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"A knowledge triangle for quality and impact – Challenges for Swedish universities"

OECD

A knowledge triangle for quality and impact – Challenges for Swedish universities

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Contents

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Introduction

We see today the emergence of a truly global knowledge landscape – national education and knowledge production systems which used to be relatively closed are now opening up to knowledge, talents and resources from abroad. As a result, the global competition for students, researchers and capital is increasing and universities are no longer natural or sheltered components of nation states or their societies. As a result they must find a role that makes them attractive and useful globally, nationally and locally.

Concurrently, both the tasks and the mandate of universities have grown. The increasingly central role assigned to knowledge for societal and economic development has resulted in a dramatic rise in the size of universities and the resources at their disposal (when looking at the sector as a whole). With this rise come growing expectations and pressures on universities to assume a broader societal responsibility and contribute to societal development, together with relevant stakeholders. In addition, universities in Sweden, as in many other countries have gradually become more autonomous and independent from the state. Compared to only 30 years ago, Swedish universities have much more freedom to shape their own destiny, including the freedom to dispose over financial resources, recruitment and how to design their organizations.

Universities' organization and leadership can and must change to adjust to these developments, and to changes in funding structures, labour markets, and knowledge production and education systems. The need for change is reflected in a growing focus on universities as organizations and in discussions on the need for reforms regarding leadership and governance, but also regarding the link between research, education and societal engagement. In particular, there are calls for reforms that will link or combine universities' tasks more closely to each other in a mutually beneficial way (see, for example Dijstelbloem et al. 2013, OECD 2015 and EC 2014). Often, this is formulated as the need to create a well-functioning knowledge triangle[6].

Swedish universities have performed quite well in this new global landscape, when considering the significant increase in the financial resources at their disposal, the rapid increase in staff and students, their degree of independence and autonomy, their research performance and their rankings in international comparisons. At the same time, the above mentioned systemic changes are also affecting Swedish universities. They are under increasing pressure to maintain and strengthen excellence in research, education and societal engagement. Particularly, they need to find ways to combine these three tasks in a strong knowledge triangle. In this report, we set out to explore how the principles of a knowledge triangle are orchestrated at Swedish universities. We first briefly describe the Swedish landscape. Then we analyse three universities (representative of different types of the Swedish university population) in greater detail, namely Chalmers University, Lund University and Malmö University. We then draw some conclusions of relevance for universities and policymakers.

[6] In line with Markkula (2013) and Goosens and Sjoer (2012), we regard the notion of a knowledge triangle to be a conceptual and normative framework for understanding the creation and dissemination of knowledge as a multifactorial and systemic process that integrates education, research and societal engagement in a synergic way. Thus, we define the third dimension of the triangle as societal engagement (i.e. the collaboration with non-academic actors) which is not equivalent to innovation or research utilisation. The framework tends to be used in a normative way in the sense that it builds on the assumption that linkages are fruitful and thus should be strengthened: our starting point is instead that such linkages will be temporary and conditional in the multi-purpose setting that contemporary universities form (Maassen & Stensaker 2011).

