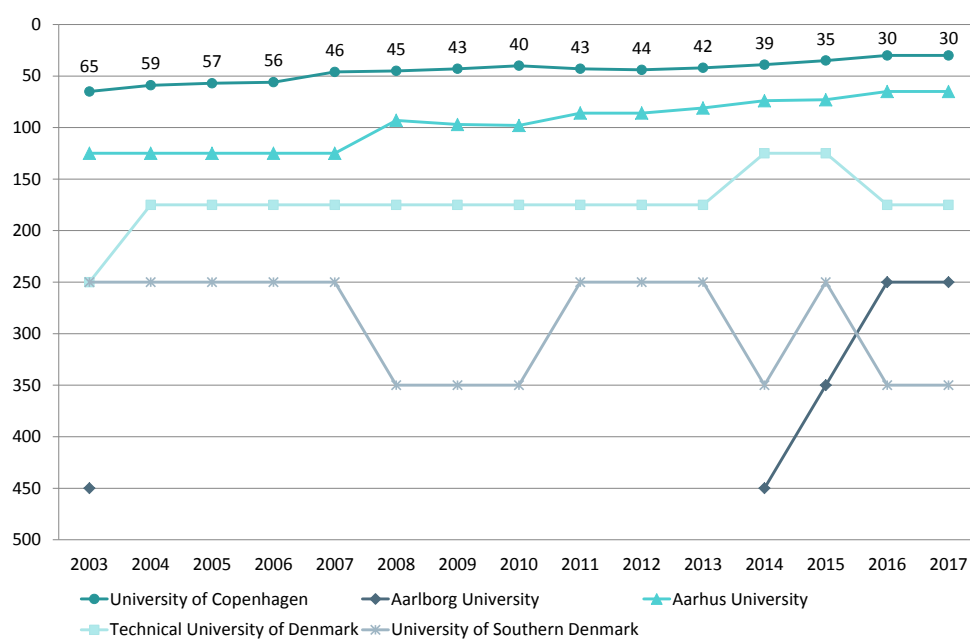
Leiden Ranking 2017: 39

QS Ranking 2018: 73

In recent years, the University of Copenhagen has significantly improved its positions in the rankings, climbing, for example, in the Shanghai Ranking from 65th place in 2003 to 30th place in 2017 (see Figure 9, p. 73). Copenhagen is thus the highest ranked university in Denmark (and comparative information for this university is also included in Salmi's material; see Chapter 2.2.6 and Appendix 6.2). Other Danish universities have likewise improved (some significantly) their positions in the Shanghai Ranking: Aarhus University, Denmark's second largest university, has moved up from the 101-150 category to 65th place, making the leap into the Top 100 in 2008. Until 2013, Aalborg University did not even feature in the Top 500 in this ranking but climbed from 2014 onwards by 100 places each year reaching the 200-300 category in 2016 and 2017. Given its specialised focus, the Copenhagen Business School 'only' achieves a position in the Broad Subject Fields ('SOC') and Subject Fields ('Economics/Business') but not in the Institutional Ranking (which is why it is also not shown in the overall institutional rankings). The Copenhagen Business School achieved the leap into the SOC 151-200 category in 2012, where in 2016 it was ranked in 50th place.

These improvements in the rankings can be attributed to a large extent to the comprehensive reforms and structural changes in the Danish higher education system since the turn of the last century (the merger process in particular produced major improvements for the two main universities that were affected). In Salmi's terms, these reforms relate to the 'tertiary education ecosystem' (see Chapter 2.2.7). We will therefore now describe these changes and the higher education framework in Denmark before moving on to look in more detail at the University of Copenhagen as the country's highest placed university in the Shanghai Ranking.

¹⁰⁹ GRI: Governmental Research Institute

Figure 9: Danish university placings in the Shanghai Ranking

Placings outside the Top 100 are not given precise numbers in the Shanghai Ranking but are assigned into category ranges (e.g. 101-151, 152-200, 201-300, etc.). Figure 9 shows the average value for each category range. Only those Danish universities that are assigned an 'Institutional Ranking' are shown.

Source: <http://www.shanghairanking.com/>; own representation.

The Political Background in Denmark

In Denmark, social democratic and right-wing/conservative/liberal governments have alternated over the last 20 years. From 1993 to 2000, the Social Democrats were in power in coalition with the socio-liberal *Radikale Venstre* party and in the early years also with the Central Democrats and the Christian Peoples Party. The Liberals (*Venstre*), a centre-right party, and the Conservative People's Party then held power from 2001 to 2010. A majority of the reforms of the Danish higher education system described below took place during this period. The Social Democrats and Social Liberals (initially also with the Socialist People's Party) returned to government from 2011 to 2014. Since then, i.e. from 2015 onwards, the government has again been made up of the (neo-)Liberal and Conservative parties.

The Danish Higher Education and University System

There are five different types of higher education institutions in Denmark:

1. Business academies (*Erhvervsakademi*): vocational education in short cycle programmes and at Bachelor level
2. University Colleges (*Professionshøjskole*): vocational education and at Bachelor level
3. Maritime Education and Training Institutions: vocational education in short-cycle programmes and at Bachelor level
4. General and specialised universities (*Universitet*): Bachelor, Masters and PhDs in academic disciplines
5. University-level institutions: Bachelor, Masters and PhDs in the Arts (cf. UFM¹¹⁰ 2016).¹¹¹

¹¹⁰ UFM (Uddannelses- og Forskningsministeriet): Ministry of Higher Education and Science.

In addition to the universities, there was also a network of 12 *Government Research Institutions (GRIs)* until the mid-2000s, which were largely integrated into the universities in the course of the merger process (for an overview of the previous situation, see DNRF 2005).

3.6.1 Reforms in the Danish Tertiary Education Ecosystem

The various dimensions in Salmi's tertiary education ecosystem (TEE) were addressed in the Danish reforms (see Pinheiro/Stensaker 2014; Kalpazidou Schmidt 2013). Our description of these reforms in this chapter is therefore presented on the basis of these dimensions.

Political, Social and Economic Macro-Environment, National Leadership/Vision for the Complete System

Around the year 2000, a national research commission proposed a reform of the funding, institutional landscape and management of the Danish universities. At the same time, and in the course of a broad political 'millennium discourse', the aspects of the 'third mission' (relationships between universities and business, technology transfer and innovation, knowledge for society) filtered through to the academic communities under various banners like 'from research to invoice'. In 2001, a government ministry which bundled the areas of science, technology and innovation was formed. This ministry would play an important part in the coming reforms. These discourses were then taken up and continued by the Globalisation Council 2005, which played a key role in the university merger process.

A strong emphasis was placed on strategic action – from the political level through to the institutions themselves – and policy development was repeatedly based on and accompanied by broad discourse and consultations.

Governance and Regulation

A 3-year 'Development Contract' system between the universities and the ministry was introduced in 1999. These contracts set the strategic focus but did not link targets to results and funding until after the third period (2008-10). A subsequent evaluation criticised the excessive detail in these contracts and the overly strong focus on indicators (Kalpazidou Schmidt 2013).

An important step in the reforms was the *University Act 2003*, which granted more autonomy to the Danish universities. Interestingly, the Austrian Universities Act 2002 accorded the Austrian universities far more autonomy in personnel and budget matters (cf. Winckler 2013: 1). The changes to the institutional framework followed two particular goals for the universities, namely to "increase their ability to make strategic priorities" and to "strengthen their decision-making powers" (Milthers 2001: 5). To achieve these goals, two bodies were installed at the top management level of a university: the 'board' and the 'rectorate'. The board is the highest authority at a university and agrees – unlike in Austria – the development contracts with the ministry. In contrast to Denmark, the Austrian variant

¹¹¹ <http://ufm.dk/en/education-and-institutions/recognition-and-transparency/transparency-tools/europass/diploma-supplement/standardbeskrivelse-danish-higher-education-system.pdf>
[Accessed 11.07.2017]

with three management bodies (university council, rectorate and senate) creates complicated governance structures and makes strategy development more difficult (Winckler 2013: 1). A few years later, in 2007, the universities demanded even more autonomy. A working group led by the ministry of science, which included the rectorates and faculty, identified further areas in which the universities could be granted autonomy. Eight of its ten proposals, most of which related to financial management and staff regulations, were implemented by 2010 (cf. Milthers 2011: 7). The EUA's 'University Autonomy Tool' currently ranks Denmark in 2nd place in the 'Organisational' dimension, in 10th place in the 'Financial' dimension, in 8th place in the 'Staffing' dimension and in 11th place in the 'Academic' dimension – all based on a comparison of 29 countries.¹¹²

The new Act also expressly adds the functions of the 'third mission' to the basic university functions of teaching and research. This aspect was also emphasised and differentiated in the second generation of development contracts. The ministry's template for the formulation of the contracts lists this function in the category 'Dissemination of Knowledge' and assigns it five dimensions: Cooperation with the vocational schools; Continuing and further education; Participation in the public debate; Dissemination of knowledge; Cooperation with the business community (Kalpazidou Schmidt 2013: 12-13).

The next relevant change was the ***Globalisation Council 2005***, whose **comprehensive globalisation strategy also emphasised the universities under keyword 'strong universities'** and was preceded by an OECD evaluation of the Danish university sector (cf. OECD 2005). The council's main recommendations included:

- Concentrating public research funding on fewer institutes;
- Creating synergy effects in research and teaching by merging universities into larger (and thus fewer) units and by integrating universities with only one faculty into universities with multiple faculties;
- Merging governmental research institutions (GRIs) with universities while maintaining separate organisational processes. (cf. Milthers 2011: 8).

The Danish government incorporated these proposals into its 2005 manifesto. In 2006, it published its globalisation strategy in a government paper titled: *Progress, Innovation and Cohesion: Strategy for Denmark in the Global Economy*. For the university sector, this strategy foresaw among other things that Denmark would have "world top level universities" (cf. Danish Government 2006: 22-23). The ten key initiatives to achieve this goal include:

- Basic funding for universities should be distributed according to quality;
- GRIs should be integrated into universities;
- Participation rates should be increased from 45 % to 50 % and degree completion times accelerated;
- The number of PhD scholarships and industrial PhD programmes should be doubled;

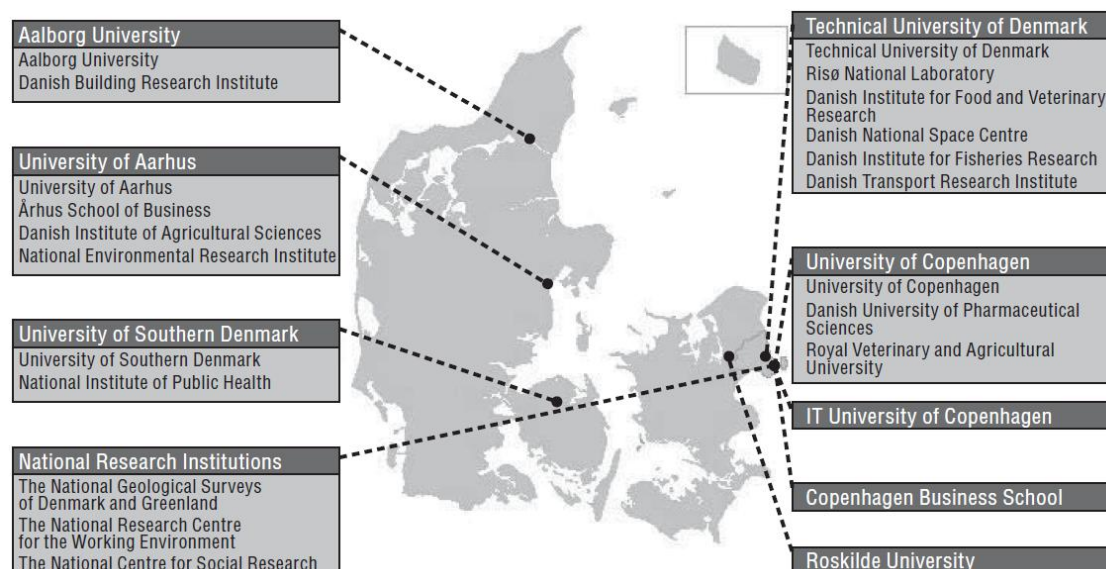
¹¹² <http://www.university-autonomy.eu/countries/denmark/> [Accessed 11.07.2017].

Austria is ranked in this comparison in 8th place for the 'Organisational', 17th place for the 'Financial', 12th place for the 'Staffing' and 12th place for the 'Academic' dimensions.

- Universities should have better possibilities to attract good researchers (e.g. flexibility in setting salaries);
- A nationwide accreditation system should be established.

Based on these initiatives, the so-called **merger process** began or was intensified in 2006, following on from the first mergers that had taken place in 2004 (integrating four GRIs into three universities: two into the Royal Veterinary and Agricultural University, one into the University of Copenhagen and one into Aarhus University; cf. Aagaard et al. 2016b: 79). In 2006 and 2007, the remaining 12 universities and 15 GRIs underwent a series of mergers that left the Danish higher education system with a total of eight universities and three GRIs (Pinheiro/Stensaker 2014: 499). The mergers were intended to strengthen research and higher education in Denmark and to increase the ability of the universities to attract international research funding.¹¹³ The government did not define a ‘master plan’ for the mergers but did, however, establish three guidelines: all institutions should remain intact after the merger process, i.e. they should not be sub-divided into smaller units; the merged institutions should have a uniform leadership; institutional mergers should not automatically mean geographical and/or physical mergers (cf. Milthers 2011: 9). Figure 10 shows how the universities and GRIs were merged. Two universities were merged into the University of Copenhagen, namely the Danish University of Pharmaceutical Sciences and the Royal Veterinary and Agricultural University; three GRIs were merged with the university in the first step in 2004. The University of Copenhagen, Aarhus University and the Technical University of Copenhagen profited most from the mergers: together they supply around two thirds of public research. They are also referred to as the ‘super-universities’ (Pinheiro/Stensaker 2014: 499).¹¹⁴

Figure 10: Danish universities from January 2007



¹Figure 10 does not show the Danish University of Education merger with Aarhus University on 01.06.2007 or the 2004 mergers. Source: Milthers 2011: 9 (taken from the Danish University and Property Agency 2009).

¹¹³ <http://ufm.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/university-mergers-of-2007> [Accessed 11.07.2017]

¹¹⁴ Pinheiro and Stensaker (2014) describe the merger process for Aarhus University in more detail.

Quality Assurance

Quality was a key aspect in the developments and discourse, albeit less with regard to low quality and more from the documentation, accountability and development/implementation of strategic priorities perspectives. Quality assurance is based on three pillars: 1) binding accreditation of degree programmes since 1992, Accreditation Act 2007, new law in 2013, all relevant aspects merged in the Danish Accreditation Agency (ACE) from 2013 (cf. Kalpazidou Schmidt 2017); 2) mandatory internal self-evaluation based on predefined rules, including publication of the results; 3) external quality assurance through panels, organised by the Accreditation Council and two agencies (CAE, EVA).¹¹⁵

Observers note the familiar tension that exists in this area between documentation and improvement through these agencies. As is also the case with regard to rankings, the universities have developed specialised strategies to handle accreditation; the University of Copenhagen, for instance, has set up a 'University Education Strategic Council' to deal specifically with this (Kalpazidou Schmidt 2013).

Financial Resources and Incentives

One relevant part of the globalisation strategy concerned research funding and the creation of "more competition and better quality in public research" (Danish Government 2016: 24). The key initiatives to achieve this goal relate primarily to the increasing and format of research funding. Public sector expenditure on research and development (R&D) should reach 1 % of GDP, or 3 % of GDP if research funded by private firms is included (figures for 2010). The reform of research funding includes, for instance, the intention to fund a larger number of longer-term projects (cf. Danish Government 2006). This intention is also reflected in the *UNIK initiative*¹¹⁶ in which four projects with a duration of five years (from 2009 to 2013) received a total of 2.8 billion euros in funding. Two of these projects were at the University of Copenhagen (cf. Aagaard/De Boer 2016).¹¹⁷

A further change in university funding involved the introduction of *performance-related research funding from 2010 onwards* when a bibliometric indicator with an incremental rule was introduced (see Chapter 3.6.2 for more details). Using the Scimago Journal & Country Rank (SJR) as indicator, Denmark did not improve its position in the country rankings from 2010 to 2016, occupying 24th place in both years.¹¹⁸ When its research output is measured against total research output worldwide, Denmark has improved from 0.74 % in 2010 to 0.92 % in 2016 (cf. SCIMAGO 2017).¹¹⁹

¹¹⁵ ACE is an independent authority (and operator) with the Accreditation Council as decision-maker. EVA (Danish Evaluation Institute) is likewise an independent authority. The two agencies are responsible for different disciplinary or professional areas. See <http://en.akkr.dk/accreditation-in-denmark/>, http://www.ecahe.eu/w/index.php/ACE_Denmark.

¹¹⁶ UNIK (*Universitetsforskningens Investeringskapital*): investment capital for university research.

¹¹⁷ The call was published in October 2007; the deadline for submissions was 1 April 2008. A maximum of 31 requests could have been submitted (in total from the eight universities); 28 requests were actually submitted. While it had been expected that five projects would be funded, only four actually received funding (cf. Aagaard/De Boer 2016).

¹¹⁸ It slipped in two of the intervening years to 25th place. Prior to 2010, Denmark's position in this ranking fluctuated between 24th and 26th place. By way of comparison, Austria occupied very similar places, but shows more of a trend: until 2011, it occupied 23rd place for several years, slipped to 24th place in 2012 and has held 25th place since 2013.

¹¹⁹ By way of comparison: Austria has improved from 0.79 % (2010) to 0.85 % (2016).

There are two components to funding for universities in Denmark. The first, basic funding, is provided by the state and is stipulated each year in the *Finansloven* (“Finance Law”) and allocated separately to three different areas: teaching, research and other purposes. The second source of income for universities comes from funding from research councils, the European Union, private investors, etc.¹²⁰

To **fund teaching**, a so-called **taximeter system** was introduced in 1994 whereby universities receive money when students make progress (i.e. earn ECTS or graduate). A ‘completion bonus’ was introduced from 2009 which is paid when a student graduates within the designated period of time. There are also plans to introduce a rule in 2020 that will deduct money from universities if students do not graduate on time.¹²¹ The *taximeter system* has been reworked several times since its introduction. A change in the funding system for teaching is also currently under discussion, with the proposed new model based on three parameters: 1) quality not quantity, 2) the number of students who find employment after graduation, and 3) a mechanism to strengthen regionalism, i.e. ensure that there are graduates across the whole of the country (cf. University World News 2016).

The greater share of **funding for research** in Denmark is “historically conditioned and fixed according to ‘incremental budgeting’” (UFM 2017).¹²² The ministry estimated in 2013 that approx. 50 % of the funding for university research stemmed from basic university funding that was allocated according to historical principles, 30 % was allocated on the basis of performance-related principles, while the remaining 20 % came from increased investments in PhD programmes (cf. De Boer et al. 2015: 54). Each year, a small portion of this funding – 2 % and also the additional funding provided from the ‘*Globalisation Fund*’ – is distributed using the 45-20-25-10 model, with 45 % assigned proportionally to teaching activities, 20 % to third-party funding, 25 % using the bibliometric indicator introduced in 2010¹²³ and 10% based on the number of PhDs (cf. Pedersen 2010).

The university budgets in Denmark have also risen over time. The reforms of the Danish higher education system went hand in hand with an increase in the level of public funding for universities. From 2003 to 2009, the total earnings of Danish universities (adjusted for inflation at 2009 prices) rose by +25 % from DKK 16.7 billion in 2003 to DKK 20.8 billion in 2009. A key contributor to this rise were the ‘research-based public sector services’ that were introduced as a result of the integration of the GRIs into the universities. However, basic funding for research was also increased, as did the level of funding obtained through competitive research grants (cf. Milthers 2011: 10f).

A further rise was also seen after 2009: from 2009 to 2015, total public funding for Danish universities (adjusted for inflation at 2015 prices) rose from DKK 18.9 billion to DKK 22.9 billion, which corresponds to a rise of approx. +21 %. However, this took place

¹²⁰ <http://ufm.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/economics-of-university-sector> [Accessed 11.07.2017]

¹²¹ According to De Boer et al 2015: 54: “There is now a new ‘completion-agreement’. By 2020, if the students do not complete their studies on time, the universities will lose a substantial amount of money (although it is not yet clear how much).”

¹²² <http://ufm.dk/en/education-and-institutions/higher-education/danish-universities/the-universities-in-denmark/economics-of-university-sector/funding-for-research> [Accessed 11.07.2017]

¹²³ The bibliometric indicator was introduced from 2010 with an incremental rule (from 10 % at the start to 25 % in 2012); the relevance of the second indicator (external funding) was simultaneously reduced in this period from 35 % to 20 %.

to a large extent in the early years of this period.¹²⁴ Measured in terms of GDP, a slight decrease can even be seen in the last two of these years: in 2013, public spending for the funding of universities corresponded to 1.17 % of GDP, while in 2014 it lay at 1.16 % and in 2015 at ‘only’ 1.15 % (cf. EUA 2016). If student numbers are also included in the equation, the EUA’s *Public Funding Observatory 2016* report (EUA 2015) comes to the conclusion that Denmark – like Austria and Germany – is a “growing system under pressure”, i.e. its student numbers are growing faster than university funding (ibid.: 4). The forecast in the EUA report is also negative since the Danish government has already approved a reduction in research grants (ibid.: 7). In actual figures, public spending for research has been cut by DKK 1.4 billion, and state subsidies for teaching will be reduced by 2 % p.a. from 2016 to 2020.¹²⁵ These financial cuts have already led to staff cutbacks at the University of Copenhagen (see Chapter 3.6.4).

Coordination and Information, Local Factors, IT Infrastructure

The governance reforms changed coordination from a traditional bottom-up mode to a distinctly top-down mode in which the strategic activities of the institutions form a central goal. Top priority is placed in this regard on accountability, and the development contracts in particular place a very strong emphasis on indicator-backed information. Quality assurance results are likewise highly formalised and must be published.

In the course of the merger process, the thematic structure was gradually overhauled and developed – with a strong focus on aspects like inter-, multi- and transdisciplinarity. At the start, it was contractually agreed that the mergers did not necessitate any changes to existing units and structures; the first step was to increase the size of the institutions, thereby strengthening their institutional strategic capacity and giving the new top-down management significantly more financial leeway. It was up to the new institutions to restructure themselves in a second step.¹²⁶ This process also led to restructurings on a faculty level that produced new and innovative disciplinary combinations; even the research councils were not organised by discipline. The 2004 and 2007 mergers at the University of Copenhagen led, for instance, to the creation of one of the largest centres for Health and Life Sciences in Northern Europe; in phase two, the Faculties of Life Sciences and Natural Sciences were combined into a new Faculty of Science, while Pharmacy, Health and Veterinary Science were transformed into a new Faculty of Health and Medical Science (Kalpazidou Schmidt 2013). The links between the faculty restructurings and the establishment of a focus on the ‘third mission’ bear similarities to the developments at Arizona State University (Chapter 3.3).

3.6.2 Access Management in Denmark

Students who want to study in Denmark have to register via the central registration website ‘*optagelse.dk*’. They can select up to eight degree courses but must also indicate

¹²⁴ Funding rose by +6 % from 2009 to 2010 and by +5 % from 2010 to 2011, from 2013 to 2014 and 2015 to 2015 it only rose by +1 % in each period.