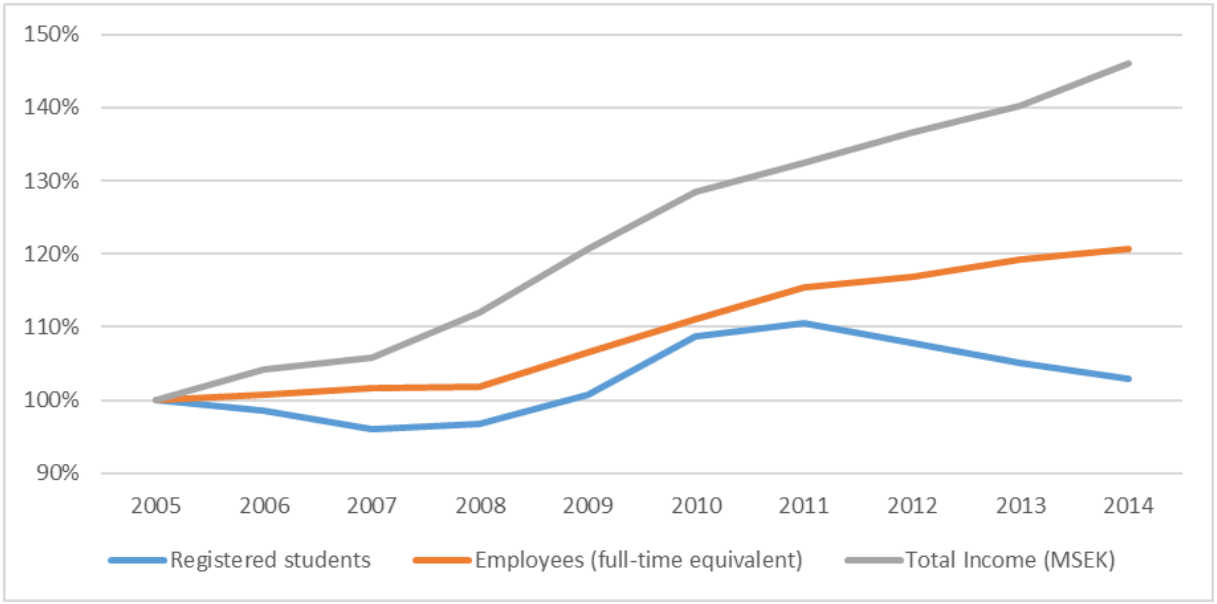
The Swedish university landscape and system

There is currently no explicit policy in Sweden targeting the knowledge triangle. Still, it is a political priority and a living concept rhetorically. There are a number of characteristics and developments in the Swedish university landscape and system that condition the way in which knowledge triangle principles are realised. These are described as follows, drawing on a review of key literature on the conditions of the Swedish policy landscape.

Massive increases in students, employment and public funding

Similar to many other OECD countries, the Swedish university system has undergone a massive expansion, with a dramatic increase in the volume of students and staff in recent decades (see Figure 1 below). Between 1985 and 2014, the number of full-time students in Sweden tripled, (Eriksson and Heyman 2014). This is a significantly higher rate of increase than in other countries, and about 45 percent of all Swedes today have experience from higher education (completed or non-completed degrees) (Ejermo 2012). Today university employees account for around 30 % of all government employees in Sweden (Jacob 2015). In the first decade of the 21st century alone, the number of university employees increased by around 31%.

Figure 1: Growth in Swedish University Sector 2005-2014 (2005=100)



Source: The Swedish Higher Education Authority 2015

These increased volumes have been accompanied – and indeed driven – by a significant increase in public funding to both teaching and research. However, Swedish universities have separate budgets and funding streams for research and teaching and since 2007, universities' funding for R&D has increased significantly more than funding for teaching. As a result, the share of funding going to R&D has increased from 53% to 58% between 1997 and 2014 (UKÄ 2015).

Sweden's R&D expenditure dedicated to universities has traditionally been high, both as a share of total R&D expenditure and as a share of GDP. Sweden is one of the countries that allocates most public funding to R&D, as a share of GDP, after Austria and South Korea. Furthermore, Swedish universities as a whole receive more R&D funding, as a percentage of GDP, than universities in other countries. The share of public R&D funding at universities has

increased from around 65% in 1981 to 73 % in 2013 (Nilsson 2015). Among OECD countries, only Denmark allocates more R&D funding, as a percentage of GDP, to universities. Between 2000 and 2011, universities' R&D expenditure increased by 76% or by 50% if general cost increases are taken into account (VR 2015). At the same time, business expenditure in R&D has declined, as a share of GDP. Thus, private R&D expenditure as a share of GDP fell from 2.55% in 2009 to 2.36% in 2013, largely due to a net outflow of corporate R&D abroad (Jacob 2015). Companies' funding of R&D at Swedish universities is relatively small by international comparison (Nilsson 2015). Summing up, Swedish universities, as a collective, receive comparably large R&D funding and a comparably large share of this funding comes from the government.

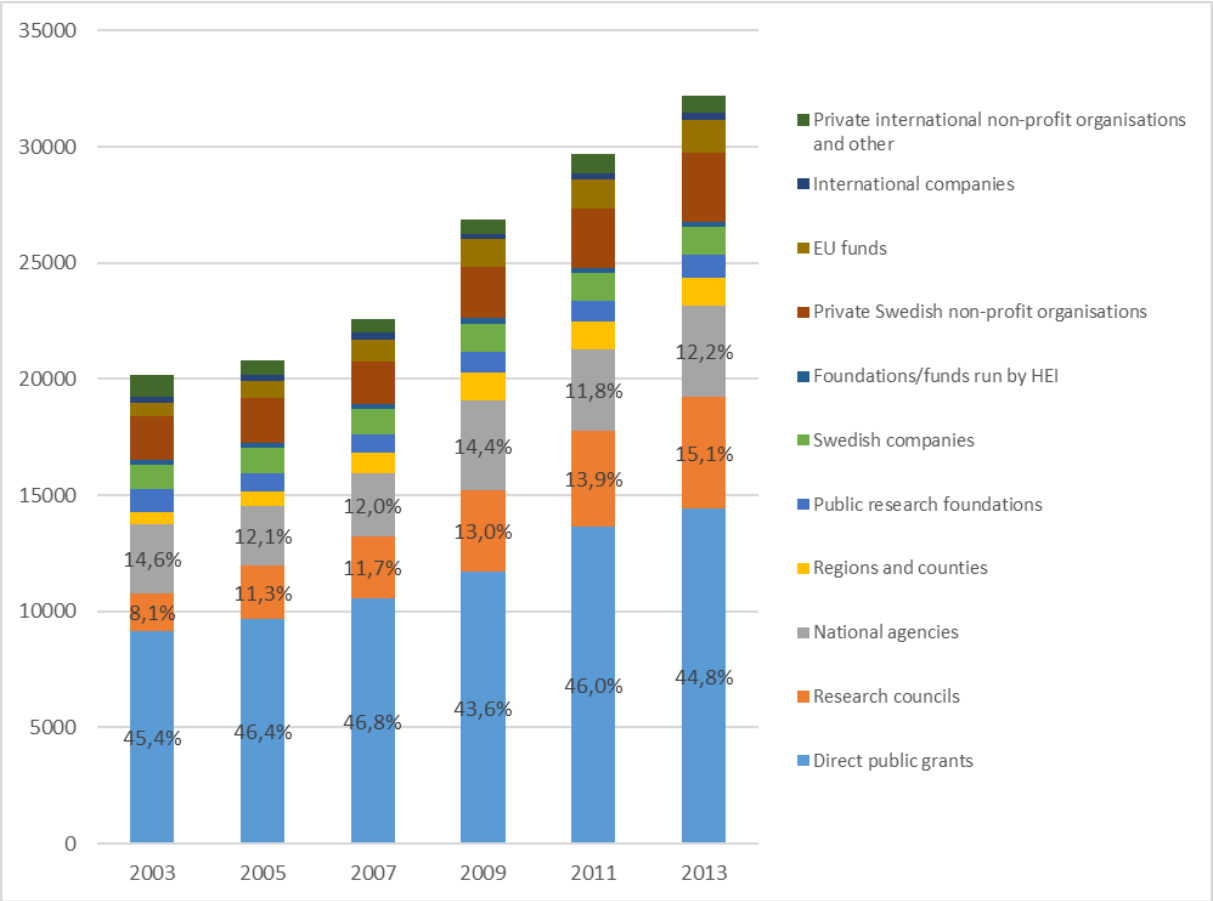
In parallel to the growth in student numbers, faculty and funding, the tasks assigned to universities by government have increased, as have public expectations on universities' contribution to social and economic development. Universities are expected to be involved in, and sometimes even drivers of, innovation processes, to contribute to economic growth and competitiveness, to meet the demand for skilled labor, to perform excellent research and to help tackle societal grand challenges (Berggren 2012; Ejermo 2012; Carlsson et al. 2014; Eriksson and Heyman 2014; Perez Vico et al. 2015).