¹²⁵ <http://www.universityworldnews.com/article.php?story=20160418210735400> [Accessed 11.07.2017] and <http://www.universityworldnews.com/article.php?story=20160909140216343> [Accessed 11.07.2017]

¹²⁶ Pineiro and Stensaker (2014) describe these changes using the example of Aarhus University, which like the University of Copenhagen also profited greatly from the mergers. The university’s income rose by +40 % from 2006 to 2012. In the first phase, it expanded from 5 faculties (2006) to 9 faculties with 55 institutes. In 2011/12, it then reduced its number of faculties to 4 (with 27 departments) as part of its strategy to become a ‘unified university’.

their corresponding order of priority. The *coordinated admissions system (KOT)* ensures that each person receives a place on their first-choice course (where possible) but also that nobody receives more than one place at university. In many disciplines, students are accepted on their preferred course as long as they meet the entry criteria. In others, however, there are more applicants than places. In such cases, places are assigned primarily by average grades (1st contingent) or (in a few exceptional cases) other criteria (2nd contingent). Applicants who do not get a place on any of their original-choice courses have the possibility to enrol on other courses in which there are still places available (cf. UFM 2017).¹²⁷

The number of first-year students in Denmark rose from the 1970s to 2000 from just under 20,000 to almost 50,000. From 2000 to 2008, the number remained relatively constant or even fell slightly; during this period, around 45,000 people began a degree course (a slightly higher target had been set in the globalisation strategy). Since 2009, there has been a sharp rise in the number of new students each year. In 2016, more than 70,000 people began a degree course in Denmark (cf. UFM 2016: 1).

In order to set the number of university places, the universities report to the responsible ministry on how many students they can accept on each course. The ministry then calculates the annual funding for the universities based on these figures (OECD 2005: 152). In 2014, the ministry announced that places would be reduced in those subjects where graduate unemployment rates are high. The goal of this initiative is to transfer new students to subjects with better prospects of employment (cf. UFM 2017¹²⁸ and Uniavisen 2014). A total of 4,000 new university places on courses with poor employment prospects were to be cut over a period of three years (from an original total of 15,000).¹²⁹

3.6.3 Developments and Strategies at the University of Copenhagen

The developments in Denmark described above led to changes and change strategies at the University of Copenhagen that could well have contributed to its rise up the rankings. This was also one of the main goals of the governance reforms, namely to increase the universities' capacity to develop their own strategies (Pinheiro/Stensaker 2014; Fumasoli/Stensaker 2013).

The University of Copenhagen is one of the founding members of the 'International Alliance of Research Universities' (IARU), which was established in 2006. The other IARU members are the Australian National University, ETH Zurich, the National University of Singapore, Peking University, the University of California, Berkeley, the University of Cambridge, the University of Cape Town (which joined the alliance in 2016), the University of Oxford, the University of Tokyo and Yale University.

¹²⁷ <http://ufm.dk/en/education-and-institutions/admission-and-guidance/how-to-apply-for-a-higher-education-programme-in-denmark-1/how-to-apply-for-a-higher-education-programme-in-denmark> [Accessed 11.07.2017]

¹²⁸ http://ufm.dk/en/education-and-institutions/higher-education/adjustment-of-student-intake-in-higher-education-programmes?set_language=en&cl=en [Accessed 11.07.2017]

¹²⁹ <http://www.universityworldnews.com/article.php?story=20141002163554769> [Accessed 11.7.2016]

In the course of the merger processes, the University of Copenhagen grew into a ‘super university’. It then subjected itself to further reorganisations. As already mentioned, the Royal Veterinary and Agricultural University and the Danish University of Pharmaceutical Sciences were both integrated into the University of Copenhagen as separate faculties in 2007: three GRIs had already been integrated into these institutions in the first merger phase in 2004. As part of the university’s development strategy, four faculties (from a total of eight) were then merged into two large faculties (Faculty of Sciences, Faculty of Health and Medical Science).

Strategies and Political Organisational Developments at the University of Copenhagen

Following the governance reforms and the mergers, the University of Copenhagen made use of its strategic empowerment to set out two successive strategies for its own development (2007 and 2012). In the process, the university implemented a number of strategic initiatives in the fields of staff policy, research policy and internationalisation.

The first of these strategies, *Destination 2012*, was published in 2007, focused primarily on internationalisation (both from a staff and a student perspective) and set the following priorities:

- Attractive workplace (e.g. establishment of a clear staff and salary policy, individual career planning)
- Focus on basic research (e.g. excellence programmes, improvement in research infrastructure)
- Development of curricula (students should have direct contact with researchers and develop strong international skills, i.e. competence in English and at least one other language)
- Partnerships with the private and public sectors
- PR work

A comprehensive *Staff and Salary Policy Handbook* was published in 2009. Alongside ten basic principles (Freedom and Co-responsibility, Work-Life Balance, On-time Information, etc.), this handbook also contains concrete staff policy guidelines (cf. UoC 2009). Some of the guidelines have since been revised, and 26 of them are available online¹³⁰, including an action plan for bullying and harassment, guidelines on the psycho-social working environment, including work-related stress and workplace bullying, guidelines for skills development, salary guidelines, etc. There is even an official catering policy: fresh ingredients, preferably organic, healthy choices, etc. (cf. UoC 2009).

The variety of ‘new’ disciplines gained through the merger with the Royal Veterinary and Agricultural University and the Danish University of Pharmaceutical Sciences was used to define *twelve interdisciplinary research platforms*. The University of Copenhagen is also strongly represented among the Centres of Excellence funded by the Danish National Research Foundation (cf. Kalpazidou Schmidt 2013). To improve its research infrastructure, the University of Copenhagen also obtained funding from the national pool for research infrastructure for three of projects, one each in its Faculties of Humanities, Science and Health and Medical Sciences (cf. UoC 2010).

¹³⁰ http://personalepolitik.ku.dk/english/personnel_policies/ [Accessed 11.7.2016]

A Swedish study describes the University of Copenhagen as *an international place of study*, basing its assessment on the university's ability to attract students from outside the Nordic countries as primary indicator. The University of Copenhagen's international *Graduate Talent Programme* follows the model used at universities in the United States and is aimed at encouraging international (and Danish) students to participate in its five-year PhD programme. Participating students receive a grant of DKK 276,000 (approx. 37,000 euros) in the first two years and a grant of DKK 400,000 (approx. 54,000 euros) in the last three years of their studies (cf. University World News 2015). However, there is also an ongoing debate in Denmark that takes the opposite stance, maintaining that too many of these international students do not stay in Denmark after graduation and are thus not available to the Danish workforce, a fact which Minister of Science Søren Pind sees as a reason to reduce the number of international students (cf. Uniavisen 2017).

The University of Copenhagen's *second general strategy* was published in 2012 and is the one that was followed until 2016. At the core of all universities lies independent basic research and research-based teaching. Accordingly, research forms the basis for three areas of focus for which concrete measures are named:

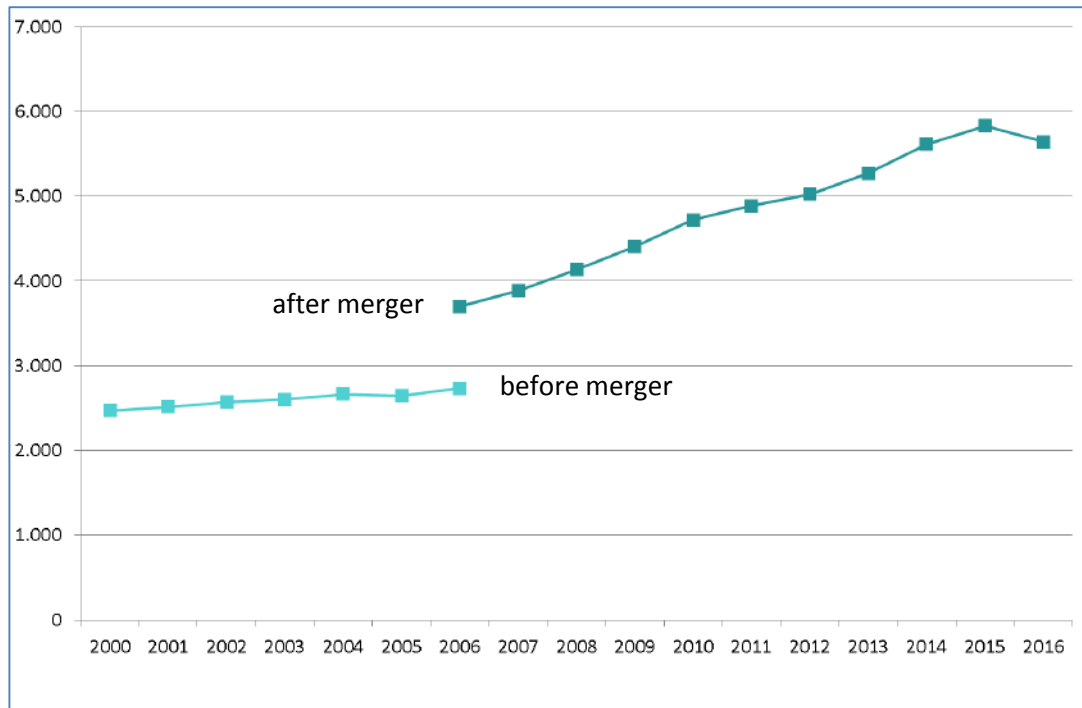
- The University of Copenhagen seeks to strengthen internal cooperation and develop a shared identity.
- The University of Copenhagen seeks to strengthen its external partnerships worldwide.
- The University of Copenhagen seeks to improve its standard of teaching.

In addition to the general strategy, the university published a separate paper titled *Strengthening external collaboration worldwide* in June 2012 outlining its strategy for *partnerships with private enterprises* for the period from 2012 to 2016. There are four aspects to this strategy: 1) establishing contacts, 2) increased focus on innovation and entrepreneurship in teaching, 3) seamless commercialisation and technology transfer processes, and 4) improved strategic dialogue with private enterprises.

Developments in the Personnel Sector

As Figure 11 shows, the number of academic staff at the University of Copenhagen has risen sharply in recent years. From 3,700 full-time equivalents (FTE) in 2006, this number has risen on average by +5 % each year. In 2015, the university employed 5,831 academic members of staff (FTE), which corresponds to an increase of almost 60 %.¹³¹

¹³¹ In Salmi's (2009) quantitative figures, the University of Copenhagen is an upwards outlier in terms of staff numbers.

Figure 11: Academic staff at the University of Copenhagen (full-time equivalents)

'Academic staff' (VIP) plus 'part-time academic staff' (DVIP), each calculated as FTE; for 2006, the lower figure represents the original University of Copenhagen, while the higher figure includes the universities integrated in the merger process.

Source: University of Copenhagen – Annual Reports for the years 2016, 2015, 2010, 2006, 2004.

In 2016, there were substantial staff cuts at the University of Copenhagen, which affected more than 500 members of staff (as an indication of the extent of these cutbacks, the university currently employs just under 10,000 people (FTE), including admin staff).¹³² Around 250 people took voluntary redundancy and some 200 were laid off. A further 70 positions were not refilled, and some 60 members of staff had their working hours cut (cf. Uniavisen 2016). The coming years will show whether and how these cutbacks have affected the university's position in the rankings.

3.6.4 Categorisation in the Analysis

Since the University of Copenhagen was selected as a case study because of its rise in the research rankings, we have taken a slightly different approach here than with the other universities. Instead of asking if the reforms and changes have been satisfactory from the desired excellence perspective, we asked whether the reforms might have been the reason for the result. However, as is the case with most multi-causal processes, this ultimately remains just a matter for speculation.

The improvements at other Danish universities (Aarhus, Aalborg) speak for the fact that the nationwide reforms have had an impact in the tertiary education ecosystem. The universities appear to have been able to use the autonomy accorded to them by the University Act 2003 to their strategic advantage. As Denmark's flagship university, the University of Copenhagen focused its development strategy above all on internationalisation (even though the government currently appears to be criticising this strategy), being an attractive employer and on internal/external collaboration. The growth

¹³² http://introduction.ku.dk/facts_and_figures/ [Accessed 11.07.2011]

achieved through the mergers and the resultant integration of publications into the university's ranking score clearly contributed to the rise up the rankings. However, the mergers did not bring about a rapid rise, so the short-term merger effect (more publications) does not seem to have been so influential, at least in the University of Copenhagen's case. The increase in public funding for universities until 2009 could also have an impact in the rankings. A strong focus in research funding on the decisive bibliometric indicators could also be a reason for the improvements. However, it should also be noted that this rise has not been achieved in all the rankings and, in particular, that Denmark's position in the country rankings has not improved since 2010 (SICMAGO 2017).

Copenhagen appears in our systematic literature search in connection with the Danish university policy, which is characterised by strong New Public Management and results-oriented reforms. Denmark has also placed a strong focus on the talent aspect (Wolfensberger 2015: 105ff) and is active in an EU human resources policy context. Documents pertaining to information for students and about centres of excellence appear with particular frequency in our literature search (see Table 8, p. 146); the former could be an indication of the university's talent policy, but this is not directly reflected in the hits.

3.7 University of Twente: Graduate School and PhD Education

Established: 1961; 2009 establishment of Twente Graduate School

Type: Public university

Location: Enschede (The Netherlands)

Students: 9,600 (2015); 55 % Bachelor

Tuition fees: Yes; dependent on country of origin and previous degree

Placings in selected international rankings:

Times Higher Education World University Ranking 2018: 179

Shanghai Ranking 2017: 301-400

Leiden Ranking 2017: 376

QS Ranking 2018: 179

Other notable rankings:

ScienceWorks and Elsevier 2015, 2013: Most entrepreneurial university in the Netherlands: 1st place

The higher education system in the Netherlands is traditionally binary, with research-oriented higher education (*wetenschappelijk onderwijs*; WO) provided at research universities and higher professional education (*hoger beroepsonderwijs*; HBO) at (vocational) higher education establishments. These two forms of higher education build – as is the case in Austria – on a tiered structure of middle and upper secondary and vocational schools (Nuffic 2015; Luijkx/de Heus 2008). The research universities in the Netherlands (unlike in Austria) make up around one third of universities.¹³³

Despite the country's small size, Dutch universities frequently occupy top places in the international higher education rankings. For example, 13 universities in the Netherlands are listed in the Top 200 in the THE Ranking for 2018.¹³⁴ The country's universities also gain a very high number of ERC grants (Noorda 2017: 2). This research strength is quite remarkable given the low average funding for research and the low share of researchers among the total population. An analysis of the framework conditions for and the measures to encourage young academics in the higher education system in the Netherlands is therefore worthwhile. The majority of its young academics pass through highly structured PhD programmes. These are described in more detail in this chapter.¹³⁵

Although the structures of the graduate schools at Dutch universities only differ slightly from one another, it nonetheless makes sense to focus the analysis on one specific case study. This case study focuses on the University of Twente because of its young age and entrepreneurial engagement, as well as its location in a structurally weak fringe area (a former industrial area). Before moving on to examine the reform of PhD-level education in the Netherlands as a whole, we will first provide a brief description of this particular university and its graduate school. This will then be followed by a detailed overview of the specific set-up at Twente Graduate School.

¹³³ See also <http://www.euroeducation.net/prof/netherco.htm> [Accessed 17.4.2018]

¹³⁴ Best universities in the Netherlands 2018 <https://www.timeshighereducation.com/student/best-universities/best-universities-netherlands> [Accessed 14.09.2017]

¹³⁵ Noorda (2017: 2) also attributes this research strength to the fact that the financial resources flow above all to a small group of research universities with very narrow profiles and an often strong focus on health and life sciences.

3.7.1 Brief Description of the University of Twente

In the 1960s, corporate relocations to other countries put the main industries (textiles, clothing, mechanical engineering) in the Enschede region under significant pressure. In response, the Dutch government decided to establish the country's third university of technology in this region (the other two are located in Delft and Eindhoven; cf. Lazzaretto/Tavoletti 2005: 481; Isfan/Moog 2003: 41).

The University of Twente (UT) was founded in 1961 as the *Technische Hogeschool Twente* in Enschede, a town near the border with Germany. In its early days, UT faced significant financial pressures and occupied a marginal position in the Dutch higher education system (HEInnovate 2015a). However, it succeeded in transforming itself from the 1980s onwards into an *entrepreneurial university* and thus distinguishing itself from its more traditional counterparts (e.g. in Leiden or Amsterdam) through its clear support for entrepreneurial activities. Nowadays, UT has more than 9,000 students spread over five *faculties*,¹³⁶ *University College Twente*¹³⁷ and *Twente Graduate School*. Its teaching focus lies on the fields of technology, natural and social sciences, behavioural research, management and business studies.

3.7.2 Development of PhD Education in the Netherlands

In recent decades, PhD-level education in the Netherlands has been subject to multiple reforms. In the 1980s, dedicated positions were created for PhD students at universities. This was followed by the establishment of dedicated research schools at the start of the 1990s and graduate schools in the mid-2000s. A central topic of debate in these reforms was whether PhD education should adopt a more practice-oriented format or be accompanied by a structured curriculum (Pechar et al. 2008: 100). While more structured programmes are based on the Anglo-American university approach, 'master apprentice model' courses bear more resemblance to continental European traditions (Janger et al. 2013). Higher education in Europe is moving increasingly from "research training towards doctoral education" (de Weert 2004: 91). The Netherlands began at a relatively early stage to implement what Aghion et al. (2008) much later identified as the decisive factor in the US system for innovation in Europe: the adoption of graduate schools.

'Assistant in Opleiding', an Initial Step

In 1986, a dedicated PhD position ('*Assistant in Opleiding*'; AiO) was established at Dutch universities. With its mix of "learning-by-doing" and "clear educational model", this step demonstrates the "double-faced and equivocally felt character of Doctoral training in the Netherlands" (de Weert 2004: 78). These are usually fixed-term four-year positions, with teaching and administrative duties restricted to a maximum of 25 % of the student's actual work time. To cover the costs of their PhD, AiOs have tuition fees deducted from their full-time salaries on a sliding scale (from 45 % in the first year to 15 % in the fourth) (de Weert 2004: 77ff).

¹³⁶ The Faculties of Behavioural, Management and Social Sciences, Engineering Technology, Electrical Engineering, Mathematics and Computer Science, Science and Technology and Geo-Information Science and Earth Observation.

¹³⁷ *University College Twente* offers an international, full-time Bachelor's degree (Honours) programme in Technology, Liberal Arts and Sciences (or ATLAS for short) that is taught in English.

Research Schools

The introduction of research schools has been driven forward by politicians since the early 1990s. The research schools are generally inter-university establishments, into which the AiOs are integrated. The more structured programmes offered at these schools are intended to improve the previous system in two ways: 1) by creating an environment that stimulates research, and 2) by offering a curriculum that is oriented on the specific research areas of PhD candidates (de Weert 2004: 80f). The structured Masters curricula should serve to prepare students both for an academic career and for other potential career paths (de Weert 2004: 92). The establishment of the research schools also went hand in hand with improved quality control in PhD education (see also Chapter 3.7.5). The major differences in supervision intensity were reduced, for instance, by making two people responsible for supervision. The graduation rates at research schools were already higher even in the 1990s than in less structured programmes (de Weert 2004: 88). There are currently more than 60 accredited research schools in the Netherlands.¹³⁸

Research Masters

From 2003 onwards, Research Masters programmes were set up at Dutch universities (Snijder 2016:43). This introduced a clear differentiation even at Masters level, even though only 3-4 % of all Masters students do a Research Masters (Snijder 2016: 177). Graduates of such programmes are more likely to start and complete a PhD (Snijder 2016: 173ff). For instance, over 50% of graduates of the Nanotechnology Masters Programme at the University of Twente start a PhD within one year of completing their Masters (QANU 2014: 24f). The Research Masters does, however, prepare students more for a university-based PhD programme and less for extramural research – corporate research departments are still not particularly familiar with this option (Snijder 2016: 175). The majority of Research Masters programmes are viewed positively both by faculty and by students (Snijder 2016: 183).

Graduate Schools

In addition to the research schools, so-called graduate schools were also embedded into some universities from 2005 onwards. In contrast to the former, a graduate school is based at one single university and thus has closer ties to its host university (Snijder 2016: 35). This allows a seamless transition from Masters to PhD:

“The essential hallmark of the silent revolution is the sliding of the first phase of the Ph.D. trajectory into the final stage of the master programme, mainly by having (research) master students prepare a proposal for a Ph.D. project” (Sonneveld 2010: 2).

To make the most of these opportunities, most graduate schools offer integrated Masters and PhD programmes. There are a fixed number of places available both for these integrated programmes and for dedicated PhD positions.¹³⁹ At graduate schools, the latter are usually full-time and for a fixed term of four years.

¹³⁸ <https://www.knaw.nl/en/topics/kwaliteit/quality-assessment-of-scientific-research/accredited-research-schools/accredited-research-schools> [Accessed 11.07.2017]

¹³⁹ “Employed doctoral candidates are engaged in a predetermined object of research which is described in a vacancy announcement or other recorded contract or agreement. All other doctoral candidates may put forward subjects of research within the research area of the research group (in consultation with the intended thesis supervisor).” (UT 2015a: 5).

PDEng, a Special Qualification for Technical Universities

A special option at technical universities in the Netherlands is the so-called PDEng, a 3rd cycle of higher education. Alongside ‘normal’ PhDs, engineering students can study for a Professional Doctorate in Engineering (PDEng; cf. 4TU.Federation 2017b), which is awarded upon successful completion of a two-year, post-Masters programme. These programmes are similar to the professional doctorates that have long been available in the Anglo-American higher education systems (Huisman/Naidoo 2006). The PDEng was launched in the 1980s on the initiative of the Dutch high-tech industry and is now run by the Association of Dutch Technical Universities (4TU.Federation).¹⁴⁰ Although their focus lies predominantly on industry-related, applied research, PDEngs are only awarded by research universities and not, for instance, by universities of applied sciences.¹⁴¹

A PDEng programme lasts for a total of two years: in the first year, the focus lies on the teaching of design methods and applications, while in the second the student gathers practical experience in the high-tech industry.¹⁴² PDEng students are employed as trainees for the regular duration of the course. Since this means they are regarded as academic staff, they are exempt from tuition fees (4TU.Federation 2017a: 9). Graduates are awarded the title ‘Professional Doctorate in Engineering’.

PhD Students Not Employed by Universities

Although the majority of PhD students are employed by universities, there are also other ways of obtaining a PhD, namely as a ‘contract doctoral research associate’ or an ‘external doctoral candidate’ (EC/Eurydice 2013). Of the 4,600 PhDs completed in 2013 in the Netherlands, more than 3,000 were awarded to PhD students employed by universities and around 1,000-1,500 to external candidates.¹⁴³

3.7.3 The Twente Graduate School

Since the exact format of graduate schools differs (Hochschulrektorenkonferenz 2011: 13), the actual framework behind them is best described using the example of one particular school. The *Twente Graduate School* (TGS) was established in 2009 and is responsible for research, teaching, supervision and quality assurance in PhD programmes at the University of Twente (UT 2016: 4). In an interview with *UT Nieuws*, TGS Director Paul van Dijk described the school as “one desk for all Ph.D. candidates,” i.e. the central administrative unit for PhD students and coordinating unit for all aspects of PhD programmes and curricula (*UT Nieuws Special* 2015: 4f). Since the TGS was founded, the number of PhD programmes – which are organised into eight clusters¹⁴⁴ – at the

¹⁴⁰ Wageningen University currently does not offer PDEng programmes (4TU.Federation 2017).

¹⁴¹ “The technological designer programmes were initiated at the request of the Dutch high-tech industry. High-tech companies need professionals who can design and develop complex new products and processes and offer innovative solutions. All programmes work closely together with high-tech industry, offering you the opportunity to participate in large-scale, interdisciplinary design projects.” (4TU.Federation 2017).

¹⁴² <https://www.studyinholland.nl/education-system/degrees/pdeng/> [Accessed 11.07.2017]

<https://www.utwente.nl/en/education/post-graduate/pdeng/what-is-pdeng/> [Accessed 11.07.2017]

¹⁴³ In Austria, in contrast, PhD students employed by universities are the minority: around 30% of all PhD candidates write their thesis while in paid employment, 5% receive a grant and 65% have neither one nor the other (Schwarzenbacher et al. 2017: 31).

¹⁴⁴ Ethics and Technology; Information Technology and Communication; Social Sciences, Innovation and Governance; MESA+ School for Nanotechnology; Biomedical Engineering; Computational Science and Engineering; Geo-Information Science and Earth Observation; Science Based Engineering.
<https://www.utwente.nl/en/education/post-graduate/tgs/programmes/> [Accessed 11.07.2017]

university has risen from six to 20 (*UT Nieuws Special* 2015: 2). A total of 234 PhDs were awarded at the University of Twente in 2015 (UT 2017: 17).

The key elements and responsibilities in the PhD process are laid down in the University of Twente's *PhD Charter* (TGS 2014). The PhD process can be roughly broken down into three phases and generally lasts four years. The 'initial phase' comprises the application, which differs depending on the status (employed or not) of the PhD student (*ibid.*): PhD students seeking regular PhD positions apply in response to a call for applications, while others have the option to submit speculative applications. The admission decision will be taken by the respective supervisor under the provision that the student has secured funding and meets the entrance qualifications (usually a Masters degree). In contrast to their counterparts with regular PhD positions, external PhD candidates have to pay tuition fees.

The second or 'research phase' lasts from the preparation of the concept to the completion of the PhD project, while the third or 'end phase' is concluded with the *defensio* (*ibid.*). The actual time taken to complete a PhD frequently exceeds the formal duration of four years; on average, PhDs in the Netherlands take five years to complete (Snijder 2016: 35).

While studying for a PhD at the University of Twente, students have to complete courses that are equivalent to 30 ECTS. The university's *Centre for Training and Development* (CTD)¹⁴⁵ offers a choice of corresponding courses, e.g. in scientific work, research support, languages, personal development, teaching, career development and entrepreneurship. PhD positions at the graduate school can also entail some teaching requirements, which must not exceed 20 % of the student's work time (UT 2015a: 10).

Although the individual graduate schools are all independent, the technical universities work closely with one another via the *4TU.Federation*¹⁴⁶. This federation was set up in 2006 as the *3TU.Federation* by the technical universities in Twente, Delft and Eindhoven, who were joined by the fourth 'member', Wageningen University and Research, in 2016. The Masters and PDEng programmes run by these universities – partly as joint ventures – form a central aspect of this partnership (see the next chapter for more details).

3.7.4 Research Masters and Integrated Masters/PhD at Twente Graduate School

In addition to the 'regular' PhD programmes, universities in the Netherlands also offer so-called integrated Masters/PhD programmes (an extension of the Research Masters programmes; see above). In contrast to a 'normal' Masters, students on the integrated Masters/PhD programmes at TGS generally move to a PhD track (in the same research field) after 1-2 years. These research-oriented programmes are designed as coherent, integrated Masters/PhD programmes and are put together by the faculties and research institutes. A wide range of compulsory and optional subjects allow students to specialise in a research field that is of particular interest to them and at the same time widen their perspective on the societal context of technology and research (cf. TGS 2017)¹⁴⁷. However, "not all Master's programmes [at UT] are involved in these research programmes" (*ibid.*). Candidates are

¹⁴⁵ <https://www.utwente.nl/en/ctd/> [Accessed 11.07.2017]

¹⁴⁶ There is a similar association in Austria – TU Austria; see <http://www.tuaustrica.ac.at/de/> for further information.

¹⁴⁷ <https://www.utwente.nl/en/education/post-graduate/tgs/prospective-candidates/phd/> [Accessed 29.04.2018]

selected above all on the basis of their performance at Bachelor level, their statement of interest and motivation and a personal interview (TGS 2017).¹⁴⁸

Through these innovations, students in the Netherlands can make preliminary decisions on whether they might want to study for a PhD and pursue a career in research at a very early stage. While this early decision does allow them to prepare better for a PhD, it could also have negative consequences from an equal opportunities perspective.

3.7.5 Regulation and Quality Assurance of PhD Programmes (Based on the University of Twente Example)

Quality management plays a key role at the heavily regulated graduate schools in the Netherlands: “Supervision, monitoring and assessment procedures are critically important for the quality of the experience and training of doctoral candidates.” (EUA 2005: 7). The monitoring and assessment of PhD students is crucial for the quality management/quality assurance of PhD programmes. At the University of Twente, both the *PhD Charter* (UT 2015a) and the *ProDoc* online platform play a key role in this monitoring and assessment.

During the ‘research phase’ of a PhD at the University of Twente, the central monitoring and quality assurance instruments are the *Training and Supervision Plan*, the *Qualifier* exam and the *annual progress meeting*. All PhD students are required to draw up a *Training and Supervision Plan* one to three months after starting their PhD, in which they define their learning goals, timeframes, supervisors, etc. This is a *dynamic* document that is adapted and updated each year (UT 2015b: 10), i.e. “an adjustable personal development plan of the PhD candidate”.¹⁴⁹ Between 6-9 months after starting the programme, PhD students sit a so-called *Qualifier* exam: “The doctoral candidate explains the research proposal, provisional results and updated planning in writing (2 A4) and in a public oral presentation to a qualifier committee (supervisor, daily supervisor(s) and at least one other professor).”¹⁵⁰ If they do not pass this exam at the first attempt, they have the possibility to retake it. If they fail it a second time, the PhD contract will generally be terminated. PhD supervisor(s) and *day-to-day assistant supervisor(s)* are only officially named after a student has passed the *Qualifier* exam. Finally, *annual progress meetings* are held between students and their supervisor(s) to monitor progress (in line with the *Training and Supervision Plan*) and make any necessary changes and adaptations. Should the *annual progress meeting* result in a negative assessment, the student has three months to make the necessary changes and improvements. A second negative assessment will generally lead to a termination of the PhD contract.

In addition to the detailed regulations set out in the *PhD Charter*, the second main instrument for regulating PhDs is the *ProDoc* monitoring system. Since its introduction in 2014, all PhD students (regardless of their contractual status) at the University of Twente are registered in the *ProDoc* system at the start of their programme. The goal of this system

¹⁴⁸ <https://www.utwente.nl/en/education/post-graduate/tgs/application-and-enrolment> [Accessed 11.07.2017]

¹⁴⁹ <https://www.utwente.nl/uc/e69/guidelines-prodoc-Ph.D.-candidates-86cabb0102c4180000676bea02c73b0b00eadb880200.pdf?whs-download=guidelines-prodoc-Ph.D.-candidates.pdf> [Accessed 11.07.2017]; see also <https://www.utwente.nl/en/education/post-graduate/tgs/currentcandidates/phd/prodoc/faq/> [Accessed 08.05.2017]

¹⁵⁰ <https://www.utwente.nl/en/education/post-graduate/tgs/rules-regulations/doctoral-process/> [Accessed 11.07.2017]; see also <https://www.utwente.nl/en/education/post-graduate/tgs/> [Accessed 08.05.2017]

is to “to facilitate, formalize and archive the formal interaction between the Ph.D. candidate and his/her promotor [sic]” at a limited number of benchmarks in the Ph.D. trajectory.”¹⁵¹ The *ProDoc* system documents the entire PhD process – all steps, meetings, submissions and exams – and thus ensures adherence to the PhD regulations.

3.7.6 Digression: Trend and Composition of PhD Graduates in the Netherlands

Following the restructuring of PhD education in the Netherlands, the number of completed PhD theses rose from 2,500 in 2001 to over 4,600 in 2015 (VSNU 2016).¹⁵² By way of comparison, around 98,000 Bachelor students and some 44,000 Masters students graduated from the country’s universities (of applied sciences) in 2015 (Eurostat 2017). The graduation rate after seven years lies at around 70 %; overall, around three quarters of students who start a PhD also complete it. On average, a PhD takes 60 months to complete (VSNU 2016).

Given the relatively low percentage of the population with a PhD compared to other OECD countries, the increase in the number of PhD students is clearly desirable from a political perspective (Snijder 2016: 177). In 2010, only PhD holders in the USA earned more than those in the Netherlands (OECD 2010: 15). Accordingly, the demand for PhD holders outside universities is also relatively high in the Netherlands: around 40 % do not work in a university-based research capacity. This figure is relatively high compared to other countries, with the range stretching from 10 % in Portugal to 50 % in Romania (OECD 2010: 10).

The increase in the number of PhD graduates can also be attributed to the strong international focus of PhD education in the Netherlands. The vast majority of programmes are taught in English – and this is the case for all programmes at Twente Graduate School (*UT Nieuws Special* 2015: 2). The good framework conditions (full-time job, limited teaching commitments) also appear to be attractive for young foreign academics: almost half of all PhD students in the Netherlands come from abroad (Snijder 2016: 35). The share of international PhD students is traditionally particularly high in the technical sciences (de Weert 2004: 95).

3.7.7 Categorisation in the Analysis

PhD education in the Netherlands was reformed on multiple occasions over recent decades and has become increasingly structured. This development follows the international trend and the recommendations of the European University Association (EUA 2005). It is assumed that structured programmes with their stronger focus on teamwork – an essential aspect of research – prepare students better for independent research activities in their future careers (Noorda 2017: 2). Furthermore, the application and acceptance processes for these programmes are more structured than in the ‘master-apprentice model’ (Janger et al. 2013: 8). In the meantime, this shift to structured programmes is fairly complete in the

¹⁵¹ UT – ProDoc Guidelines. <https://www.utwente.nl/uc/e69/guidelines-prodoc-Ph.D.-candidates-86cabb0102c418000676bea02c73b0b00eadb880200.pdf?whs-download=guidelines-prodoc-Ph.D.-candidates.pdf> [Accessed 11.07.2017]; see also <https://www.utwente.nl/en/education/post-graduate/tgs/currentcandidates/phd/prodoc/faq/> [Accessed 08.05.2017]

¹⁵² According to uni:data, 1,835 PhDs were completed in Austria in 2015/16. Some 25,000 students were enrolled for PhDs in the same period.

Netherlands, the vast majority of PhDs are completed at graduate schools or research schools. Since there are now virtually no differences between PhD education in the Netherlands and its US, Swedish and UK counterparts in terms of competitive recruiting, team-based supervision, curricula and focus on the demands of an academic career (Janger et al. 2013: 19f), Dutch PhD education now matches the standards customarily found at the world-class universities.

Twente is the only one of our case studies for which a separate case study on the university's set-up process is available (see Table 9, p. 147). It is also an extraordinary case of a newly-founded university in a disadvantaged region being managed to success, whereby recognition must also be given in this regard to a number of factors in the Salmi model (e.g. leadership, governance and internal cooperation). Twente strives to establish a strong reputation for itself in the region through its partnerships with industry, but also has a strong reputation for research (top in the country in the Leiden Ranking; the Centre for Higher Education Policy Studies brought a focus on higher education research). It also seeks to gain a high profile in the competition for talent through its graduate school (the 'human side' of business is a clearly transportable strategic focus).

Particular focus is placed at Dutch universities on promoting young academics in a narrow sense: a large percentage of PhD students remain at universities in a research capacity. Despite the introduction of the PDEng, educating graduates and providing them with the professional training needed for a non-university career is accorded less relevance than in other countries (Snijder 2016: 184). This is due in part to the strong role played by the HBOs (practice-oriented higher education institutions; around two thirds of all students).¹⁵³ The graduate schools permit early selection and encourage students who are strong in research to specialise in Research Masters and integrated Masters/PhD programmes. This focus on young academics – and the attractiveness of the programmes for talented international researchers – are just two of the reasons for the Netherlands' strength in research.

In addition to the impact of the PhD programmes on research output, the job satisfaction of PhD students is also highly relevant. The positions available to them at the graduate schools in the Netherlands are financially attractive, and the terms and conditions are reasonably good: they are full-time jobs (with corresponding full-time salaries); in Austria, PhD students are usually only employed by universities on a part-time basis (if at all). Furthermore, at the University of Twente, the teaching commitments of PhD students must not exceed 20 % of their paid work time. International comparisons of job satisfaction among PhD candidates are difficult to find: one survey of academic professions that is available does not distinguish between predoc and postdoc university staff (Teichler/Höhle 2013). However, of the twelve European countries studied in this survey, job satisfaction in this group is highest in the Netherlands. Dutch academics are also reasonably optimistic when it comes to academic career prospects for young people (their counterparts in Austria, in contrast, are very pessimistic; Kwiek/Antonowicz 2013: 46f). However,

¹⁵³ According to Kreckel (2008: 275) the Dutch universities' strong position in research is the result of the country's binary higher education system and the high numbers of students in practice-oriented vocational higher education institutions (around two thirds of all students) rather than universities. This has allowed the universities to concentrate from a teaching perspective on educating future PhD students and researchers.

university staff in the Netherlands do also have an above-average tendency to view their jobs as a burden (Kwiek/Antonowicz 2013: 48f).

3.8 University of Duisburg-Essen: Heterogeneity as Opportunity, Diversity as Contribution to Excellence

Established: 2003 (through the merger of the University of Duisburg and the University of Essen)

Type: Public university

Location: Duisburg and Essen (Germany)

Students: 43,000; approx. 38 % Bachelor (excluding teacher training), 27 % Masters, 22 % teacher training (state examination and Bachelor), 4 % Medicine (state examination), 8 % PhD

Specific characteristics: 61 % of first-year students do not have a grammar school background (compared to the German average of 48 %)

Tuition fees: None (since 2011)

Placings in selected international rankings:

Times Higher Education World University Ranking 2018: 201-250

Times Higher Education Young University Ranking 2016/17: 13

Leiden Ranking 2017: 356

QS Ranking 2018: 601-650

The University of Duisburg-Essen (UDE) was established in 2003 through the merger of the two former universities in its host cities¹⁵⁴. With around 43,000 students, 5,800 employees and an annual budget of 483 million euros, it is one of the largest universities in Germany (UDE 2017a). UDE is a full university with eleven faculties: Humanities, Social Sciences, Educational Sciences, Economics and Business Administration, Mercator School of Management, Mathematics, Physics, Chemistry, Biology, Engineering and Medicine. Research at the university focuses on four key areas: Nanoscience, Biomedical Sciences, Urban Systems and the Transformation of Contemporary Societies. UDE is primarily state-funded, augmented by third-party funding of around 109 million euros (UDE 2017a).

UDE's position in the international higher education rankings is mixed: in the THE Young University Ranking of universities that are aged 50 years or under, it occupied 13th place worldwide in 2017. In the THE World University Ranking, it has climbed from the 351-400 range in 2014 to now hold a place in the Top 250. In other notable rankings, the university occupies a lower position (Leiden and QS Rankings) or is not ranked (Shanghai Ranking).

In Germany, UDE is known in particular for its advocacy of 'education climbers' and migrants. Even its slogan – "*Offen im Denken*" ("Open-Minded") – reflects not only its innovative teaching and research but also its inclusive approach and the relevance of diversity in its guiding principles (UDE 2017a). UDE places a strong focus on gender equality, students from migrant and/or low-education backgrounds and international students – all themes that are also the focus of attention in the Austrian Federal Ministry of Science, Research and Economics' strategy for the social dimension (BMWF 2017). Accordingly, we will now take a closer look at UDE's particularly strong activities in this regard in the field of teaching and learning (Leichsenring 2011: 38). Diversity measures relating to personnel development and research will only be discussed thereby in passing.

¹⁵⁴ The Gerhard Mercator University of Duisburg and the University of Essen.

3.8.1 The History of Diversity Management at the University of Duisburg-Essen

The first few years after the merger of the two separate state universities in 2003 to form the University of Duisburg-Essen were strongly characterised by the logistical and political challenges that came with the merger; in this phase, diversity was only accorded marginal attention (MWF NRW 2005). Indeed, all diversity matters were handled until 2008 by the 'Gender and Diversity' unit in the 'University Development Centre'. An evaluation of the centre (ZEvA 2009) gave this unit a primarily negative assessment for its focus on gender and corresponding lack of initiative in or negligence of diversity. According to the evaluators, the unit at that time did not exhibit adequate competence in diversity, a field that includes two areas that are of utmost importance for UDE, namely migration and low-education social classes (ZEvA 2009: 11).

In 2008, the topic was upgraded by the establishment of the first *Vice-Rectorate for Diversity Management* at a university in Germany. This was the result of a clear and conscious strategy: the difficult circumstances faced in a region with a high immigrant and/or working-class population were turned into something positive – diversity and equal opportunities were identified as a potential unique selling point (USP) for the university (Heinrich 2013). Unlike in other countries (e.g. Australia), the different baseline conditions are not taken into consideration in higher education rankings and funding in Germany (Krempkow/Kamm 2011). Diversity management was subsequently included in UDE's development plan as a core future task, and the University Development Centre unit and Vice Rectorate worked together on a project basis (Rektorat der UDE 2009). Existing measures were bundled together into a coherent diversity management concept. A survey of students was also carried out to determine the need for further programmes (Stammen 2010). Diversity is already firmly anchored at UDE; an even broader implementation of diversity measures is one of the goals of its 2016-2020 development plan (Rektorat der UDE 2015: 10).

3.8.2 The Structure of Diversity Management at the University of Duisburg-Essen

A distinctive feature of diversity management at UDE (and one which has since also been adopted by several other German universities) is the bundling of responsibility into a specially-created Vice Rectorate for Gender and Diversity since 2008. This Vice Rectorate sets the university's overall diversity management strategy (UDE 2015b). Diversity is embedded as an interdisciplinary topic in all UDE structures and processes. This includes, for instance, its inclusion in curricula, support for diversity as a research topic, the development of diversity competence among university staff and students, assistance in equal opportunities work, the acquisition of third-party funding for diversity management projects, the integration of diversity management into quality assurance instruments and the building up of partnerships and contacts. Management of and responsibility for related programmes are likewise the task of this Vice Rectorate (UDE 2017a). UDE embraces a concept of diversity that recognises and accepts differences and diversity. Accordingly, diversity management covers the totality of measures that serve not only to prevent people from being discriminated against because they are different but also to actively support and advocate difference and diversity without pre-defining what difference actually means (Ziegler 2017). The long-standing Vice Rector and a member of her team wrote a book about their experiences in developing the diversity management strategy at UDE (Klammer/Ganseuer 2013). Alongside a definition of the core dimensions of diversity –

gender and family context, disability, ethnic, cultural and social origins – and a description of diversity-sensitive course structures, teaching/learning platforms, counselling services and degree content, this book focuses in particular on the concrete development, implementation and monitoring of a diversity strategy at higher education institutions.

The Vice Rectorate is currently made up of the Vice Rector, a diversity advisor, a student assistant and a secretariat. But it also works with other working groups on diversity matters. Relocated at the beginning of 2017 from the *Centre for University and Quality Development* to the *Academic Counselling Centre*, the “*Offene Hochschule*” (“Open-Minded University”) department brings together twelve members of faculty responsible predominantly for running fixed-term programmes to promote equal opportunities and diversity. Diversity is also a cross-departmental matter of great relevance for staff in other departments (quality management, lecture series, research, ...). The university endeavours to establish centralised and decentralised projects that involve many internal and external participants (UDE 2015b: 2). As a result, each faculty has its own diversity officers since 2014 (Hochschulvertrag 2015). Matters relating to women’s and gender research, gender mainstreaming, equal opportunities and the promotion of women are also the remit of the *Equal Opportunities Office*, while the *Inclusion Advice Centre* handles matters relating to students with special needs and/or chronic illnesses. In addition to the UDE diversity strategy, a separate inclusion strategy was put in place in 2015 (UDE 2015a).

Funding for the various members of staff that work on diversity comes from various sources: while the university has established a number of jobs in the Vice Rectorate, projects that are visible to the outside world are/were funded by foundations (*TalentKolleg Ruhr*, *ProSALAMANDER*, *Chance hoch 2*, *Dritter Bildungsweg*), federal ministries (*OnTOP*), the state of North-Rhine Westphalia (*Talentscouting* at several universities) and the national/state programme for more quality in teaching (e.g. the *Bildungsgerechtigkeit im Fokus* project and sub-projects) for the duration of the project. Only limited corporate funding has so far been raised for such initiatives (Heinrich 2013).

3.8.3 Diversity Measures at the University of Duisburg-Essen

The diversity measures at the University of Duisburg-Essen stand in stark contrast to the frequently narrow (selection) measures encountered under the excellence banner. The most visible of these are the programmes to improve access opportunities and degree requirements for different groups of students that have been introduced primarily by the Vice Rectorate for Diversity Management. The *Bildungsgerechtigkeit im Fokus* (“Focus on Educational Justice”) project was funded from 2011 to 2016 and consisted of several separate measures (Evalag 2014: 3):

Measures to provide comprehensive support and advice and help students find their role in their chosen course (*Mentoring System*, *Blended Learning*, *Tutoring Programme*)

Measures – on a course-related basis – to help students recognise their skills and abilities and provide them with corresponding support (*MINT Orientation Phase*, *Writing and Language Skills*, *Foreign Languages and Internationalisation* projects)

Measures to provide quality assurance and establish relevant basic feedback instruments (*Benchmarking*, *Course Analyses*, *Student Panel*, *Self-Assessment* projects).

Initial indications from participants indicate that the *Mentoring Programme* had strong emotional added-value; first-year students felt that they were receiving the support they needed for their course. According to Hauser (2015), mentoring by non-traditional students for non-traditional new students has, in particular, enormous potential. The *E-/Blended-Learning* measures were extended to better address student needs, e.g. of students who can essentially only study part-time because they need to work or have care commitments (UDE 2015b: 25; Goedicke et al. 2014).

The audit in the middle of the funding period recommended the continuation of almost all the sub-projects evaluated (e.g. mentoring, blended learning, tutoring, course analyses, student panel; Evalag 2014). More extensive use of the *MINT* orientation phase measures and an expansion of measures to promote writing and language competences in German were also recommended (Evalag 2014: 5f). Negative assessments were, however, given to the relationship between central project management and the sub-projects. It would seem there were some deficits in the communication between the project units, due in part to the unfortunate division of responsibility for content (sub-project leaders) and budget (faculties) (Evalag 2014: 6). In a second phase of funding, the project will focus on the orientation phase and will receive an additional 19 million euros in funding from the *Qualitätspakt Lehre* (“Teaching Quality Pact”) until 2020 (Rundschau Duisburg 2016).

The *Talentkolleg Ruhr* (“Ruhr Talent College”) is organised by the University of Duisburg-Essen, Dortmund University of Applied Sciences and the Westphalian University of Applied Sciences. The goal of this initiative is to encourage interest in going to university, especially among talented young people whose parents did not attend university. Its *Clearing Unit* offers initial advice and counselling to interested young people. The *Fit for Study* programme offers them the opportunity to refresh and improve their language and methodological skills. The *Smart for Study* programme adapts *Fit for Study* to the needs of people with work experience, returning students and foreign academics. School pupils can accompany so-called *Campus Scouts* through a typical day at university and thus gain an introduction to student life (UDE 2017c).¹⁵⁵ A similar approach is taken in the *Chance hoch 2* (“Double the Chance”) project that is run by UDE’s Vice Rectorate for Diversity in which school pupils with a low-education background from Grades 9 or 10 upwards can receive intellectual and financial assistance and even a personal mentor until they go to university (UDE 2017b).¹⁵⁶ A total of 17 higher education establishments in North-Rhine Westphalia (NRW) participate in the state-funded *NRW Talentscouting* programme, which sends talent scouts to secondary schools to work with teachers to identify motivated young people and support them on the path to university.