A resourced but fragmented funding system

In Sweden, the policy areas of relevance to the knowledge triangle (research, education and societal engagement) are largely managed in silos. Consequently, the central public funding streams for the three tasks are separated and isolated from one another, creating significant challenges from a knowledge triangle perspective. This creates fragmentation and weak integration of tasks.

In addition, Sweden's research funding system is characterized by a relatively large number of funding organizations (see Figure 2 below), which creates further fragmentation. The funding system has targeted selected research groups or even individuals, while it has undermined the leverage of university management and its ability to exert strategic leadership (Jacob 2015). Resources and thus leverage are centred around and reside primarily with research groups or even individuals which have considerable independence and decision-making power. The result is that the ability for universities as organizations to act strategically and drive change is quite limited. Rather, changes occur through specific R&D programmes which yield effects that are limited to specific research groups or academic disciplines (Benner 2013). Thus, much of the steering power lay in the hands of research funding agencies and research groups.

Figure 2: Funding of University Sector by source 2003-2013 (MSEK)



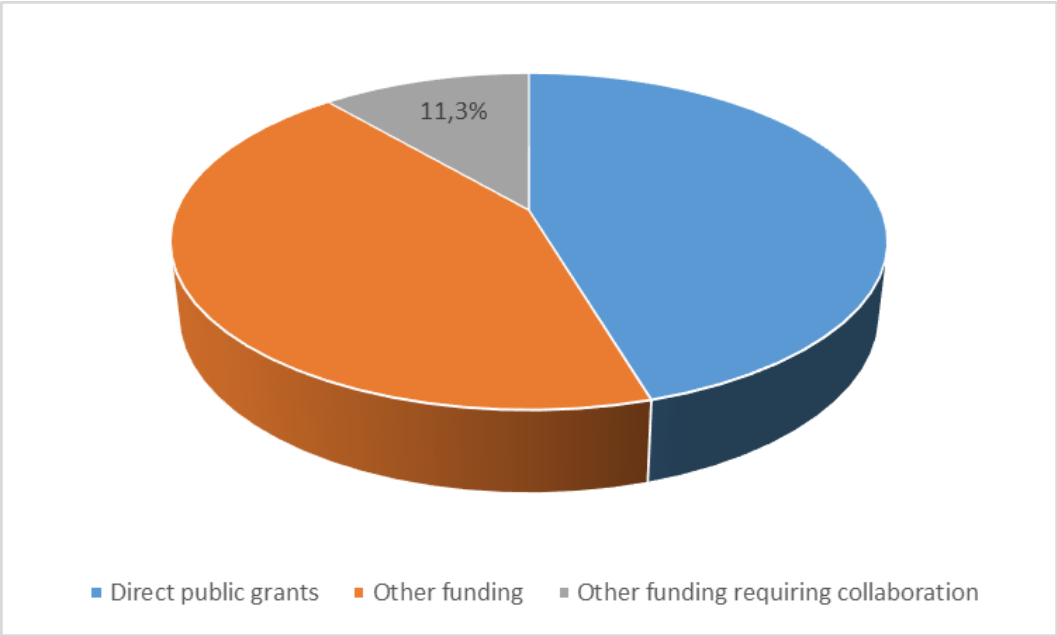
Source: Statistics Sweden 2014

Strong but unsystematic tradition of societal embeddedness

Swedish universities have traditionally been publicly governed and predominantly government-funded (Benner & Sörlin 2015). The Swedish university population includes three types of higher education institutions: comprehensive, specialised and regional universities. As integral parts of society and the public sector, particularly the older comprehensive universities have a strong tradition of embeddedness in and interaction with their respective local contexts. This includes primary and secondary schools, the private sector, politics and culture but also government ministries and agencies. The specialised universities include the technical, agricultural and medical universities that all have long-standing 'natural' ties to related industries, sectors and networks. The regional universities, founded after 1977, were from their inception strongly focused on the conditions and demands of their local and regional context, particularly with regard to the demands of the local labor markets and the public sector's demand for skills in education and healthcare. Regional may be seen as a misnomer as these universities recruit students and faculty as broadly – sometimes even more so – than comprehensive and specialized universities. The term 'regional' indicates that they were founded as part of the regional mobilization of resources after the industrial crises of the 1970s and 1990s.

During the 1970s and 1980s, a number of initiatives and policies created a more institutional approach to interaction with the surrounding society. Offices and publicly funded programs aimed at promoting cooperation between industry and academia were set up. Technology parks emerged, as did other forms of 'intermediaries' or 'bridging functions' between academia and the surrounding society, with a strong focus on the business sector in general and technology-based firms in particular. An important threshold event occurred in 1998 when the government officially made cooperation with surrounding society one of universities' core missions. In the wake of this decision, public funds were earmarked and increasingly made available to universities for cooperating with industry. By 2013, the proportion of public funds to universities requiring collaboration had reached more than 11% (see Figure 3 below).