OnTOP draws on the insights gained in the *ProSALAMANDER* pilot project (which received the German Diversity Award) to provide individual support to 16 academics (at present) whose degrees are not recognised in the German labour market in ‘upgrading’ their qualifications (Rektorat der UDE 2016: 45). The *ChanceMINT.NRW* career development programme is currently helping 50 female engineering students to prepare for their future careers (Rektorat der UDE 2016: 44).

¹⁵⁵ <https://www.uni-due.de/talentkolleg/campus-scouts.php> [Accessed 11.07.2017]

¹⁵⁶ <https://www.uni-due.de/chancehoch2/> [Accessed 11.07.2017]

In addition to the measures provided by the *Bildungsgerechtigkeit im Fokus* programme described above, UDE also provides writing skills workshops, tutorial programmes, preparatory courses to balance out differences in prior education as well as a range of advice and ombudsman services. These are available to students from all groups. The majority of these programmes, which are also of central relevance for UDE's diversity strategy, are run by its *Centre for University and Quality Development* (Schlüter/Schilling 2016). Part-time degree options have been introduced in several faculties (***Extended Duration Part-Time Degrees***), although this option has so far only been taken up by a few students (2015/16: 340 students; Rektorat der UDE 2016: 33). In the German CHE University Ranking, the measures to support new students only receive a positive assessment for Political and Social Sciences; for Business Studies and Informatics they receive a negative assessment (Zeit Campus 2017).

The ***Centre for the Development of Competences in Diversity Management in Degrees and Teaching at Universities in NRW (komDiM)*** founded in cooperation with Cologne University of Applied Sciences offers special courses for teaching staff across the whole of NRW. The ***ProDiversität*** initiative helps staff at UDE with teaching, advisory and management roles to increase their competence in accepting heterogeneity. ***Diversity Days*** have likewise been organised at the university and further ***bottom-up measures*** have been recognised with internal diversity awards (UDE 2017b).¹⁵⁷

3.8.4 Evaluation, Audits and Quality Management

Knowledge-based quality assurance and improvement is an important element of the diversity strategy (Klammer/Ganseuer 2013: 123ff). Some of its programmes have been audited by external institutions and improved as a result. In addition to the aforementioned evaluation of *Bildungsgerechtigkeit im Fokus* and unpublished evaluations of the university, two other audits merit particular mention (*Vielfalt gestalten in NRW* ("Creating Diversity in NRW") by the Stifterverband initiative to promote education, science and innovation and *Familiengerechte Hochschule* ("Family-Friendly University")). These were both used to develop existing measures further, create new measures and embed the findings of the audits even more deeply in the minds of people at the university.

There is also strong internal cooperation with quality management. To enable it to develop measures that are a precise fit to student needs, the Vice Rectorate carries out annual surveys of students known as the ***UDE Student Panel*** (UDE 2016). The course analyses that were intended to be included in these surveys as a central aspect of internal quality management have been delayed for data protection reasons (Evalag 2014: 5) but are planned for the next *Bildungsgerechtigkeit im Fokus* funding period.

3.8.5 Categorisation in the Analysis

With its strong focus on diversity, UDE was an early promoter of a topic that has gained strong relevance in the excellence discourse in the second half of the 2000s (see Chapter 2.2). According to Ghosh (2012), appropriate and balanced access (to higher education) is itself characteristic of excellence.

¹⁵⁷ <http://www.komdim.de/> (Accessed 24.04.2017)

Given the complexity of the topic and the many possible target dimensions, it is difficult to give an overall assessment of the success of diversity management at UDE. However, UDE stands fully behind its diversity strategy: terms like ‘learning’, ‘diversity’ and ‘social responsibility’ are clearly evident in our systematic searches (see Table 10, p. 148). Publicly accessible evaluations and audits are primarily available for individual measures. Numerous awards – including the University Manager of the Year Award for Rector Ulrich Radtke, the *ZEIT*-Verlagsgruppe 2015 Award for Equal Opportunities and Educational Equity Initiatives and the German Diversity Award for the *ProSALAMANDER* project – all testify to the success of diversity management at the University of Duisburg-Essen. In comparison to other universities in North-Rhine Westphalia, UDE stands out above all for its large number of individual measures, its coherent diversity management strategy (RWTH Aachen University is the only other university in the state with such a strategy) and its participation in the Stifterverband diversity audit (in which only a third of the universities participated).¹⁵⁸

An interpretation of national and international higher education rankings provides a further indication of the success of UDE’s diversity management. In comparison to the whole of Germany, UDE has a higher share of risk groups like first-generation students, students with a migration background or working students (see following paragraph). This would lead us to expect that the dropout rates would be higher than at universities whose students come from more academic backgrounds. However, the percentage of Bachelor and Masters degrees completed in the standard period of time lies in the upper mid-range according to the CHE Ranking (*Zeit Campus* 2017) or is above or around average in the U-Multirank ranking. As at most German universities, the Bachelor degree completion rate is below average compared to other countries.¹⁵⁹ The difficult baseline conditions stemming from the composition of the student body are thus well compensated for in comparison to other German universities.

Another means of determining whether the outreach measures and the positioning of UDE as a university of all colours (Heinrich 2013) are bearing fruit is to look at the student population. As is customary in Germany, the selection procedure at UDE also does not include any quotas for disadvantaged groups (with the exception of the special treatment given to people in work). The places on the courses are allocated on the basis of grades and selection interviews (e.g. for Medicine; UDE 2009). The extent to which social background is addressed in these selection interviews and taken into consideration in the decision process is not officially made known.

The share of female students at UDE in the winter semester 2015/16 lay at 49 % and was thus around the average for Germany; the share of foreign students is comparatively high (UDE: 19 %; all universities: 11 %). The share of students with foreign citizenship is only slightly higher than at RWTH Aachen University (18 %), but significantly above those at the neighbouring universities of Bochum (14 %) and Dortmund (10 %; DeStatis 2017) and all state universities in NRW as a whole (2014: 12 %; IT NRW 2015: 32). According to the results of the *UDE Student Panel*, the share of first-year students from non-academic backgrounds lay at 61 % in 2015/16 (UDE 2016). In a comparable survey of students, this

¹⁵⁸ “Diversity (Management) an Hochschulen in NRW – eine umfassende Übersicht.” (“Diversity (Management) at Universities in NRW – A Comprehensive Overview”) http://www.komdim.de/diversity-in-nrw/?no_cache=1 [Accessed 11.07.2017]

¹⁵⁹ <http://www.umultirank.org> [Accessed 11.07.2017]

share lies for all German universities at 48 % (Middendorff et al. 2017: 27). The share of first-year students with a migration background (36 %) is significantly above that of all German universities (20 %; Middendorff et al. 2017: 30).¹⁶⁰ The share of working students at higher education institutions in the Ruhr area is among the highest in Germany; in this regard, students in the cities of Essen and Duisburg are on a par with those in Dortmund and Bochum (Middendorff et al. 2017: 61). In comparison with other universities in Germany and in NRW, the student population at UDE is very diverse and successful.

After first-time students, the transfer from Bachelor to Masters is a further indicator. An analysis of the cohorts of Bachelor degree graduates in 2010/11 shows that at that time female graduates with a non-academic education background and professional qualifications rarely wanted to pursue a Masters degree (Ebert/Stammen 2014). The diversity measures had thus not (yet?) produced an exception to the German trend of social selectivity in the Masters degree context (Auspurg/Hinz 2011) at that point in time. The survey of new students at UDE indicates that the plans of members of the different social groups to pursue a postgraduate degree do not differ at the start of their degrees (Ebert/Stammen 2014), and that any thoughts of dropping out likewise bear no relation to diversity characteristics (Kliegl/Müller 2012).

The development of the composition of first-year students over time offers a further indication of the success of outreach measures. In contrast to the falling shares of foreign students at the other universities in NRW, their share at UDE has risen since 2007 (IT NRW 2009, IT NRW 2015). The share of first-year students with non-German citizenship and a migration background rose sharply (from 28 % to 36 %) from the winter semester 2012/13 to the winter semester 2015/16, while that of students with special needs/chronic illnesses rose slightly (to 6 %). The share of students who did not attend a grammar school and of over-25s among first-time students both remained constant (UDE 2016). The outreach measures are thus only having a partial effect, the goal of attracting even more low-education students has so far not been achieved, and the figures are stagnating – albeit at a relatively high level.

It could be expected that diversity and a strengthening of the social dimension would have a negative effect in the rankings, particularly those that are based on research performance or prestige. However, this is not the case: UDE has a good position in the Times Higher Education Ranking in particular; in most of the other rankings it occupies a midrange place among German universities. Third-party funding generated by UDE grew by more than 50 % from 2008 to 2013 – and thus by significantly more than other comparable universities like Dortmund (+26 %) or Bochum (+44 %) (IT NRW 2015: 34). Even if it remains unclear what the university would be like under other circumstances, this can definitely be seen as a success given its large share of high-maintenance students. In this case, there is no negative correlation between a heterogeneous student population and concerted diversity efforts on the part of the university on the one hand and its research performance on the other.

¹⁶⁰ The comparisons between students and first-year students should be interpreted with caution. Furthermore, figures taken from different surveys are only partially comparable given the different response rates. For want of more comparable data, the universities described should thus only be seen as an illustration of a trend.

4 Synthesis

4.1 Excellence as Political and Academic Term

When we discuss the term excellence – especially given its current political relevance – we have to differentiate between its – at times contradictory or conflicting – use in various fields. First there is its use in the political field, i.e. in the governance and control of higher education systems and institutions and in the positioning of national (or regional) centres of knowledge and thus also economic centres. Second, there is its use in the political sense within the academic profession, i.e. in the battles for position within the various subdivisions of the academic field (what type of research, which institutions, groups, people is/are excellent?) but also in the profession's endeavours to position itself vis-à-vis politics and society, where it is battling for power of definition, autonomy and self-control (and seeks to keep the notion of excellence indeterminate and thus under control) (Lamont 2009, 2011).

There is much talk in the political field of elite universities, and governments frequently instigate excellence initiatives for their universities and higher education institutions. As a rule, elite universities offer very selective access to higher education (usually) in combination with high tuition fees. They can also ordinarily look back on centuries of excellence in higher education. But what is actually meant by excellence? On the one hand, the debate surrounding this term is driven strongly by the growing relevance of international higher education rankings, which are themselves the object of strong criticism when it comes to their methodology and quality. On the other hand, excellence is (implicitly) used above all in reference to research excellence, measured using bibliometric approaches that are likewise strongly criticised (not least because they concentrate primarily on English-language publications, give priority to quantity over quality and negate the different publication cultures in different disciplines). In this context, there is hope that excellent research will resonate to the other functions of a university, especially teaching. However, since experience shows that excellent researchers are not always automatically also good teachers, higher education policy is now likewise reinforcing the importance of teaching quality.¹⁶¹

In addition to teaching and research, an increasing focus is also now being placed on other basic functions of the university under the banner of the 'third mission' (cf. Lassnigg et al. 2012). While what these functions actually are remains a matter of intense debate, they in essence include the direct cultural, economic, political and social¹⁶² contributions of higher education institutions – as manifestations of the global knowledge and research system – to their local environment and to society. In some cases, given the increasing pressures being placed on the academic profession, the focus here lies on explicitly promoting activities that had previously been carried out informally and as a matter of course in higher education institutions. In others, it lies on translating activities at global level to the local level (and possibly also vice versa). In others still, it is about bundling the divided tasks in the originally linear and sequential R&D model – basic research-applied research-industrial

¹⁶¹ For example, *Ars Docendi* in Austria, *Qualitätspakt Lehre* in Germany, the TEF Teaching Excellence Framework in the UK in addition to the REF Research Excellence Framework that is used to assess (and fund) university research.

¹⁶² Deliberately listed in alphabetical order; since there is much dispute regarding their weighting.

development – into the ‘triple etc. helix’ institutions (an aspect that is of central relevance for elite universities in particular). In other words, it is about ‘knowledge transfer’ to business, to the host community and on site. Furthermore, increased attention is now being given to concepts like the ‘inclusive university’ or diversity management. All of these developments mean we can really no longer talk of *one form of excellence*, since it clearly manifests itself in different forms in different fields, i.e. *excellence is diverse*.

Since excellence likewise applies in academic circles to a specific form of research, namely traditional ‘blue skies’ research under strict academic self-regulation, it also falls to some extent between the different basic functions. In the distinction made in the study of science (Gibbons et al. 1994), excellence would comprise what is conceived to be the ‘Mode 1 (traditional, disciplinary research)’ and what in principle contradicts both the ‘third mission’ (which incorporates the ‘Mode 2’, i.e. transdisciplinarity) and the entrepreneurial university (which at times relaxes or relinquishes academic self-regulation).¹⁶³ The higher education rankings assume a conflicting role in these battles for position: they undermine academic self-regulation on the one hand, yet also sustain ‘Mode 1’ and the elitist core sectors with their criteria on the other.

Despite the breadth of the excellence discourse, policy considerations focus above all on the rankings and world-class universities. The term excellence is thus ascribed more by ‘outsiders’ than it is applied by the institutions themselves (Hazelkorn 2011). Tangible political demands for the establishment of WCUs in Austria must thus also be considered in this light. The question of whether this is actually necessary extends to a country’s integration in the world economy (and world society) and thus in the globalisation process. Put bluntly, the question could be formulated as follows: does a nation/region need WCUs to be able to participate fully in and make a substantive contribution to (i.e. not just be visible) global knowledge production and exploitation? The targets define the benchmarks (the debate in Austria is calling for positions in the Top 100; one could ask: is that enough?). At any rate, establishing a WCU requires significant funding, money that might then not be available elsewhere. Such a policy would lead to the much-discussed problem of the harmonisation or enforcement of a model as gold standard and associated drift towards (or risk of) a systematic diminution of diversity in higher education systems (not a desirable development from an evolutionary standpoint). The lack of consideration of national circumstances in the international higher education rankings leads researchers to ask whether it would in fact not be better to base flagship universities on national relevancy than on global rankings (Douglass 2015).

Three more or less parallel and contradictory phenomena are also salient. First, the void of meaning has been dissolved into such a variety of aspects that the ‘excellent wood cannot be seen for all the excellent trees’; second – reinforced by the rankings – a global upper class of world-class institutions has emerged, which proceed on the one hand to (ostensibly) define standards that then cannot on the other hand (realistically) be met (and partly make a mockery of themselves, e.g. when a plurality of countries line up in a ‘rat race’ for a university in the Top 10 and have to elbow out the current occupants to achieve it); third,

¹⁶³ In principle, one can follow the battles in the research landscape between the various research approaches that can be expressed by the Mode 1 vs. Mode 2 distinction (and many parallel distinctions like disciplinary-applied, hard-soft, etc.), whereby bibliometrics in turn largely reflects Mode 1.

when it comes to excellence – contrary to the much-affirmed declaration of intent for ‘evidence-based policy’ – the academic discourse is largely decoupled from the political discourse, with few of the academic insights transferred into policy – on the contrary, since such academic insights would encourage reflection and a relativisation of excellence policy.

4.2 Transferability of the Case Studies to the Situation in Austria

The diversity in excellence is also reflected in the selection of universities analysed in our case studies. At these universities, conscious measures were implemented with the aim of achieving excellence in different fields. The starting point for these changes lay in some cases in the universities themselves (Arizona State University, Duisburg-Essen), in others in the implementation of national strategies (Copenhagen, Twente, Aalto).

In Salmi’s model, world-class universities are defined by excellent graduates, research results and technology transfer. This should be achieved through the appropriate use of resources, governance and concentration of talent (see Chapter 2.2). While some of the universities in our case studies orient themselves on this gold standard, others show that there is room in the definition of excellence for other areas of focus.

As far as transferability to the current situation in Austria is concerned, some of the individual initiatives to promote start-ups or manage diversity are of particular interest. More far-reaching reforms would first require deeper (academic) discourse and core policy decisions. If agreement could be reached on the general direction, i.e. on the needs and opportunities that are specific to Austria – and not just a goal like ‘having at least one university in the Top 100’ – the case studies presented in this report provide inspiring examples for actual reform.

It should, however, be noted that our case studies are based on desktop research and looked in particular at governance structures and major changes over time. This uncovered a number of individual aspects that could also be of interest in the Austrian context. But before any individual ideas could be transferred to Austria, these case studies would have to at least be augmented by visits to the actual universities studied and thus through qualitative information and testimonials. Changes that did not produce the expected result are rarely documented – especially not in annual reports or on websites, which, although important sources of information for desktop research on institutions, ultimately serve other purposes.

4.2.1 Arizona State University

In their model of the ‘New American University’, Crow and Dabars (2015) develop a very detailed multifactorial alternative to the gold standard of the WCUs, which is in many ways diametrically opposed to the hegemonic discourse and the key challenges of developing universities and research. They focus on academic excellence, open access, expanding the student population (also by broadening diversity) and entrepreneurship in close interaction with the regional economy. It is also interesting to note that ASU is (now) a really large mass university of a similar size to the University of Vienna.

It should however be noted that the majority of the change processes enacted by ASU are difficult to replicate. Mitchell (2011) emphasises several times that there are some ASU-specific aspects which prevent the model from being readily applicable to all universities in America. The young university's relatively brief history and thus less established structures facilitated the change process. The fairly limited higher education alternatives elsewhere in Arizona (only three universities) likewise supported the change option. Crow and Dabars are fully aware of this when they argue that they are not delivering a blueprint for other universities and that every institution has to create its own development strategy (Shapira 2015: 7).

Two particular aspects seem noteworthy from an Austrian perspective. The first is the handling of the deliberate expansion in the student population (+70 % in 13 years), since a similar rise in student numbers has also been seen in Austria, albeit one that has essentially happened *en passant* and largely without control. The second is the clear orientation on the needs of the regional economy, supported by a strong focus on entrepreneurship and start-ups.

The fact that an active control of the growth in the student population can produce better results than a reactive approach can be seen at ASU in the high graduation rates, the targeted support for social minorities and the early focus on digital teaching methods. Active retention policies (e.g. reducing dropout rates), improving the social dimension and making use of technology in teaching are constant buzzwords in today's higher education sector (see, for example, the 2017 Austrian Strategy for the Social Dimension or the EU's 2016 Study on Dropout and Completion). Since ASU is a pioneer here in several regards, its achievements and their medium-term impacts merit a more detailed study and analysis. Doing so would, however, have exceeded the scope of our short case study.

The creation of a start-up-friendly climate and the focus on entrepreneurship are far more prevalent topics in the debate now than they were 15 years ago when the ASU began its transformation. Alongside its education function, ASU deliberately seeks to strengthen the regional economy through its focus on technology transfer. As the ASU case study shows, this approach does indeed contribute to new companies being established in the region. ASU's experience also shows that regional engagement only leads to success when it remains focussed and does not succumb to the risks of a 'multitude of opportunities'. The decision what not to do is equally as important as the decision about what will be done. To obviate potential frustrations as a result of this decision process, communication with local partners is extremely important (Goddart/Kempton 2012 25).

If Austrian higher education institutions (universities or universities of applied science) are seeking to increase their focus on start-ups and entrepreneurship, ASU could serve as a role model and offer examples of well-established successful initiatives. Our case studies on the University of Edinburgh and Aalto University likewise contain a wealth of ideas that could be transferable to the situation in Austria.

4.2.2 University of Edinburgh

The University of Edinburgh would best serve as an example for Austria of how to go about fulfilling the criteria for a WCU. Preparing in earnest for this would mean taking the various parameters seriously and testing possible implementation scenarios. One point that would also have to be taken into consideration is that the University of Edinburgh profits from substantial endowment income. Approximating the possibilities open to this university would only be possible with a high volume of investment. The University of Edinburgh also demonstrates particular strengths in embedding itself in the region – strengths that have been developed over many decades in a supportive ecosystem and on the basis of centuries of higher education and research excellence. In the present circumstances, this is a league in which Austria would find it difficult or perhaps even impossible to play.

4.2.3 Aalto University

Aalto University is clearly a large and impressive merger project that seeks to develop an innovation-oriented university into a WCU. To this end, Aalto University was established from the outset as a foundation with its own governance structure and a great deal of autonomy. It has also already mobilised almost one billion euros in foundation capital. While the project has gained rapid momentum, it seems to have focused – similar to traditional EU innovation policy – more on commercialisation and exploitation than on basic research. The university was also relocated to Finland's most important industrial innovation centre. This does not correspond to the WCU concept, and the University of Helsinki is still a stronger research university than Aalto, where creativity appears to be more important than research excellence. In a sense, Aalto University is a diametrically opposed counter-model to the Institute of Science and Technology Austria (IST Austria) in that the former places a very strong focus on entrepreneurship and embedding itself in the region, while the latter concentrates on basic research more or less independent of its environment. Both are difficult to assess in terms of their impact in their respective national landscapes.

It is also difficult to assess the level of resistance that would be encountered in Austria to a merger policy like those seen in the Nordic countries in recent years. In particular, the Nordic role models for regional mergers of universities and universities of applied sciences would reach Austria at a time in which the two sectors are being pushed to emphasise their own profiles (and thus their differences) and in which the universities of applied sciences are to be expanded to take the load off the universities. At any rate, increased collaboration is probably also more the 'Austrian way of doing things' as opposed to mergers ordered from above: despite all the profiling efforts, some universities and universities of applied sciences have already introduced joint courses, while collaborations between universities are likewise becoming more commonplace (examples here include, for instance, the NAWI Graz collaboration between the University of Graz and Graz University of Technology in the natural sciences or the shared use of large equipment). While the size of the universities (at least in Vienna) does not currently lend support to the merger concept, the large number of 'specialised universities' in Austria might, in contrast, benefit from a structural 'clean up'.

Notwithstanding the merger debate, Austria can learn from the entrepreneurship and start-up focus at Aalto University. The Helsinki metropolitan area has both a strong

research university (University of Helsinki) and a university that focuses on innovation (Aalto). The two could also co-exist in Austria. It need not be a university that forms the nucleus, it could also be a larger (expanding) university of technology like the UAS Technikum Wien in Vienna. A stronger focus could be placed there on start-ups and entrepreneurship, while partnerships could be established, for instance, with the University of Applied Arts Vienna (and/or the University of Art and Design Linz), Vienna Technical University or Vienna University of Economics and Business (and perhaps even with engineering-based secondary schools or the TGM technical high school). The Aalto case study offers a multitude of ideas for such an approach, from its campus architecture to its involvement of students in university strategy development.

4.2.4 University of Copenhagen

The University of Copenhagen has significantly improved its position in the university rankings in recent years. One reason for this lies in the recent reforms of the Danish higher education system and the autonomy they granted to the country's universities. These reforms have established Denmark firmly in the global competition for talent. However, the strong focus on attracting international students also reveals a conflict of goals: while attracting foreign students can raise the quality of graduates and research, they are also more likely to leave the country after graduation and thus not remain available to the regional job market.

While the circumstances in Denmark are only partly comparable with those in Austria, the university systems in both countries are currently having to deal with strong increases in student numbers and slower rises in public funding. However, Denmark can exert more control on this through the funding of student places than has so far been the case in Austria.

The high number of government-funded research institutions that were integrated into the Danish universities also finds no comparison in Austria. Non-university-based basic research in Austria is supplied primarily by the Academy of Sciences, IST Austria (which was deliberately established as a non-university institution) and a few smaller establishments like the Centre for Meteorology and Geodynamics (ZAMG). Were the Max Planck Society in Germany to merge with the country's universities, this would have a very clear impact on their placings in various higher education rankings. However, since there is no similar institution to the Danish GRIs in Austria, the GRI merger process does not really constitute a model that could be applied in this country.