Figure 3: Proportion of University Sector Funding requiring collaboration (2013)



Source: Statistics Swedish 2015 (data elaborated by VINNOVA 2015)

While historically there has been close interaction with surrounding society, interaction can also be argued to have been unsystematic and centred and revolving around certain individuals, groups or communities. Personal relations and path dependencies played an important role in these interactions. This was particularly striking when it came to cooperation with the business community, where collaborations might be argued to have been stochastic, i.e. unplanned and entirely bottom-up on the academic side, rather than strategic. For the newer universities, interaction revolved primarily around teaching and education and around mobilizing resources.

The unsystematic way of handling societal engagement is changing somewhat. With increasing autonomy, universities have started to adopt a more systematic view of interaction with surrounding society. In the past two decades many universities have adopted strategies for cooperation with industry and society. This has also spurred changes in organisational structures, recruitment or other policies. However, there is broad variation in universities' approaches to establish a link between their strategies for societal engagement and their operational practices (in research and education).

An important aspect related to the link between research and societal engagement is mobility. By international comparison, Swedish universities still recruit a large share of their faculty internally (Bienenstock et al. 2014). Mobility, both between universities and between academia and industry or surrounding society, appears also to be relatively limited.

Education in the shadow of research

The link between education and research has been a cornerstone of Swedish policy (Berggren 2012; VINNOVA 2011). This is mirrored in that basic research, applied research and teaching are combined within the same organizations in the Swedish university system (Öquist and Benner 2012; Carlsson et al. 2014). This creates a unique opportunity to realise knowledge triangle principles. However, the significant increase in funding for research and the focus on research excellence has reinforced an already strong prioritization of research, among researchers but also at university management level, at the expense – or even to the detriment – of teaching and interaction with society (Bienenstock et al. 2014).

An underlying reason for this is that research is given higher status than education. Academic excellence is often equated with research skills, suggesting an underestimation of the key role of teaching in community development (Bienenstock et al. 2014). This is clearly seen in

incentive systems that reward research successes, but not education to the same extent (Carlsson et al. 2014; OECD 2015).

Thus, despite political ambitions, there are clear signs of a division of labour between teaching and research among faculty in Sweden (Geschwind and Broström 2014). Ironically, one explaining factor is the combination of advanced research and education in one organization. Consequently, scientists can redeem or 'liberate' themselves from teaching and transfer the task onto individuals within the same organisation with lower research ambitions or less success in gaining research funding. Hence, incentives for researchers to strengthen knowledge triangle principles at the individual level are not in line with the political ambitions.

Increased autonomy and resources – passive university leadership

In Sweden, the expectations of integration of university tasks fall on universities themselves, in particular following Sweden's autonomy reform. However, the increased resources and autonomy that the sector has experienced so far have not proven to be sufficient to foster better knowledge triangle linkages or integration. Traditionally, Swedish university leadership has been relatively passive, hands-off and non-interfering, focusing more on administrative governance rather than strategic management (Carlsson et al. 2014; Öquist and Benner 2012; Jacob 2015; Bienenstock 2014). In contrast, the increased size and complexity of university operations, greater autonomy, more differentiated funding streams – with a relatively large number of research funding bodies – and a growing pressure from society on universities to 'have impact' raises the need for more proactive and accountable leadership at universities (Berggren 2012; Carlsson et al. 2014; Öquist and Benner 2014; Heckscher et al. 2015).

A discussion relating to the mandate of universities related to engagement is the so-called 'teacher's exemption' (sometimes also referred to as the 'Professor's Privilege'), whereby university researchers own the intellectual property of their inventions. There has been an ongoing discussion in Sweden as to whether the ownership of intellectual property generated by university staff should continue to belong to the individual or whether it should be conferred to the university, similar to the Bayh-Dole Act in the United States. Opponents to the reigning teacher's exemption argue that it inhibits commercialization of university research. A government commission in 1996 advocated against the abolition of the teachers' exemption, whereas another commission – backed by the government – argued in favour of abolishing the exemption in 2005. The issue remains contested, and the role of intellectual property rights in the overall mix of collaborative mechanisms continues to be a thorny issue. On the one hand, the teacher's exemption creates incentives for individual teachers to engage; on the other hand, it creates a somewhat skewed understanding of collaboration as commercialization. In addition, it marginalizes universities to some extent, as much of collaboration takes place outside their control.

Case studies of three universities

In the sections that follow, we analyse three Swedish universities in the light of the current Swedish policy landscape: Lund University, Chalmers University and Malmö University. These cases have been selected to reflect the Swedish university population in term of size and type (i.e. comprehensive, specialised or regional), as well as to demonstrate the variation of approaches to operationalising the knowledge triangle.

Lund University is one of Sweden's large, comprehensive universities with long-standing traditions and experience in all three areas of the knowledge triangle. Chalmers represents a specialised university with ambitious management traditions and extensive industrial collaboration. Malmö University is one of Sweden's newer regional universities, where the articulation with the local community (including the

city and industry) has been central to the formulation of research and educational programmes. An overview of key statistics for the three universities is provided in Table 1 below.

Table 1. Key figures for the universities included in the case studies for the year 2014

	Lund University	Chalmers University	Malmö University
Year founded	1666	1829	1998
Vision	"To be a world-class university that works to understand, explain and improve our world and the human condition"	"Chalmers for a sustainable future"	"A world where diversity, knowledge and creativity is transformed into action for sustainable development"
Full time students (Undergraduate and Graduate Students)	27 702	8 926	12 340
Of which Graduate students	7 146	3 137	1 438
Full-time faculty	2 997	1 173	753
Professors	708	201	77
Total Revenue	7,5 million SEK (app. 815 KEUR)	3,4 million SEK (app. 370 KEUR)	1,3 million SEK (app. 141 KEUR)
Research Revenue as a share of total Revenue	67,6 %	71,5 %	20,8 %
Share of block funding (research and education)	56,2 %	48,4 %	75,7 %
Share of Public Funding Requiring Collaborative Research With Actors outside Academia (2013)*	9,7 %	22,5 %	14,8 %

*This includes funding from research funding organisations that require the participation of non-academic actors, such as from VINNOVA or the Knowledge Foundation.

Sources: Universities' homepages, The Swedish Higher Education Authority (UKÄ) database (accessed 2016) and data analysed by VINNOVA based on data from Statistics Sweden.