4.2.5 University of Twente

This university was selected as a case study for changes in PhD-level education. The aim of the reforms that were introduced to give a more structured format to PhD education in the Netherlands was to improve the quality of PhD graduates and thus also the quality of their research. Of the 'accelerating factors' proposed by Altbach and Salmi (2011: 334f.), use is made of English as the teaching language, diaspora and benchmarking (cf. Chapter 2.2.7). From an elitist perspective, the reforms introduce a selection aspect for talented young academics at an earlier stage than in other countries. The differentiation of elite units in which competition for positions is high is clearly a deliberate strategy in the Netherlands:

its ‘Honours courses’ provide particularly ambitious and capable young students with special opportunities to advance, thus also increasing the desired competition.

The Universities Act 2002 already gave greater structure to PhD education in Austria and brought it in line with EU recommendations. However, the establishment of graduate schools and research schools like those in the Netherlands would go a step further. Only around 27 % of PhD students in Austria are currently employed by their universities¹⁶⁴, while the Austrian Science Fund (FWF) only approved one new PhD programme in the three years from 2014 to 2016.¹⁶⁵ Whether PhD education in Austria should be structured even further is above all a political decision that should be preceded by fundamental deliberations on the function of PhD education in the country. If graduate schools were to become an option, Twente could serve as a possible example for the format they might take.

The University of Twente is also interesting as an example of the successful establishment of strong universities in otherwise decentralised, under-developed or problem regions. It is located in a former industrial region near the German border with a weak infrastructure and shows what can be achieved with appropriate efforts. The ties between regional impact and research strength are also interesting. However, it should be noted that the regional structure in the Netherlands (e.g. accessibility) is much more balanced than in Austria.

4.2.6 University of Duisburg-Essen

The University of Duisburg-Essen has turned the difficult baseline conditions (an above-average share of students from migration/socially weak/low-education backgrounds or working students) in a region strongly affected by structural changes in the economy into a strength by upgrading diversity management instead of trying to imitate the gold standard of the WCU. The UDE case study shows that external recognition of a pioneering role can lead to the acquisition of funding for more complex individual measures. Since foundations are of limited relevance in Austria as a source of funding, such funding could be sought here above all from competitive higher education funding sources (e.g. higher education infrastructure funds). Although UDE has so far not succeeded in doing so, attempts could also be made to obtain corporate funding for such initiatives.

The anchoring of diversity management in a central and prominent position allows diversity to become a genuine cross-departmental topic in universities. The inclusion of diversity – and diversity departments – in general university strategy (as is the case at UDE) is of central relevance (Klammer/Ganseuer 2013: 119ff.). Without this, there is the risk that such units will become isolated solutions in structures that are otherwise hostile to diversity (Krempkow et al. 2014: 6). In the meantime, other universities in Germany have also created Vice Rectorates that deal primarily with diversity (e.g. University of Cologne, Technical University of Dortmund, University of Bielefeld).¹⁶⁶

¹⁶⁴ https://uniko.ac.at/modules/download.php?key=10897_DE_0&cs=3D3C [Accessed 11.11.2017]

¹⁶⁵ Cf. FWF funding statistics; <http://www.fwf.ac.at/de/ueber-den-fwf/foerderungsstatistiken/> [Accessed 05.06.2018]

¹⁶⁶ For a comprehensive overview of diversity (management) at universities in NRW see http://www.komdim.de/diversity-in-nrw/?no_cache=1 [Accessed 11.07.2017]. A counterexample is perhaps Bavaria, which concentrates more on differentiation and the creation of elite streams (see Wolfensberger 2015, Chapter 12).

Individual measures to promote different student groups should be developed by universities to fit their own student population, since they are the ones who should know their students – and their needs – best. The evidence-based development of such programmes could be based (as it is at UDE) on continuous diversity monitoring. The Austrian universities could adopt some of the many activities used at UDE to reduce the under-representation of various groups and above all to lower the dropout rate among non-traditional students (in the broadest sense). In addition to inclusion in a holistic institutional strategy, the links with quality management and diverse outreach activities at and with schools are of central importance in this regard. The measures detailed in the Austrian strategy for the social dimension (BMFWF 2017) follow a similar direction, but have yet to be implemented by the universities.

However, the central message to be learned from the UDE case study is that equity and excellence are not mutually exclusive. Despite (or perhaps even because of?) the growing heterogeneity and above-average diversity of its student population, UDE does not achieve poorer results than other universities in Germany and it is clearly better than many other universities at obtaining third-party funding.

4.3 Conclusions on the Discourse

Although the discourse on excellence and WCUs is very compelling and has a strong appeal in many parts of the world, there is no such clear alternative in the discourse on the development of the European university. The key topics in Europe are maintaining/fostering diversity as opposed to a gold standard and participating in global knowledge production and promoting innovation and social advancement at national/local level.

The economic development imperatives demand a strong innovation system in which knowledge production in various forms plays an important part. The higher education system assumes an important role in this, but is – like much of business – already a global enterprise. In the Schumpeterian model that still prevails in the modern world of business, it is those enterprises that work on the ‘frontier of innovation’ that are the most competitive. This also introduces competition in the higher education system. At the same time, research and the knowledge it produces are needed to help address social and societal challenges.

The development focus differs in the WCU and the civic/responsible university models: the former places a clear focus on academic excellence in research with ostensibly clear (albeit complex) criteria; the latter are designed to be much broader and more multifunctional. The decisive aspect in both cases seems to be that at least some of a country’s universities/higher education institutions are contributing to, shaping and facilitating global knowledge production. But successfully establishing the link to the societal environment appears to be equally important – not just for the sake of the actual research output itself but also so that this type of rationality is represented and the research is contextualised in the discourse. This does not appear to be the case in the model for the existing WCUs, which can function and make their contribution to global knowledge production even when de-contextualized from their regional and local environments.

The establishment of the ‘third mission’ in its various shapes and forms appears to be a key development criterion for both types of universities, whereby a WCU in principle starts here from a better position than an institution that has to both first establish its position in academic research and build up its links to society.

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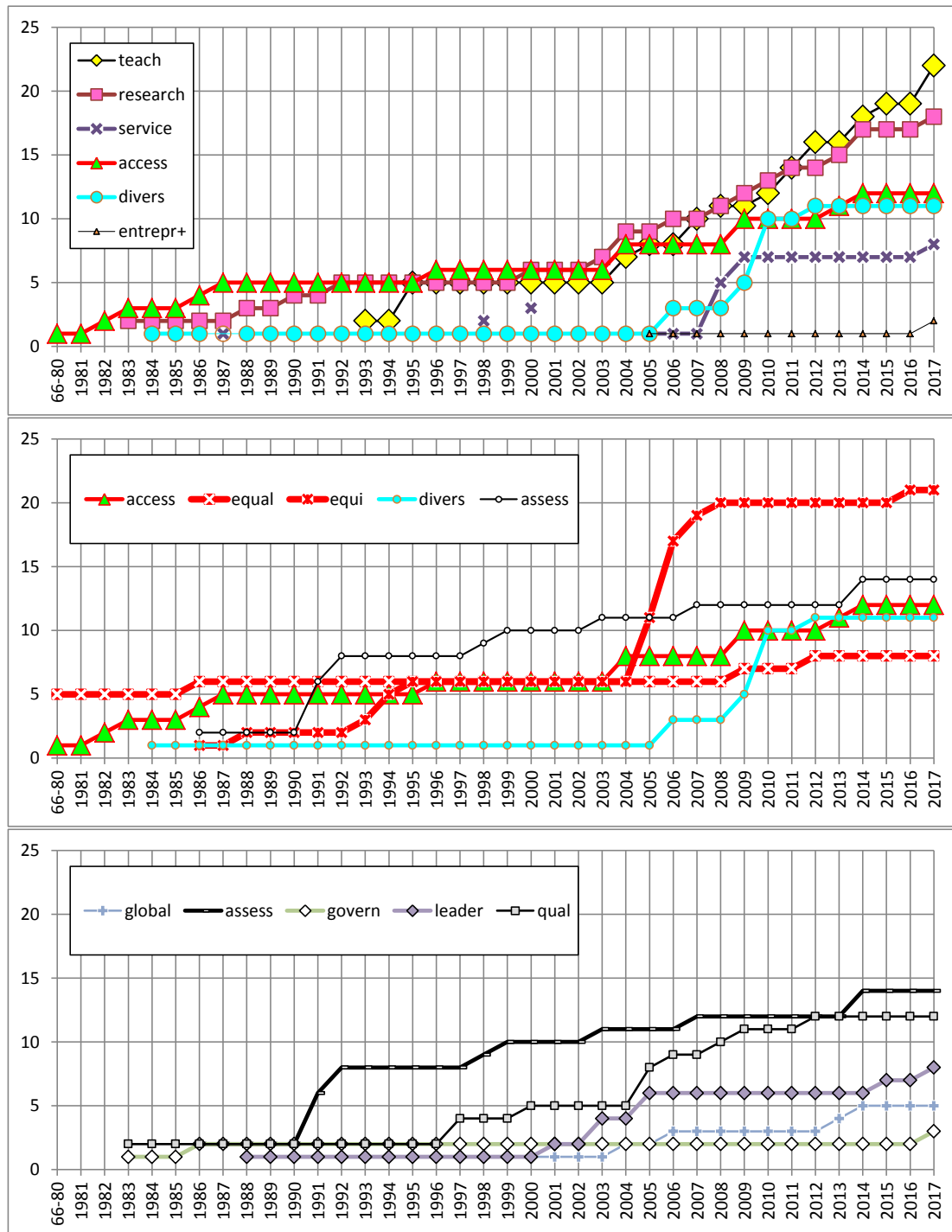
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6 Appendix

6.1 Timeline of Academic Discourse on Excellence in Higher Education and Universities

Figure 12: Discourse by topics over time

(a) Search term: “higher education” (full period)



Graph 1: Function-related topics; keywords: teaching, research, services (latter expanded by entrepr, transf, applied)

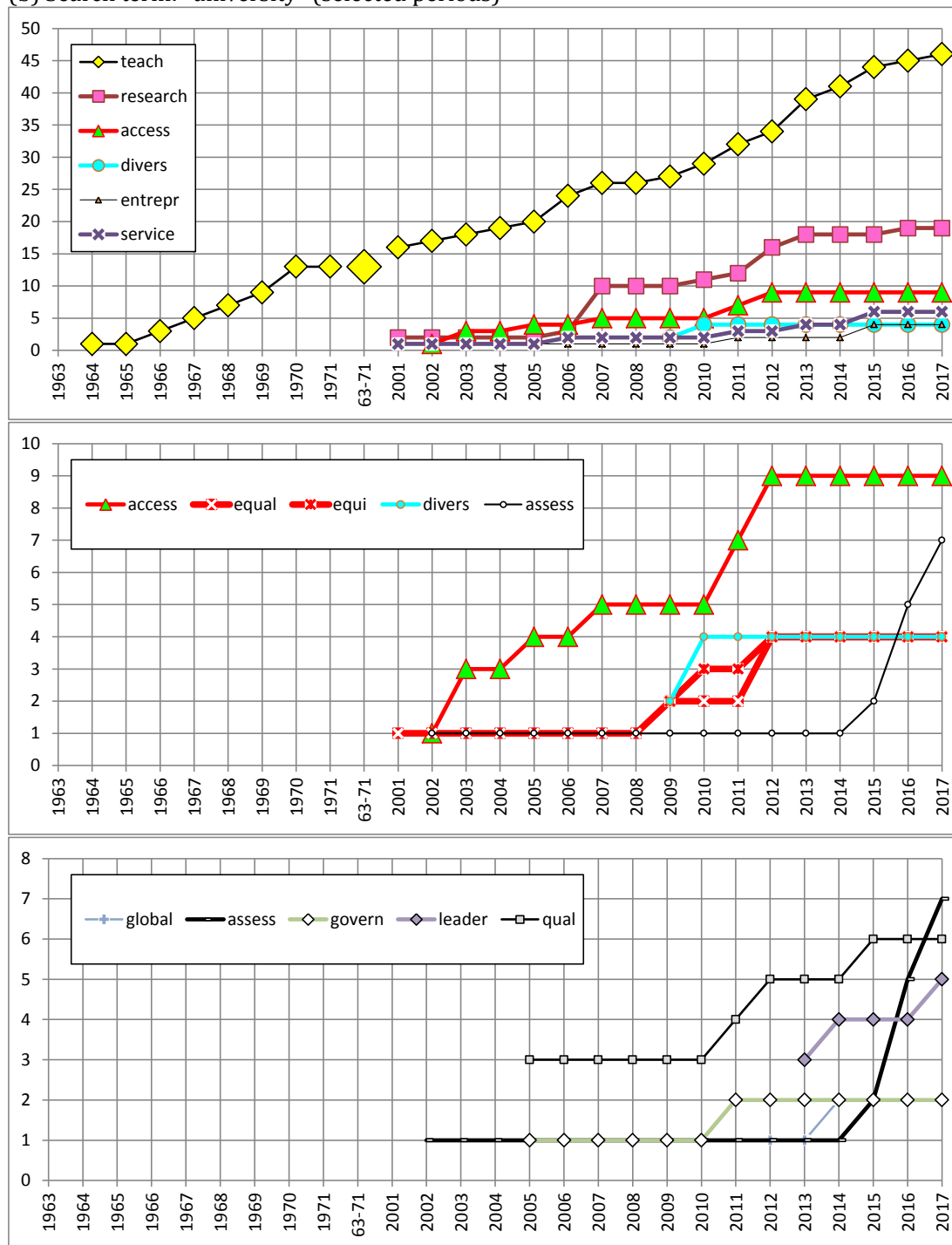
Graph 2: Access/equity/fairness; keywords: access, equal, equi, divers

Graph 3: 'Technical' policy design topics; keywords: government, leader, assess, standard, accred

Source: EBSCOhost searches, August 2017

Figure 12 (cont.): Discourse by topics over time

(b) Search term: “university” (selected periods)



Graph 1: Function-related topics; keywords: teaching, research, services (latter expanded by entrepr, transf, applied)

Graph 2: Access/equity/fairness; keywords: access, equal, equi, divers

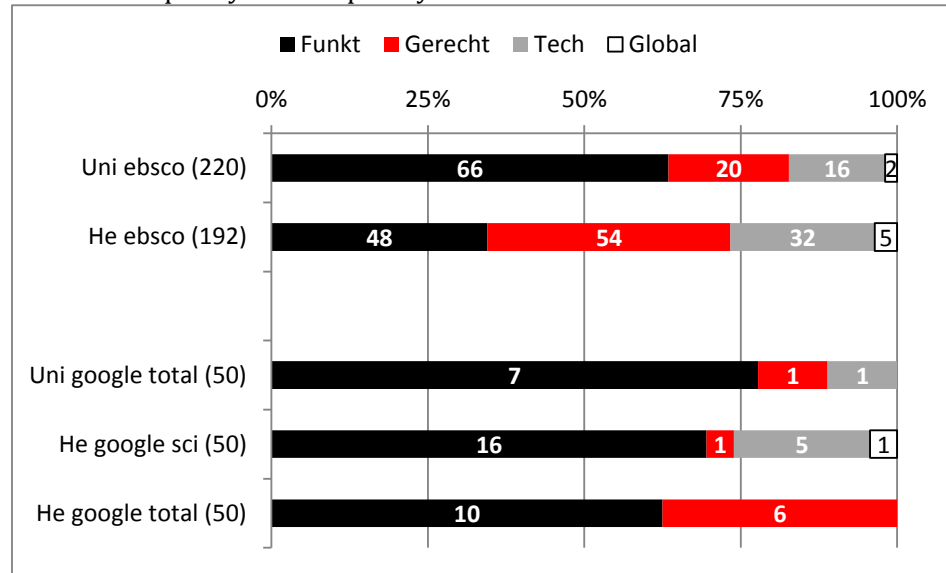
Graph 3: 'Technical' policy design topics; keywords: govern, leader, assess, standard, accred

Source: EBSCOhost searches, August 2017

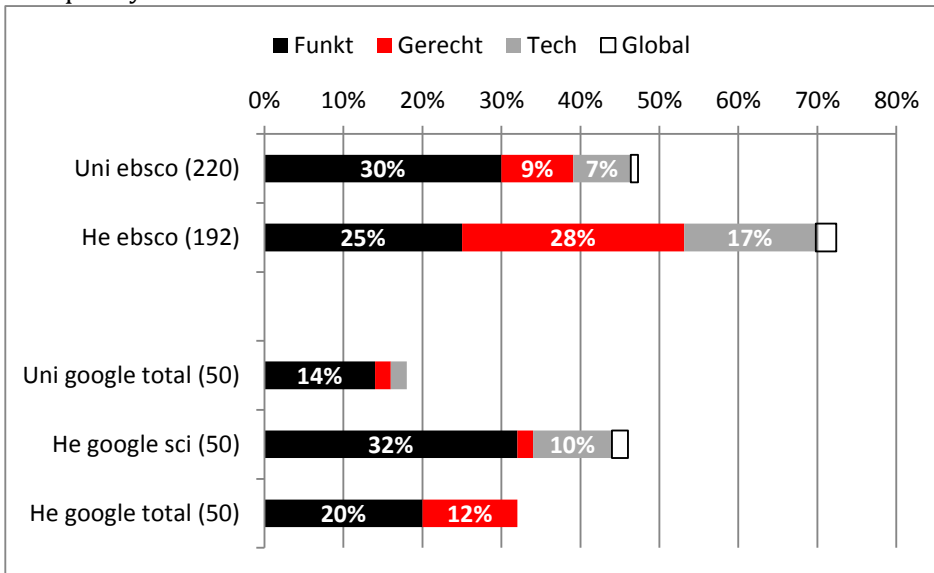
Figure 13: Cross-section of topics, comparison of academic literature with Google search

(a) general topic areas

Absolute frequency of the topic keywords



Frequency relative to total hits

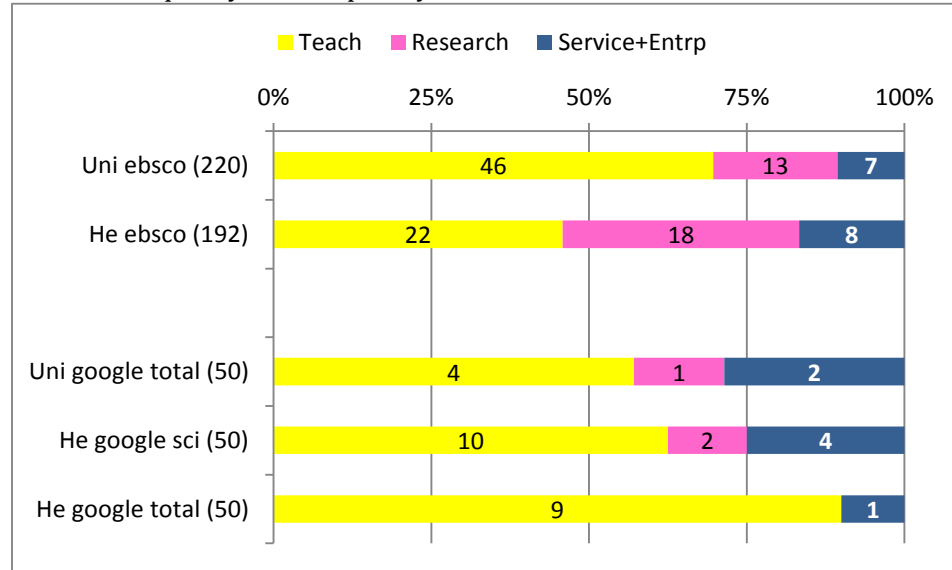


Legend: Searches for Uni=excellence+university, He=excellence+higher education; ebsco=EBSCOhost, Google differentiated by total=all and sci=Scholar; figures in brackets=N der analysed hits; keyword dimensions: *Funkt*: functional topics (teach, research, service incl. entrepr+transf+applied); *Gerech*: socio-political topics (access, equal, equi, divers); *Tech*: 'technical' policy design topics (govern, leader, assess, standard, accred); shares under 5 % not indicated in figures.
 Source: EBSCOhost and Google searches, August 2017

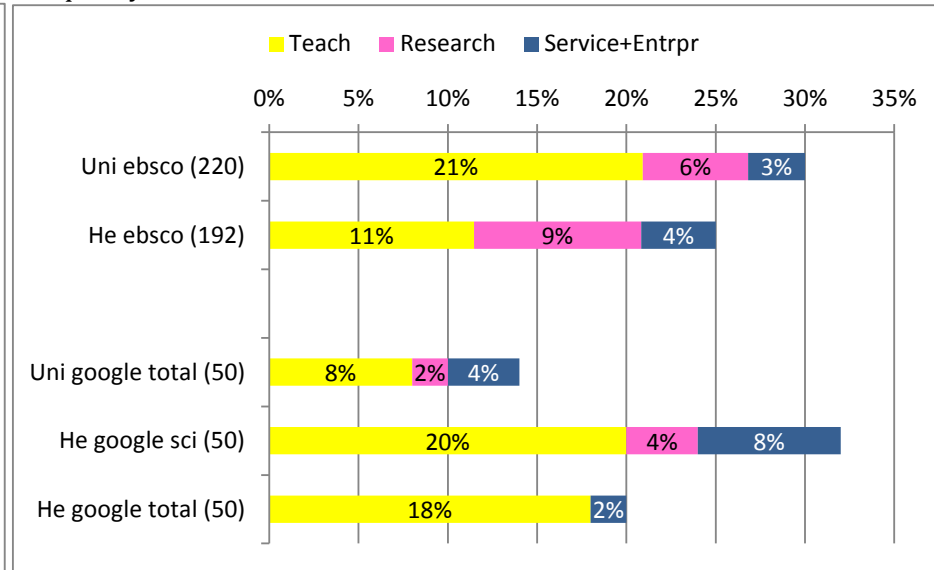
Figure 13 (cont.): Cross-section of topics, comparison of academic literature with Google search

(b) Function-related topics: teaching, research, 'third mission'

Absolute frequency of the topic keywords



Frequency relative to total hits

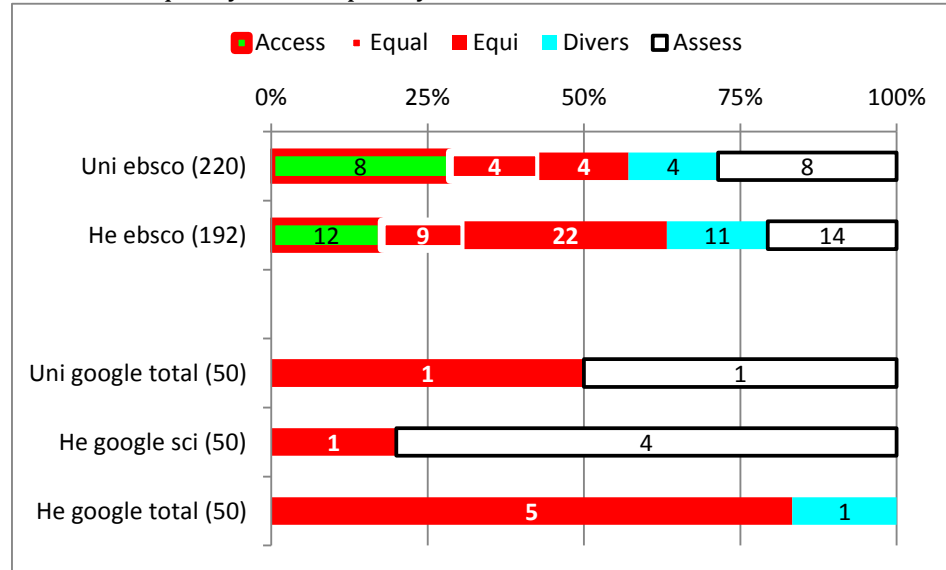


Legend: Searches for Uni=excellence+university, He=excellence+higher education; ebsco=EBSCOhost, Google differentiated by total=all and sci=Scholar; figures in brackets=N der analysed hits; keyword dimensions: teach=teaching, research=research, service+entrp='third mission' (service, entrepr, transfer, applied)
 Source: EBSCOhost and Google searches, August 2017

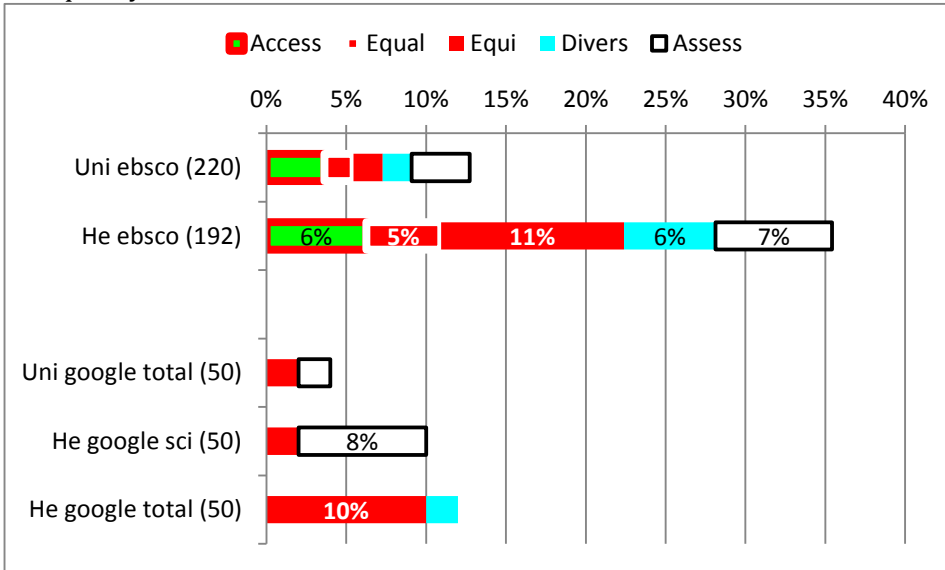
Figure 13 (cont.): Cross-section of topics, comparison of academic literature with Google search

(c) socio-political topics: access-equity-fairness-diversity-examination/assessment

Absolute frequency of the topic keywords



Frequency relative to total hits



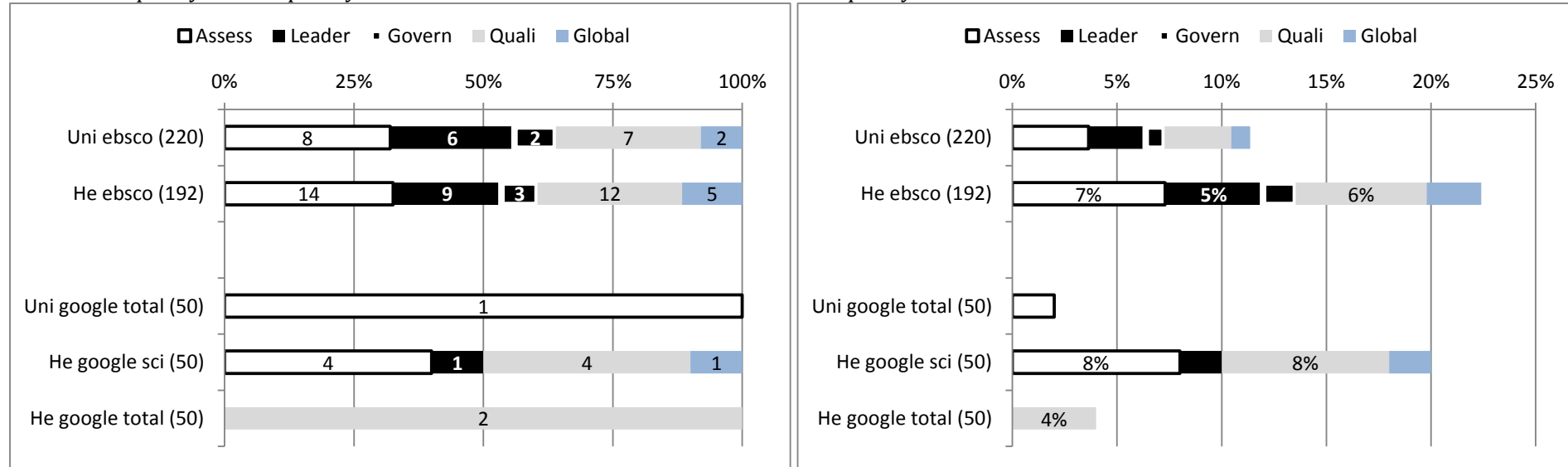
Legend: Searches for Uni=excellence+university, He=excellence+higher education; ebsco=EBSCOhost, Google differentiated by total=all and sci=Scholar; figures in brackets=N der analysed hits; keyword dimensions: access=access; equal=equity; equi=fairness; divers=diversity; assess=examination/assessment; shares under 5% not indicated in figures
 Source: EBSCOhost and Google searches, August 2017

Figure 13 (cont.): Cross-section of topics, comparison of academic literature with Google search

(d) 'Technical' policy design topics

Absolute frequency of the topic keywords

Frequency relative to total hits



Legend: Searches for Uni=excellence+university, He=excellence+higher education; ebsco=EBSCOhost, Google differentiated by total=all and sci=Scholar; figures in brackets=N der analysed hits; keyword dimensions: assess=examination/assessment; leader=leadership; govern=governance; quali=quality; global=globalisation; shares under 5% not indicated in figures
 Source: EBSCOhost and Google searches, August 2017

6.2 Illustrations of the Dimensions of World-Class Universities

These illustrations are based on the data in Appendix G “The best by any measure 2007-08” in Salmi 2009 (Pages 93-98), augmented by special information contained in the text. The ‘ranking’ was constructed using the average of the Shanghai and THE World University Rankings, whereby in the Shanghai Ranking the mid-position in the category was used for the lower rankings. Endowments (Salmi 2009: 24) and Differentiation by Graduate Levels (ibid.: 22) were added.

The following corrections and calculations were carried out:

The two Central and Latin American universities of Mexico and Buenos Aires were excluded because their size made them extreme outliers (190,000 and 280,000 students and 29,000 and 25,000 faculty)

CalTech is also a skewing outlier due to the relation between very high expenditure (over 2 billion US\$) and comparatively low student and faculty numbers (2,200 and 500)

The overall averages were calculated without these excluded institutions using all known values (N=24 for the finance variables and N=30 for the other variables; no financial information was available for Jerusalem, ParisVI, Oslo, Moscow, São Paulo and Nanjing)

The country groups were calculated using the universities for which full information was available and without the outliers excluded in the first step:

>USA: Harvard, Yale, MIT, Columbia, Chicago, Stanford, Princeton, Berkeley

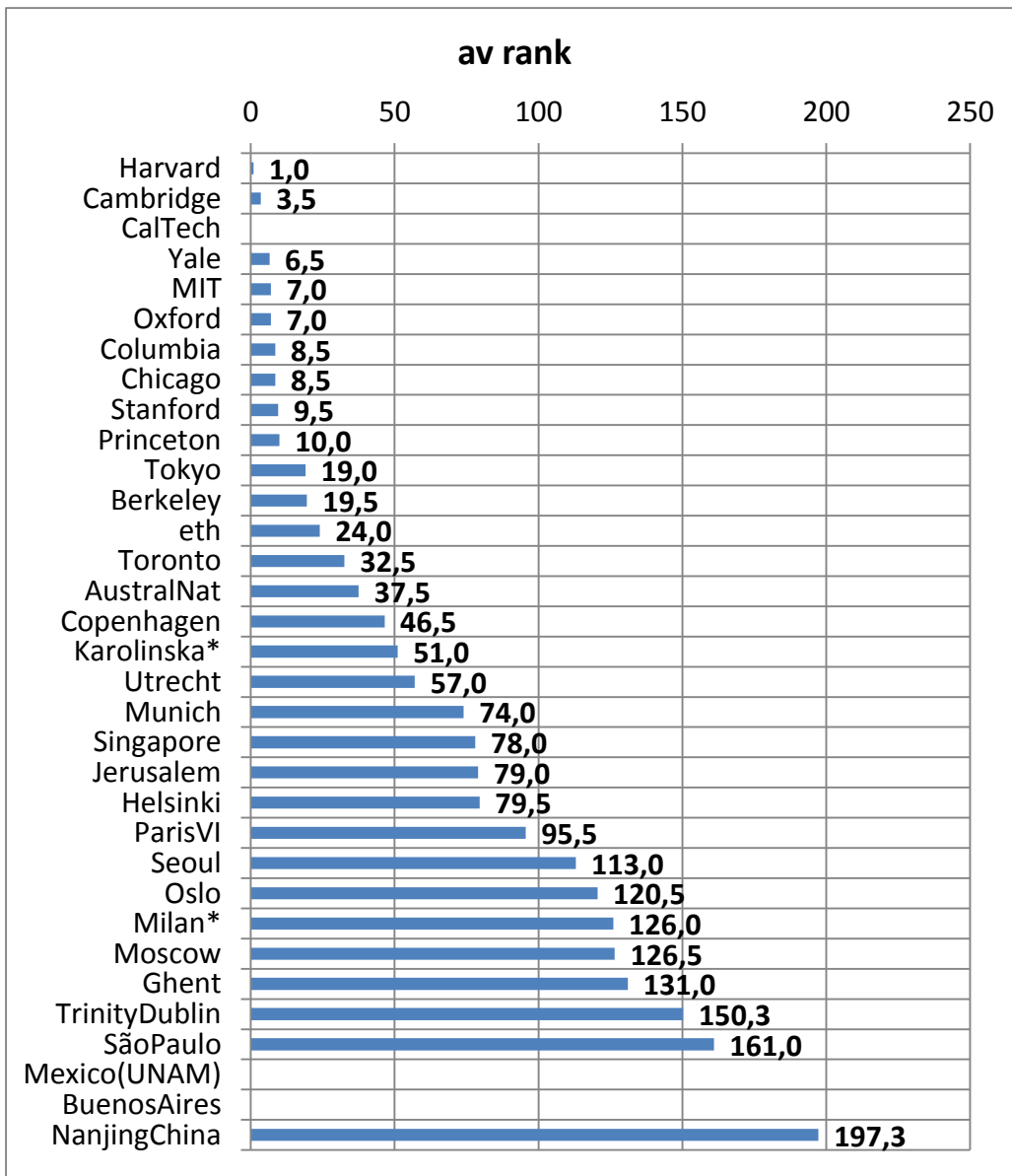
>Europe: Cambridge, Oxford, ETH, Copenhagen, Karolinska*, Utrecht, Munich, Helsinki, Milan*, Ghent, Trinity College Dublin (*Karolinska and Milan only in the THE ranking)

>Other world: Tokyo, Toronto, Australian National University, Singapore, Seoul

Variables used:

- annual expenditure in million US\$
- number of students
- number of faculty
- students/faculty
- annual expenditure per student in US\$
- annual expenditure per faculty in US\$

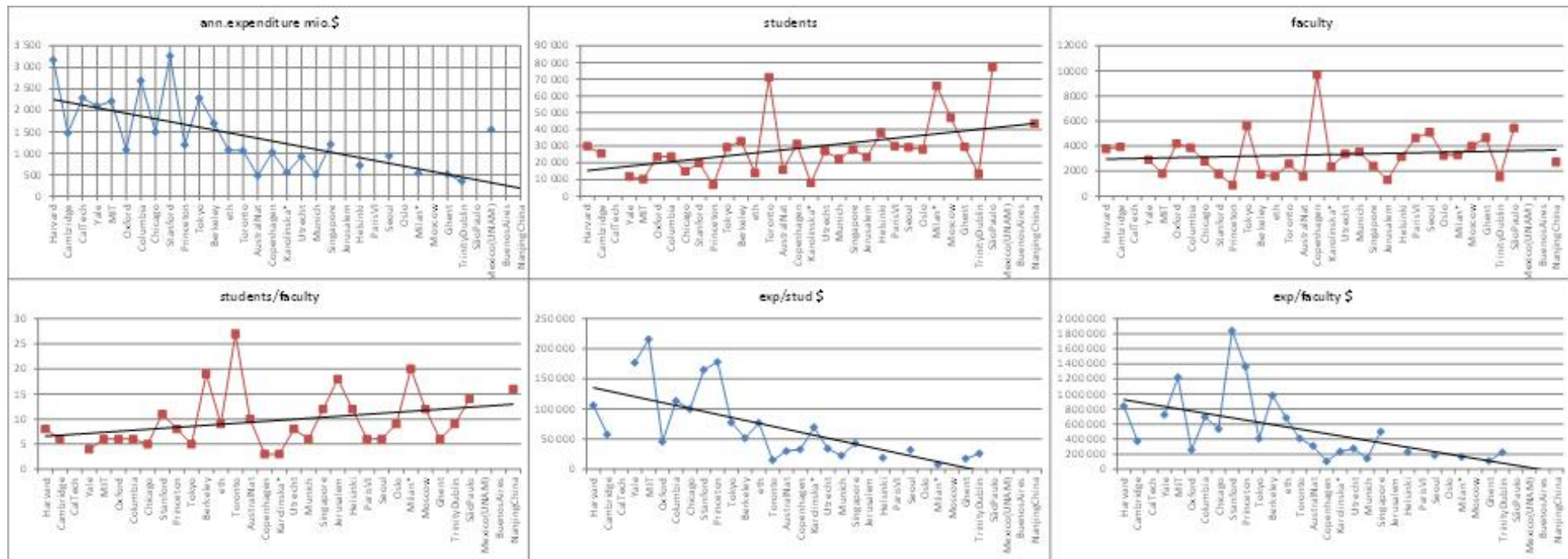
Overview: Average ranking of the selected WCUs



Source: own calculation based on Salmi; CalTech, Mexico and Buenos Aires excluded as outliers;

*Karolinska and Milan only in THE Ranking.

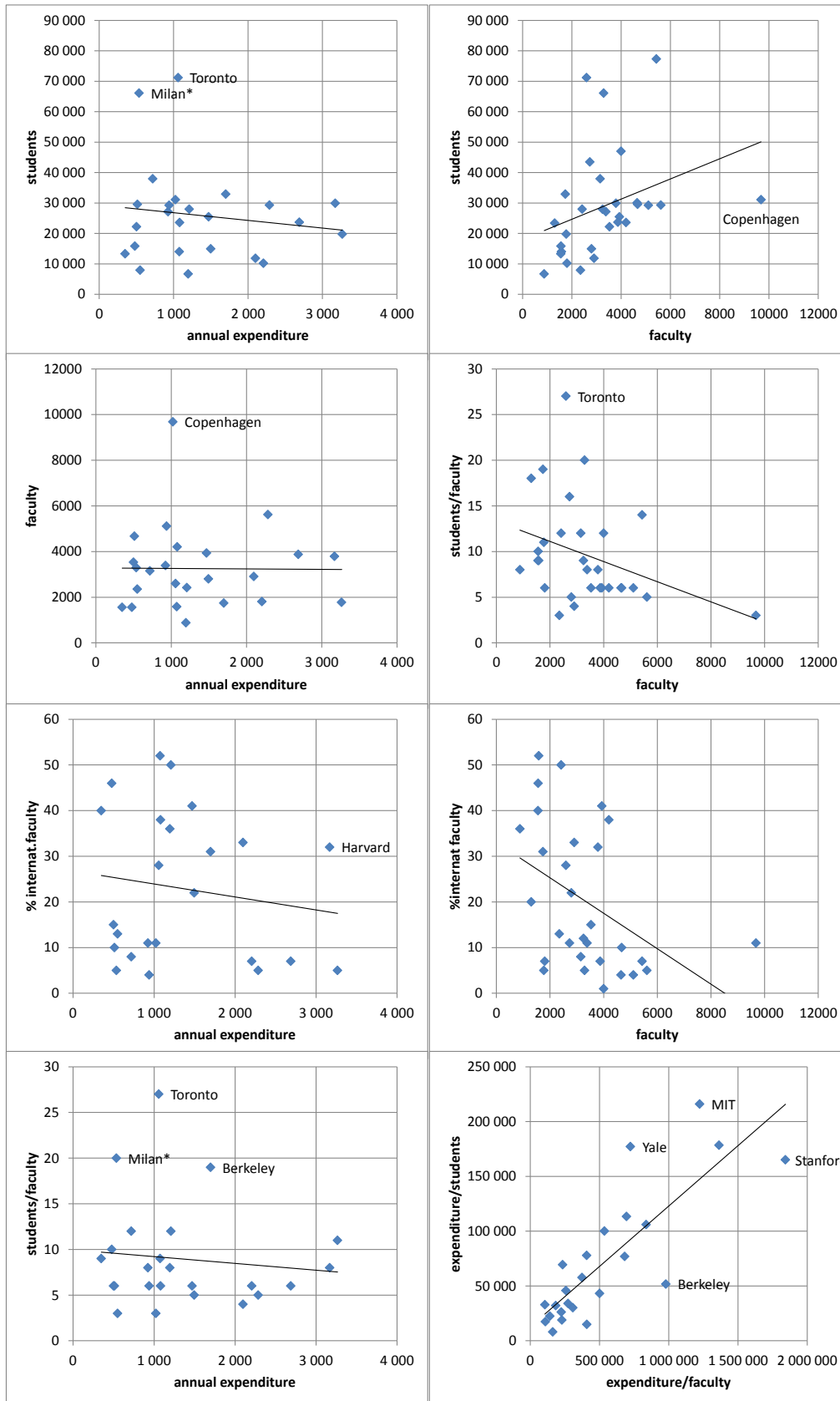
Figure 14: Expenditure, students and faculty at WCUs acc. to Salmi (line charts)



Legend: WCUs ranked by average ranking position; for names and ranking of the institutions see overview above; variables shown: ann.expenditure mio.\$: annual expenditure in mio. US\$; students: number of students; faculty: number of members of faculty; students/faculty: number of students per member of faculty; exp/stud \$: annual expenditure per student in US\$; exp/faculty \$: annual expenditure per member of faculty in US\$.

Source: Salmi 2009: 93-98; Calculation: IHS.

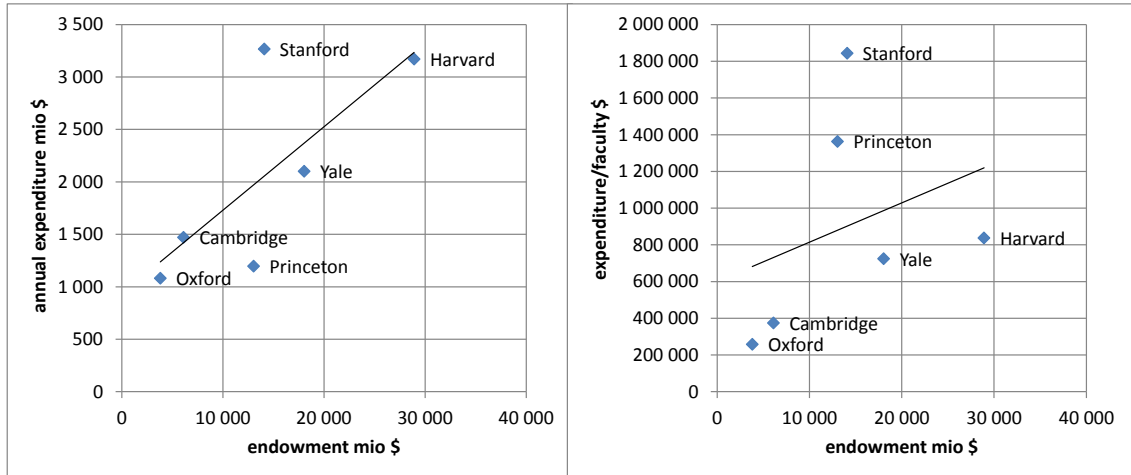
Figure 15: Expenditure, students and faculty at WCUs acc. to Salmi (scatter charts)



Legend: annual expenditure: annual expenditure in mio. US\$; students: number of students; faculty: number of members of faculty; students/faculty: number of students per member of faculty; expenditure/students: annual expenditure per student in US\$; expenditure/faculty: annual expenditure per member of faculty in US\$; %internat.faculty: percentage of international faculty members

Source: Salmi 2009: 93-98; Calculation: IHS.