The cases studies mainly build on 15 interviews conducted between November 2015 and March 2016: five at Lund University, seven at Chalmers University and four at Malmö University. Interviewees made up a representative sample of individuals with regard to research group, department, faculty and university management level (including Professor, Dean, Pro Vice Chancellor and Vice Chancellor levels), as well as to the universities' three tasks. For Lund and Chalmers, the interviews are labelled as L1-5 and C1-7, respectively. For Malmö University the interviewees are referred to by their title in the text. In addition to the interviews, university policy documents and previous studies of relevance have been reviewed.

Lund University

Background

Founded in 1666, Lund University (LU) is one of the oldest universities in Northern Europe and is ranked among the top 100 in the world[7]. LU is comprised of eight faculties[8] located in three campuses (in Lund, Helsingborg and Malmö). The University is also home to a number of institutes, specialised research and innovation environments, and platforms for societal interaction. Two major facilities for materials research are currently under construction in Lund: the MAX IV Laboratory, which will be a world-leading synchrotron radiation laboratory and ESS, a European facility that will be home to the world's most powerful neutron source. These will be of decisive importance for materials and life sciences and for industrial development. In Lund, Medicon Village has also been established to provide a favorable environment integrating research, innovation and enterprises in the area of life sciences.

Interpretations and attitudes

Central management at Lund University expresses the importance of the interplay between research, education and societal engagement – highlighting the university's vision "to be a world-class university that works to understand, explain and improve our world and the human condition" (Lund University 2012). At the same time, central management recognizes that the faculties have no common interpretation or way of operationalizing the knowledge triangle – resulting in fragmentation or unbalanced linkages between the various tasks.

On an ideological level, the importance of the interplay is well understood and embedded in our strategy and employees' understanding. However, there is a long way to go before we realise our aim of having 'complete' learning environments – with a well-functioning and balanced integration between research, education and societal engagement – across our faculties. (L1)

Certain institutions are doing well to integrate research and education. These are often the same environments with well-defined strategies for interacting with society. In other cases, the three missions are developed in isolation of one another. (L2)

On an individual (or group) level, there is a general understanding that research, education and societal engagement should be mutually reinforcing activities as more "integration" can enhance the quality of each aspect. Yet the approach for linking the various elements differs broadly across Lund's faculties and departments. For some faculties or disciplines with more direct and practical application to societal issues (e.g. engineering or social sciences), there is a more natural integration and responsiveness (of research and education) to societal needs. This has led to differing levels of competence and experience across the faculties in engaging with "outside" actors in the local/regional system in order to understand and address their needs (through e.g. tailored educational programmes, research or collaborative projects).

The general perception is that efforts to integrate research, education and societal engagement are not recognized or merited. In fact, allocating time to interact with society may be considered a "waste of time" as it takes time away from research (or applying for research funding).

Without clear communication on what is expected, financing or other incentives, it is difficult for LU employees to take the third mission seriously. (L2)

Although the concept of the knowledge triangle is known and supported, the reality at Lund University does not reflect a systemic process that integrates education, research and societal engagement in a synergic way. Rather, there is a disconnection. Education, research and societal engagement are often seen (and implemented) as separate tasks at LU – with separate financial streams and organizational support. In addition, the attitudes towards and perceived value of pursuing each task vary.

[7] LU ranked 70th in QS ranking 2015/2016 and 90th in Times Higher Education World University ranking 2015/16.

[8] The eight faculties are: Faculty of Engineering, LTH; Faculty of Social Sciences, Faculties of Humanities and Theology; School of Economics and Management; Faculty of Medicine; Faculty of Science; Faculty of Law; Faculty of Fine and Performing Arts.

Organisation and leadership

The central management at Lund University is comprised of a Vice Chancellor, a Deputy Vice Chancellor (with special responsibility for education and international relations), a Pro Vice-Chancellor for Research and Research Infrastructure, a Pro Vice-Chancellor for External Engagement, as well as the University Director (responsible for administration and finances). Each of the eight faculties have similar management structures, with a Dean and Vice-Deans with (separate) responsibilities for education and research. Some faculties also have individuals on the management team with responsibilities for innovation and collaboration and/or international relations. While the University and Faculty Boards have overall responsibility for education, research, innovation and interaction with society, management (on central and faculty levels) is responsible for the operational work – including management of financial resources and personnel.