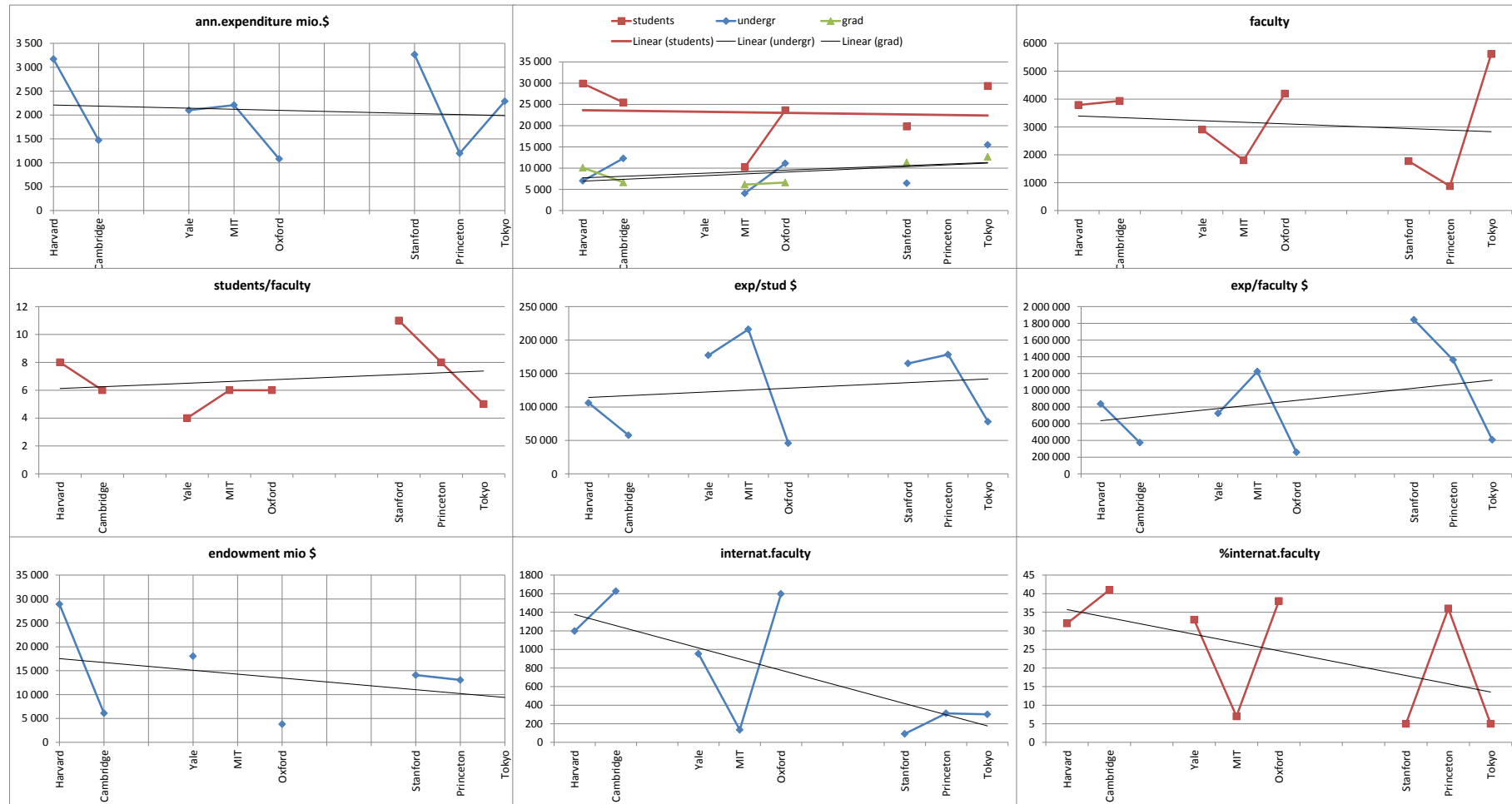
Figure 16: WCU endowment and expenditure acc. to Salmi



Legend: annual expenditure mio \$: annual expenditure in mio. US\$; expenditure/faculty: annual expenditure per member of faculty in US\$; endowment mio. \$: endowment in mio US\$

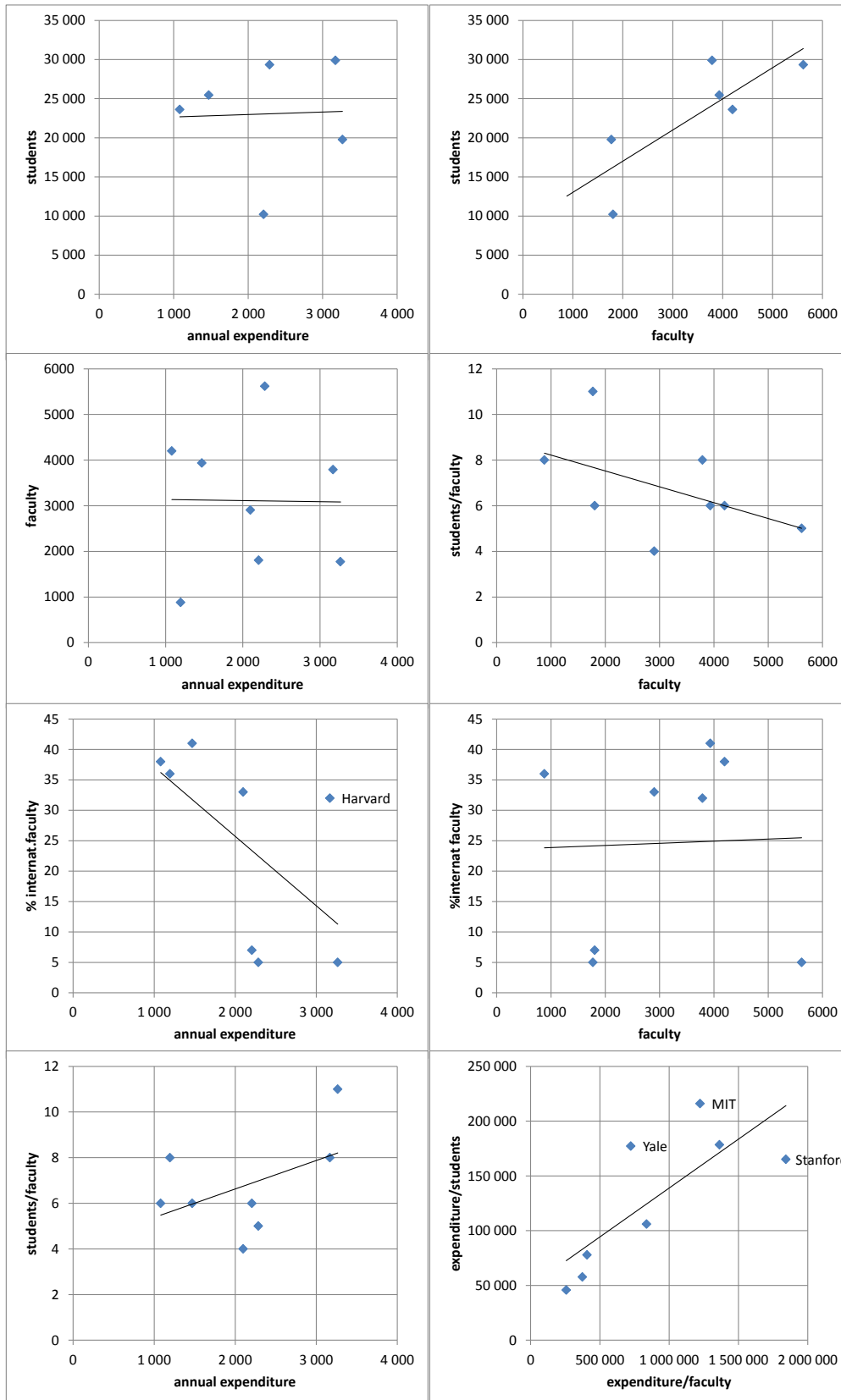
Source: Salmi 2009: 93-98; Calculation: IHS.

Figure 17: Expenditure, students, faculty and international faculty for the top WCUs acc. to Salmi (line charts)



Legend: ann.expenditure mio.\$: annual expenditure in mio. US\$; students: number of students; faculty: number of members of faculty; students/faculty: number of students per member of faculty; exp/stud: annual expenditure per student in US\$; exp/faculty: annual expenditure per member of faculty in US\$; %internat.faculty: percentage of international faculty members
 Source: Salmi 2009: 93-98; Calculation: IHS.

Figure 18: Expenditure, students, faculty and international faculty for the top WCUs acc. to Salmi (scatter charts)

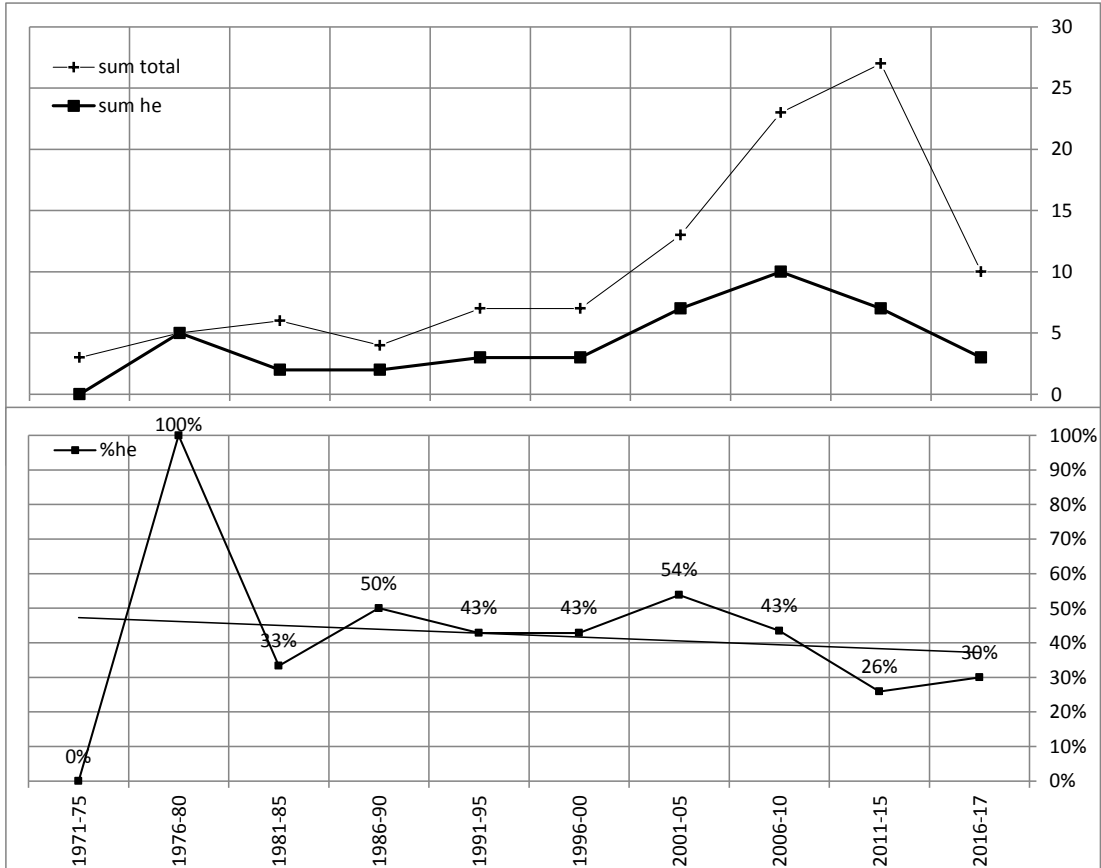


Legend: annual expenditure: annual expenditure in mio. US\$; students: number of students; faculty: number of members of faculty; students/faculty: number of students per member of faculty; expenditure/students: annual expenditure per student in US\$; expenditure/faculty: annual expenditure per member of faculty in US\$; %internat.faculty: percentage of international faculty members

Source: Salmi 2009: 93-98; Calculation: IHS.

6.3 Database Search for 'Excellence' in National/Regional Environments of the Universities in the Case Studies

Figure 19: Search in EBSCOhost, hits with 'education policy' in title 1971-2017, thereof hits with 'higher education'

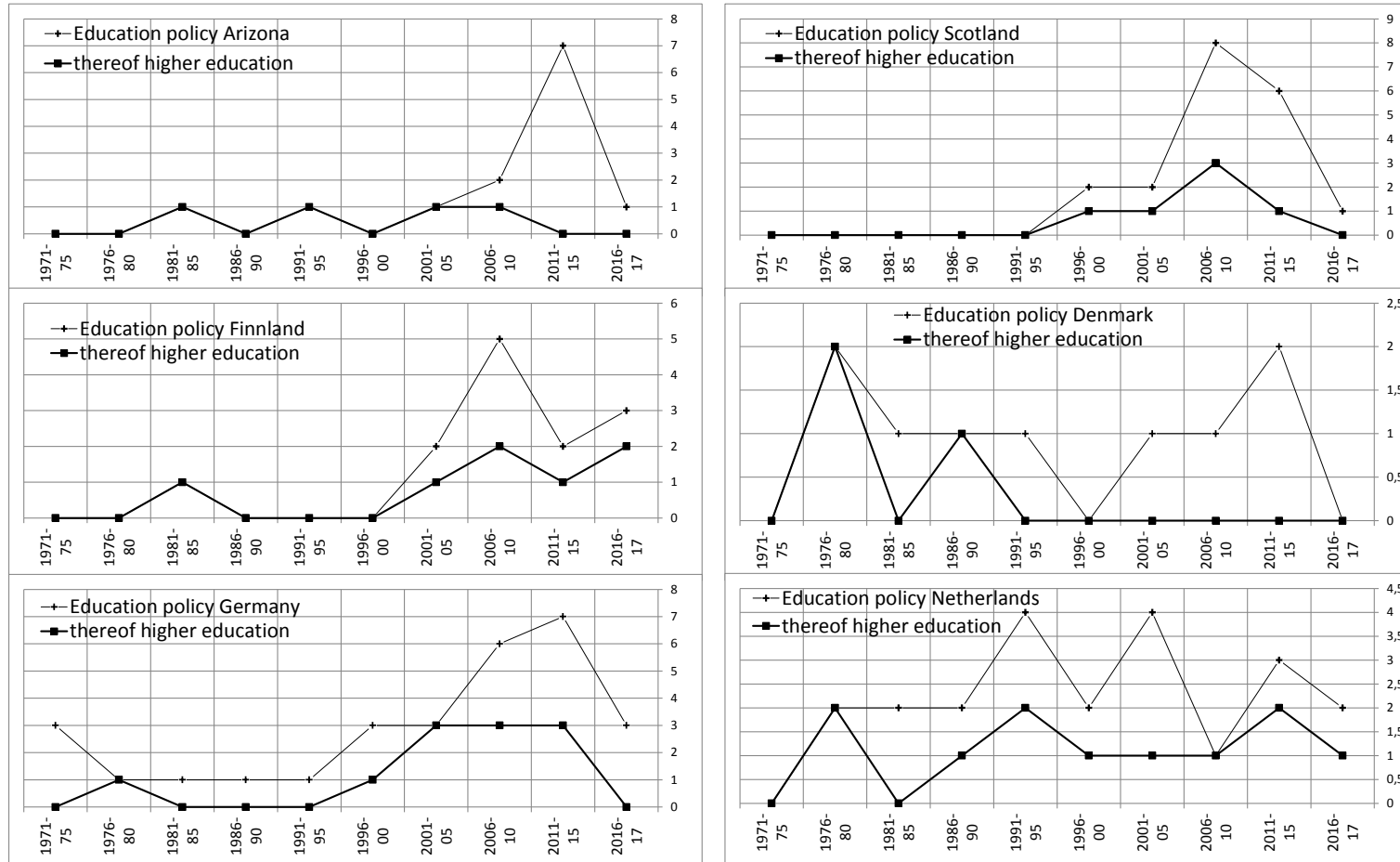


Number of hits for the search for the terms 'excellence' and 'education policy' and 'higher education'.

%he: percentage of all hits with 'higher education'

Source: EBSCOhost searches, August 2017

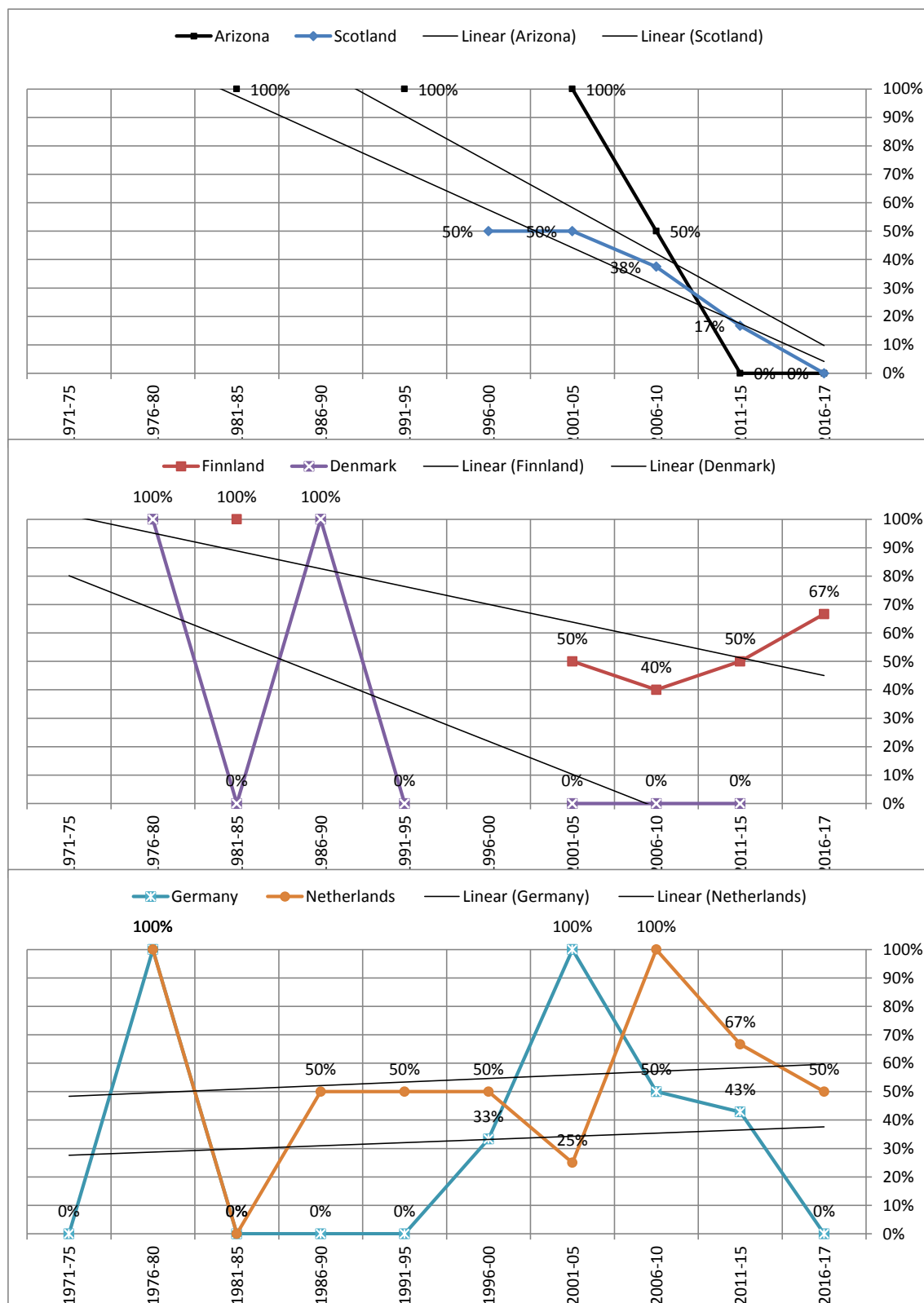
Figure 20: Total hits for ‘education policy’, thereof ‘higher education’ and ‘excellence’



Number of hits for the search for the terms ‘excellence’ and ‘education policy’ and ‘higher education’.

Source: EBSCOhost searches, August 2017

Figure 21: EBSCOhost search, percentage of total hits for 'education policy' with 'higher education', by regions, 1971-2017



Number of hits for the search for the terms 'excellence' and 'education policy' and 'higher education'.
 Source: EBSCOhost searches, August 2017

6.4 The Discourse in the German-Speaking Countries

Table 3: Hits for the search for 'Exzellenz' in the title in peDOCS Education Portal

Ricken, Norbert (2009): Elite und Exzellenz – Machttheoretische Analysen zum neueren Wissenschaftsdiskurs. in: Zeitschrift für Pädagogik 55 (2009) 2, S. 194-210, Aufsatz (Zeitschrift), Peer-Review, Bildungssoziologie
Prenzel, Manfred (2009): Von der Unterrichtsforschung zur Exzellenz in der Lehrerbildung. in: Beiträge zur Lehrerinnen- und Lehrerbildung 27 (2009) 3, S. 327-345, Aufsatz (Zeitschrift), Peer-Review, Schulpädagogik
Helsper, Werner (2009): Elite und Exzellenz – Transformationen im Feld von Bildung und Wissenschaft? Einleitung in den Thementeil. in: Zeitschrift für Pädagogik 55 (2009) 2, S. 167-174, Aufsatz (Zeitschrift), Peer-Review, Vergleichende Erziehungswissenschaft
Macha, Hildegard; Gruber, Susanne (2010): Spielplatz der Exzellenz: Eine Kultur der Sorge an Hochschulen. in: Moser, Vera [Hrsg.]; Pinhard, Inga [Hrsg.]: Care – wer sorgt für wen? Opladen u.a. : Budrich 2010, S. 135-147. – (Jahrbuch Frauen- und Geschlechterforschung in der Erziehungswissenschaft; 6), Aufsatz (Sammelwerk), (Verlags-)Lektorat, Frauen- und Geschlechterforschung in der Erziehungswissenschaft, Hochschulforschung und Hochschuldidaktik
Thompson, Christiane (2010): Jan Masschelein / Maarten Simons: Jenseits der Exzellenz, Eine kleine Morphologie der Welt-Universität, Zürich: diaphanes 2010 [Rezension]. in: Erziehungswissenschaftliche Revue (EWR) 9 (2010) 4, Aufsatz (Zeitschrift), Peer-Review, Hochschulforschung und Hochschuldidaktik
Maaz, Kai; Nagy, Gabriel; Jonkmann, Kathrin; Baumert, Jürgen (2009): Eliteschulen in Deutschland. Eine Analyse zur Existenz von Exzellenz und Elite in der gymnasialen Bildungslandschaft aus einer institutionellen Perspektive. in: Zeitschrift für Pädagogik 55 (2009) 2, S. 211-227, Aufsatz (Zeitschrift), Peer-Review, Empirische Bildungsforschung
Flöter, Jonas (2012): Ulrike Ostermaier (Hrsg.), Hochbegabung, Exzellenz, Werte. Positionen in der schulischen Begabtenförderung Festschrift zum zehnjährigen Bestehen des Sächsischen Landesgymnasiums Sankt Afra. Dresden: Thelem 2011 (343 S.) [Rezension]. in: Erziehungswissenschaftliche Revue (EWR) 11 (2012) 3, Aufsatz (Zeitschrift), Peer-Review, Schulpädagogik

Source: http://www.pedocs.de/abfrage_suchen.php?la=de [Accessed 15.08.2017]

Table 4: EBSCOhost title search for 'excellence' and 'higher education' or 'university', hits with keyword 'Germany' in text of the materials found**Excellence, Higher Education, Germany (8 hits)**

[ARTICLE]The Quality of Educational Services in Higher Education--Assurance, Management or Excellence? Academic Journal; Author: Sarbu, Roxana; Ilie, Anca Gabriela; Enache, Antonia Cristiana; Dumitriu, Dan; Author Affiliation: Bucharest Academy of Economic Studies; Bucharest Academy of Economic Studies; Bucharest Academy of Economic Studies; Source: Amfiteatru Economic, June 2009, v. 11, iss. 26, pp. 383-92

[ARTICLE]Managing differentiation of higher education system in Japan: connecting excellence and diversity. Academic Journal; By: Kitagawa, Fumi; Jun Oba. Higher Education (00181560). Apr2010, Vol. 59 Issue 4, p507-524. 18p.

[BOOK]Rankings and the reshaping of higher education: the battle for world class excellence. Review; By: Morris, Huw. Studies in Higher Education. Sep2011, Vol. 36 Issue 6, p741-742. 2p.

[BOOK]Ellen Hazelkorn, rankings and the reshaping of higher education: the battle for world-class excellence, Palgrave Macmillan, 2011. Review; By: Sheil, Tony. Higher Education (00181560). Mar2012, Vol. 63 Issue 3, p397-399. 3p.

[BOOK]Rankings and the reshaping of higher education: the battle for world-class excellence, by Ellen Hazelkorn. Review; By: Marginson, Simon. Journal of Higher Education Policy & Management. Oct2012, Vol. 34 Issue 5, p557-560. 4p.

[BOOK]Fairness in Access to Higher Education in a Global Perspective Reconciling Excellence, Efficiency, and Justice. Review; By: Hughes, Jonathan. Widening Participation & Lifelong Learning. Fall2013, Vol. 15 Issue 4, p81-84. 4p.

[ARTICLE]In pursuit of excellence? Discursive patterns in European higher education research. Academic Journal; By: Ramirez, Francisco; Tiplic, Dijana. Higher Education (00181560). Apr2014, Vol. 67 Issue 4, p439-455. 17p.

ARTIKEL]East and South African-German Centre of Excellence for Educational Research Methodologies and Management (CERM-ESA) A Case for Internationalisation and Higher Education Engagement. Academic Journal; By: von Möllendorff, Malve; Kurgat, Susan; Speck, Karsten. Educational Research for Social Change. Apr2017, Vol. 6 Issue 1, p93-99. 7p.

Excellence, University, Germany(5 hits)

[ARTICLE]Aspiring to Steeples of Excellence at German Universities; By: Hochstettler, Thomas John. Chronicle of Higher Education. 7/30/2004, Vol. 50 Issue 47, pB10-B11. 2p.

[ARTICLE]A German plan to promote excellence at a group of universities cleared an important hurdle last month when leaders of the federal government and Germany's 16 states agreed to let the program proceed; By: Labi, Aisha. Chronicle of Higher Education. 7/22/2005, Vol. 51 Issue 46, pA26-A26. 1/9p.

[ARTICLE]University Rankings in Action? The Importance of Rankings and an Excellence Competition for University Choice of High-Ability Students Author: Horstschræer, Julia; Author Affiliation: ZEW, Mannheim; Source: Economics of Education Review, December 2012, v. 31, iss. 6, pp. 1162-76; Publication Date: December 2012

[ARTICLE]University Rankings in Action? The Importance of Rankings and an Excellence Competition for University Choice of High-Ability Students

[ARTICLE]University rankings in action? The importance of rankings and an excellence competition for university choice of high-ability students

Source: EBSCOhost searches, August 2017.

6.5 Systematic Google Scholar Search for the Universities in the Case Studies

Table 5: Google Scholar search Arizona

Excellence, Higher Education, Arizona

[BOOK] Rankings and the reshaping of higher education: The battle for world-class excellence 2015

Book review: A culture for academic excellence: Implementing the quality principles in higher education 2000

[BOOK] Higher education: Handbook of theory and research 2014

[BOOK] Active Learning: Creating Excitement in the Classroom. 1991 ASHE-ERIC Higher Education Reports.

Beyond national states, markets, and systems of higher education: A glonacal agency heuristic 2002

[BOOK] Cooperative Learning: Increasing College Faculty Instructional Productivity. ASHE-ERIC Higher Education Report No. 4, 1991.

Theoretical considerations in the study of minority student retention in higher education 2000

Faculty of color in academe: What 20 years of literature tells us. 2008

Maintaining effectiveness amid downsizing and decline in institutions of higher education 1998

[BOOK] The innovative university: Changing the DNA of higher education from the inside out 2011

Excellence, Universities, Arizona

Potentially avoidable hospitalizations of nursing home residents: frequency, causes, and costs 2010

[BOOK] Computational neuroscience in epilepsy 2011

Cross-sectional study of patient-and physician-collected cervical cytology and human papillomavirus 2003

[BOOK] Handbook of sport psychology 2007

Seasonal stable isotope evidence for a strong Asian monsoon throughout the past 10.7 my 2001

Enhancement of regression of cervical intraepithelial neoplasia II (moderate dysplasia) with topically applied all-trans-retinoic acid: a randomized trial 1994

Deconstructing the crystal structures of metal-organic frameworks and related materials into their underlying nets 2011

[BOOK] Teaching transformed: Achieving excellence, fairness, inclusion, and harmony 1999

[HTML] American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the ...2012

[BOOK] Handbook of self and identity 2011

Source: Google Scholar search, August 2017, Page 1

Table 6: Google Scholar search Edinburgh**Excellence, Higher Education, Edinburgh**

[BOOK] A handbook for teaching and learning in higher education: Enhancing academic practice 2008

Motivational factors in students' approaches to learning 1988

Students' perceptions of quality in higher education 2003

Barriers to reflective practice: The changing nature of higher education 2003

A framework for developing excellence as a clinical educator 2001

Does higher education promote independent learning? 1990

[BOOK] Learning from Experience: Policy and Practice in Aid to Higher Education. CESO Paperback No. 24. 1995

Theorizing progress: Women in science, engineering, and technology in higher education 1999

Using assessment for learning and learning from assessment 2002

Improving teaching and learning in higher education: The case for a relational perspective 1987

Excellence, Universities, Edinburgh

[BOOK] Compressed sensing: theory and applications 2012

Retail grocery logistics in the UK 2000

Performance measurement tools: the Balanced Scorecard and the EFQM Excellence Model 2003

Etiology of stroke and choice of models 2012

[PDF] Explaining extreme events of 2012 from a climate perspective 2013

Utility of renal biopsy in the clinical management of renal disease 2014

[BOOK] Knowledge and its Limits 2002

[BOOK] The Elucidation of Organic Electrode Processes: A Polytechnic Press of the Polytechnic Institute of Brooklyn Book 2013

[HTML] University rankings: Diversity, excellence and the European initiative 2011

[HTML] Incidence, natural history and cardiovascular events in symptomatic and asymptomatic peripheral arterial disease in the general population 1996

Source: Google Scholar search, August 2017, Page 1

Table 7: Google Scholar Search Aalto

Excellence, Higher Education, Helsinki	Excellence, Universities, Helsinki
Evaluation of the factors that determine quality in higher education: an empirical study 2010	[HTML] Genetic markers enhance coronary risk prediction in men: the MORGAM prospective cohorts 2012
Quest for excellence in business education: a study of student impressions of service quality 2004	[HTML] High temperature and bacteriophages can indirectly select for bacterial pathogenicity in environmental reservoirs 2011
Changing structures of the higher education systems: The increasing complexity of underlying forces 2006	[HTML] Sleep restriction increases the risk of developing cardiovascular diseases by augmenting proinflammatory responses through IL-17 and CRP 2009
[BOOK] Women, universities, and change: Gender equality in the European Union and the United States 2007	No pain, no gain: clinical excellence and scientific rigour—lessons learned from IA morphine 2002
Searching for excellence in business education: an exploratory study of customer impressions of service quality 1997	[BOOK] Global university rankings: Challenges for European higher education 2013
From strategic planning to meaningful learning: diverse perspectives on the development of web-based teaching and learning in higher education 2007	Molecular targets for tumour progression in gastrointestinal stromal tumours 2004
The response of higher education institutions to regional needs 2000	[HTML] Yersinia enterocolitica serum resistance proteins YadA and Ail bind the complement regulator C4b-binding protein 2008
[PDF] The quality of educational services in higher education—assurance, management or excellence 2009	Biological properties of extracellular vesicles and their physiological functions 2015
The development of HEdPERF: a new measuring instrument of service quality for the higher education sector 2006	[BOOK] MEG: An introduction to methods 2010
[PDF] Gate-keeping, gender equality and scientific excellence 2004	[HTML] Coamplified and overexpressed genes at ERBB2 locus in gastric cancer 2004
Excellence, Higher Education, Aalto	Excellence, Universities, Aalto
[PDF] New elitism in universal higher education: The building process, policy and the idea of Aalto University 2012	An outbreak of <i>Listeria monocytogenes</i> serotype 3a infections from butter in Finland 2000
[HTML] In the shadow of celebrity? World-class university policies and public value in higher education 2014	Single-electron current sources: Toward a refined definition of the ampere 2013
[PDF] Designing strategies for efficient funding of higher education in Europe 2013	[HTML] Alterations in spontaneous brain oscillations during stroke recovery 2013
[PDF] Teaching excellence initiatives: modalities and operational factors 2015	[BOOK] International Studies: Interdisciplinary Approaches 2011
Mergers in higher education 2016	Predictors of alcohol intake and heavy drinking in early adulthood: a 5-year follow-up of 15–19-year-old Finnish adolescents 2001
Reconciling republican 'Egalite' and global excellence values in French higher education 2013	Becoming “world-class”? Reputation-building in a university merger 2011
[HTML] Europeanisation, international rankings, and faculty mobility: Three cases in higher education globalisation 2009	Towards a classification of service processes 1992
Promoting skills for innovation in higher education: A literature review on the effectiveness of problem-based learning and of teaching behaviours 2014	[HTML] Improved contact predictions using the recognition of protein like contact patterns 2014
Is education getting lost in university mergers? 2010	[BOOK] Noncontact atomic force microscopy 2015
[PDF] Institutional Management in Higher Education: A Study of Leadership Approaches to Quality Improvement in University Management-Nigerian and Finnish ... 2004	[BOOK] Bayesian filtering and smoothing 2013

Source: Google Scholar search, August 2017, Page 1

Table 8: Google Scholar search Copenhagen**Excellence, Higher Education, Copenhagen**

[BOOK] Rankings and the reshaping of higher education: The battle for world-class excellence 2015
[BOOK] Transforming Higher Education. 1996
Changing structures of the higher education systems: The increasing complexity of underlying forces 2006
The emergent European model in skill formation: comparing higher education and vocational training in the Bologna and Copenhagen processes 2012
"Sustainability" in higher education: From doublethink and newspeak to critical thinking and meaningful learning 2002
Student recruitment strategies in higher education: promoting excellence and diversity? 2010
Case studies, make-your-case studies, and case stories: a critique of case-study methodology in sustainability in higher education 2004
Fifteen years of quality in higher education (Part Two) 2010
Rankings of higher education institutions: A critical review 2008
Accreditation in the framework of evaluation activities: A comparative study in the European higher education area 2004

Excellence, Universities, Copenhagen

[BOOK] Many-body quantum theory in condensed matter physics: an introduction 2004
[HTML] Variants of β 2-microglobulin cleaved at lysine-58 retain the main conformational features of the native protein but are more conformationally heterogeneous ... 2006
Use of opioid analgesics in the treatment of cancer pain: evidence-based recommendations from the EAPC 2012
[HTML] Structure of apoptosis-linked protein ALG-2: insights into Ca ²⁺ -induced changes in penta-EF-hand proteins 2001
Recommendations on presenting LHC searches for missing transverse energy signals using simplified -channel models of dark matter 2016
EuroInf: a multicenter comparative observational study of apomorphine and levodopa infusion in Parkinson's disease 2015
[BOOK] Changing European employment and welfare regimes: The influence of the open method of coordination on national reforms 2009
[HTML] Short-and long-term prognosis for very old stroke patients. The Copenhagen Stroke Study 2004
Whole-genome analyses resolve early branches in the tree of life of modern birds 2014
[BOOK] Self and other: Exploring subjectivity, empathy, and shame 2014

Source: Google Scholar search, August 2017, Page 1

Table 9: Google Scholar search Twente**Excellence, Higher Education, Twente**

Higher education excellence and local economic development: The case of the entrepreneurial university of Twente 2005

[BOOK] Handbook on globalization and higher education 2011

[BOOK] Quality assurance in higher education: Trends in regulation, translation and transformation 2007

[BOOK] University governance 2009

[BOOK] Markets in higher education: Rhetoric or reality? 2006

[PDF] Wissenschaft und Karriere 2004

The use of self-, peer and co-assessment in higher education: A review 1999

Understanding the real barriers to technology-enhanced innovation in higher education 2009

Student recruitment strategies in higher education: promoting excellence and diversity? 2010

Internationalization of higher education in the OECD countries: Challenges and opportunities for the coming decade 2007

Excellence, Universities, Twente

Higher education excellence and local economic development: The case of the entrepreneurial university of Twente 2005

[HTML] Nanostructured 3D constructs based on chitosan and chondroitin sulphate multilayers for cartilage tissue engineering 2013

[BOOK] University governance 2009

[BOOK] Micro Total Analysis Systems: Proceedings of the [micro] TAS'94 Workshop, Held at MESA Research Institute, University of Twente, The Netherlands, 21-22 ... 1995

The University-Industry Relations of an Entrepreneurial University: the Case of the University of Twente 1999

[PDF] European multi-level governance 2009

[BOOK] The world-class university and ranking: Aiming beyond status 2007

The Holy Grail of science policy: Exploring and combining bibliometric tools in search of scientific excellence 2003

[BOOK] Basic orthopaedic biomechanics & mechano-biology 2005

Clinical evaluation of paresthesia steering with a new system for spinal cord stimulation 1998

Source: Google Scholar search, August 2017, Page 1

Table 10: Google Scholar search Duisburg-Essen

Excellence, Higher Education, Duisburg-Essen	Excellence, Universities, Duisburg-Essen
[PDF] Leistungsklassen oder „Added Value“? Zwei Ansätze zur Berücksichtigung unterschiedlicher Startbedingungen im Wettbewerb von Hochschulen 2011	Konzeptionen der strategischen Unternehmensberatung 2012
Diversitätsgerecht Lehren und Lernen 2014	Zukünftige Entwicklungen in der Mobilität 2012
Residence close to high traffic and prevalence of coronary heart disease 2006	[BOOK] Service Excellence als Impulsgeber: Strategien-Management-Innovationen-Branchen 2007
Institutionelle Erneuerung durch Fusion? Vergleich von Hochschulfusionen in Deutschland und Großbritannien 2012	Experimental study of pedestrian counterflow in a corridor 2006
[BOOK] Die Vielfalt gestalten-Diversity an Hochschulen 2010	Qualitätssicherung einer Blended-Learning gestützten Aus- und Weiterbildungsmaßnahme mit dem DIN Referenzmodell für Qualitätsmanagement und ... 2005
Qualitätssicherung einer Blended-Learning gestützten Aus- und Weiterbildungsmaßnahme mit dem DIN Referenzmodell für Qualitätsmanagement und ... 2005	Diversitätsgerecht Lehren und Lernen 2014
Neue Governance als Wettbewerb um Sichtbarkeit 2012	Biological properties of extracellular vesicles and their physiological functions 2015
[PDF] Ergebnisse einer Expertenbefragung (2005) [PDF] 1. Veranstaltungen in Niedersachsen 2016 Die Autorinnen und Autoren 2014	[PDF] Synergien durch Integration und Informationslogistik 2008
	[BOOK] Die Vielfalt gestalten-Diversity an Hochschulen 2010
	[PDF] Frauenanteile in der Exzellenzinitiative 2011
Excellence, Higher Education, Duisburg	Excellence, Universities, Duisburg
[PDF] Welche Qualifikationen brauchen Lehrende für die „Neue Lehre“? Versuch einer Eingrenzung von eCompetence und Lehrqualifikation 2005	[PDF] Meta-Modelling and Ontologies 2006
... elements for future programs seeking to establish excellence in engineering education through professional qualification of faculty teaching in higher education 2008	Classifying orofacial pains: a new proposal of taxonomy based on ontology 2012
Internationalising higher education: Comparing the challenges of different higher education institutions in Malaysia 2008	[BOOK] Service Excellence als Impulsgeber: Strategien-Management-Innovationen-Branchen 2007
Diversitätsgerecht Lehren und Lernen 2014	[BOOK] Technologietransfer durch Migranten aus Entwicklungslandern 2013
Introduction: Changing cultures in higher education 2010	[BOOK] Welternährung, Nutztierschutz und Lebensmittelsicherheit: eine monetäre Bewertung in Entwicklungs- und Schwellenländern 2015
The global competition in higher education 2012	[BOOK] Advances in XML Information Retrieval: Third International Workshop of the Initiative for the Evaluation of XML Retrieval, INEX 2004, Dagstuhl Castle, ... 2005
The literature landscape of blended learning in higher education: the need for better understanding of academic blended practice 2013	[HTML] In-situ biofilm characterization in membrane systems using optical coherence tomography: formation, structure, detachment and impact of flux change 2014
[PDF] Artikel (wissenschaftliche Zeitschrift) 2011	[BOOK] Type 2 diabetes: principles and practice 2016
[PDF] Convergence or divergence in international higher education policy: Lessons from Europe 2003	Running: the risk of coronary events†: Prevalence and prognostic relevance of coronary atherosclerosis in marathon runners 2008
[BOOK] Universitätskulturen-L'Université en perspective-The Future of the University 2014	Treatment of severe uveitis associated with juvenile idiopathic arthritis with anti-CD20 monoclonal antibody (rituximab) 2011

Excellence, Higher Education, Essen	Excellence, Universities, Essen
[BOOK] Rankings and the reshaping of higher education: The battle for world-class excellence 2015	[PDF] Qualitätsmanagement und Standardisierung im E-Learning 2002
[BOOK] Transforming Higher Education. 1996	[BOOK] Spitzenleistungen im supply chain management: ein Praxishandbuch zur Optimierung mit SCOR 2007
[BOOK] Learning and teaching in higher education: The reflective professional 2009	Indication of long-term endothelial dysfunction after sirolimus-eluting stent implantation 2005
[PDF] Leadership and excellence in schooling 1984	Herpes zoster and postherpetic neuralgia: incidence and risk indicators using a general practice research database 2002
Organizational socialization in higher education 1997	[PDF] Erfolgreiches Transformationsmanagement im Vertrieb: 1. FOM-Transfer-Workshop Sales Management Excellence, Essen, 8. Oktober 2013 2013
[BOOK] Internationalization of higher education in the United States of America and Europe: A historical, comparative, and conceptual analysis 2002	[HTML] Occurrence and characteristics of class 1, 2 and 3 integrons in <i>Escherichia coli</i> , <i>Salmonella</i> and <i>Campylobacter</i> spp. in the Netherlands 2007
[BOOK] Civic responsibility and higher education 2000	[BOOK] Esterification of polysaccharides 2006
Selections from the compelling need for diversity in higher education, expert reports in defense of the University of Michigan 1999	Intradiscal pressure recordings in the cervical spine 1999
[BOOK] The meanings of mass higher education 1995	Biological properties of extracellular vesicles and their physiological functions 2015
Community, technical, and junior colleges: Are they leaving higher education? 1989	Promoting innovation and excellence to face the rapid diffusion of novel psychoactive substances in the EU: the outcomes of the ReDNet project 2013

Source: Google Scholar search, August 2017, Page 1

6.6 International Higher Education Rankings

Until the start of the 1990s, international higher education rankings were largely academic in focus (usually only related to one subject) and attracted little public attention outside the world of higher education (Federkeil 2013:34). This changed in 1993 when the *Academic Ranking of World Universities* (ARWU), the so-called *Shanghai Ranking*, was published for the first time and attracted worldwide attention. Since then more and more rankings have emerged with different aims, target groups, methods and indicators (ibid.). In addition to the Shanghai Ranking, the most widely consulted rankings from an international perspective are the *Times Higher Education Ranking* (THE Ranking) and the *Quacquarelli Symonds World Ranking* (QS Ranking). There are also a large number of other global rankings that focus on specific aspects, e.g. the internet presence of higher education institutions (*Webometrics Ranking*), employment market prospects (*Mines ParisTech Ranking*), etc. The *Leiden Ranking*, which is published by the *Center for Science and Technology Studies* (CWTS) at the University of Leiden, focuses exclusively on research output. The *U-Multirank* initiated by the European Commission seeks, in contrast, to depict the multidimensionality of university output.

Higher education rankings are increasingly being used by students, stakeholders and the higher education institutions themselves in their decision-making processes (uniko 2017: 7). They are intended to reflect the quality of university output (in all its complexity and variety) and to promote international visibility. The informative value of higher education rankings should, however, not be overestimated (uniko 2017: 5). Their validity, reliability and impact are highly debated: on the one hand, their advocates argue that rankings support students in their choice of higher education institution, depict (aspects of) university output and provide universities with valuable information and incentives to improve their performance (Kroth/Daniel 2008). To facilitate global comparisons, most international higher education rankings vastly simplify an extremely heterogeneous higher education landscape. They thus deliver a somewhat skewed image or one that is restricted to only some aspects of academic/institutional performance; they do not consider national parameters (size, composition, disciplinary orientation, access rules, funding, etc.) or characteristics of the respective university and disciplinary culture (uniko 2017: 13). The methods used to draw up such global ranking lists vary at times considerably depending on their focus. They also change over time, which is why comparisons between the different rankings and time series analysis are mostly not possible or not meaningful. This is accompanied by the highly contentious data quality – one of the most serious points that speaks against their objectivity (ibid.). A number of factors play a role here – the **data source** and/or **data collection method** (e.g. whether the data is supplied by the universities or obtained from publicly available sources, bibliometrics or a survey), the **data preparation** (different calculations and categories to gain a better place in the rankings, weighting), **indicator calculations** and much more (uniko 2017: 14). Accordingly, the inevitable limitations of such global rankings should not be ignored when analysing the results.

In addition to the problematic aspects mentioned above, the following should also be taken into consideration when it comes to international higher education rankings: **publication indicators** aim to measure academic output based on the number of papers and citations. Some disciplines are not fully covered by this, which leads to skewed representations.

Furthermore, papers written in English are generally cited more often than those written in other languages, which puts the universities in the German-speaking countries at a clear disadvantage from an assessment perspective. The explanatory power of **reputation survey** is likewise highly contentious since the data obtained is at times very strongly weighted and skewed. Then there is the so-called Matthew effect by which recognised and higher ranked universities are regularly selected as the best in class. Universities with lower rankings only receive a few points. Annual ascents and descents are not necessarily linked to academic performance, they can also be the result of statistical effects (ibid.). Last but not least, **indicators** only reflect the academic realities to a limited extent, whereby the lack of transparency in their composition and weighting and changes in the calculation methods used constitute a further problem.

We will now describe four of the most prominent global higher education rankings, all of which rank the universities used in our case studies as well as some of the Austrian universities.¹⁶⁷ The aforementioned advantages and disadvantages should always be considered in the analysis of ranking results.

Times Higher Education World University Ranking (THE Ranking)

The British magazine *Times Higher Education* publishes a series of rankings each year, including the *World University Rankings*. The latter currently ranks 980 universities which offer graduate level education and have published at least 150 papers a year over a five-year period. The ranking assesses universities using 13 differently weighted indicators in the following areas: teaching, research, citations, knowledge transfer and international outlook. Some of the data is supplied by the respective university, while publication and citation data is compiled by a cooperation partner. The ranking also incorporates the results of a reputation survey of academics. The annual *Young University Rankings*, which evaluate young universities (aged 50 years or younger) worldwide, are calculated using the same principles. In contrast to the *World University Rankings*, reputation surveys are not given as high a weighting in the *Young University Rankings*. *Times Higher Education* also publishes a series of other international higher education rankings, including the *World Reputation Rankings*, the *BRICS & Emerging Economies University Rankings*, the *Asia University Rankings*, etc.

For further information and current rankings see: www.timeshighereducation.com

Academic Ranking of World Universities (Shanghai Ranking)

Developed by the Center for World-Class Universities at the Shanghai Jiao Tong University, the *Shanghai Ranking* is one of the most widely-used international rankings (uniko 2017: 24) and is characterised by its comparatively high level of transparency and objectivity. 500 universities are currently included in the ranking. These universities are assessed using six indicators for the following criteria: (1) Quality of Education – based on the total number of alumni who have received a Nobel Prize or a Fields Medal in the last 100 years; (2) Quality of Faculty – based on (2.1) the total number of staff who have received a Nobel Prize or a Fields Medal in the last 100 years and (2.2) the total number of

¹⁶⁷ The following information was taken from a vademecum on international higher education rankings published by the Austrian Universities Conference (uniko 2017).

highly cited researchers; (3) Research Output – based on (3.1) the total number of papers published in the *Nature* and *Science* journals in the last 5 years and (3.2) the total number of papers published in *Science Citation Index-Expanded* (SCIE) and *Social Science Citation Index* (SSCI) journals; (4) Per Capita Performance – the sum of the weighted indicators in (1) to (3) divided by the number of full-time equivalent faculty at the university. None of the information used to calculate the indicators is supplied by the universities themselves. They are automatically ranked if they achieve sufficiently high scores for the indicators used.

For further information and current rankings see: www.shanghairanking.com

CWTS Leiden Ranking (Leiden-Ranking)

The CWTS Leiden Ranking is published by the Centre for Science and Technology Studies (*Centrum voor Wetenschap en Technologische Studies*, CWTS) at the University of Leiden in the Netherlands. It is a multidimensional ranking (2016: 18 indicators) that is based solely on bibliometric analyses of academic publications. The Leiden Ranking assesses neither the quality nor the content of the publication, but instead ranks universities based on quantitative indicators such as the citation rate. The Leiden Ranking ranks universities based on 18 indicators that are divided into two groups (*Impact* and *Collaboration*): the *Impact* indicators focus on the citation frequency of the publications, while the *Collaboration* indicators measure a university's publication activity network. Rankings are also produced for individual disciplines. In 2016, 842 universities were included in the Leiden Ranking.

For further information and current rankings see: www.leidenranking.com

QS World University Ranking (QS Ranking)

The QS World University Ranking is published annually by Quacquarelli Symonds (QS) and currently includes 900 universities. The QS Ranking uses a total of six indicators: 50% of the total points awarded to an evaluated university come from two indicators that are based on subjective assessments by academics (Academic Reputation – 40%) and employers (Employer Reputation – 10%) obtained via surveys. The following aspects are also taken into consideration: faculty/student ratio, citations per faculty, percentage of international faculty and percentage of international students. A series of other rankings are also published based on the *QS World University Ranking* data, including the *QS World University Ranking by Subject*, *by Faculty* or *by Region*, the *QS Best Student Cities*, the *QS Top 50 under 50*, etc. For this purpose, the available information is collated differently and at times given a different weighting.

For further information and current rankings see: www.topuniversities.com

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Title (English): Diverse Excellence. Case Studies of Excellent Universities

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