The Strategic Plan for Lund University 2012-2016 sets out the overall goal of "highest quality education, research, innovation and interaction with society" and outlines four strategies for achieving this goal: cross-boundary collaboration; internationalization; quality enhancement; and leader, teacher, and employee excellence. The strategy for cross-boundary collaboration highlights the ambition to create physical and virtual meeting places, as well as develop support structures and incentives to stimulate internal (within LU) and external cross-boundary collaboration in education, research and administration. These strategic ambitions are reflected in a number of recruited positions or support functions within the University's central administration, which were initiated or further developed under the leadership of the previous Vice-Chancellor.

[LU management] developed a number of organizational structures, including LU Open[9] *and the Research and Innovation Council of Skåne, recruited skilled and experienced personnel, and initiated activities to strengthen the interplay between research, education and societal engagement.* (L3)

In addition to the central strategy for Lund University, each of the faculties have their own strategies to guide their operational work. The current Vice-Chancellor and leadership team[10] are in the process of formulating a new strategic plan for LU and undertaking a number of changes to central support functions – including a shift of responsibility for initiating and leading cross-boundary collaborative activities from the center to the faculties to ensure stronger embeddedness with core operations, that is research and education (Lund University 2015).

All faculties should have their own platforms for developing relations with external actors, proactively initiating and following-up on collaborative projects – driven by the faculty's strategy. It's understandable that the central level may be involved in initiating some platforms, such as cross-disciplinary ones, but these should be integrated and developed within the faculties and departments. (L4)

There are examples of 'integrated knowledge triangles' within departments, but cross-disciplinary programs or platforms are rare [due to autonomous faculties and the lack of incentives to pursue cross-disciplinary activities]. The central administration has limited resources to support cross-disciplinary efforts, and those activities that have been initiated are not always viewed in a positive light. It seems to work better if one faculty has the lead responsibility for a cross-disciplinary platform – with the responsibility of involving other faculties. This ensures structures are stable and are perceived as 'core'. (L2)

The forthcoming strategy will play an important role in signaling LU's priorities for a stronger interplay between research, education and societal engagement (guiding the respective strategies at the faculty level). There is also a need for more concrete guidance on how the University will work with the knowledge triangle – through e.g. support structures and incentives. Currently, the link between the university's strategic vision and operational practice is rather weak.

The University leadership needs to provide a strategic direction, support structures and incentives, as well as visibility of good examples. [Integration of research, education and innovation/societal engagement] won't happen by itself. (L1)

[9] LU Open is *a development unit (under the central administration's section for research, collaboration and innovation) specialized in matching stakeholders (e.g. industry, public sector, cluster organisations) with researchers and students, and designing and executing projects with the objective of solving complex challenges.*

[10] As of January 2015

There seems to be a need for simplifying and clarifying the central support functions – clearly communicating a service offering to the recipient faculties and departments. (L4)
In addition, the central administration and faculty management see a need for changing the financing system to enable a better integration between research, education and societal engagement. Needed changes include flexible use of existing budgetary allocations and financial support (or other incentives) for societal and cross-disciplinary collaboration.
It is difficult to finance the development of new educational programs or research areas, as the financing system does not allow for flexible use of budgetary allocations in research and education. A strengthened integration between research, education and societal engagement needs to be not only interesting, but also financially viable. (L2)
There should be better incentives and financing for working with societal engagement. It is important to have accessible financial support or seed money to start new things and weave in societal interaction as part of educational and research activities. An example of this is a platform between LU's Helsingborg campus and the city of Helsingborg – where the city allocates around 0,6 MEUR per year to fund research and educational activities conducted in collaboration with regional actors. (L4)
Collaboration across disciplines and with external actors [on education and research] can be strengthened through financing – or by making collaboration a requirement for accessing [certain] research financing. (L5)

Informal drivers

A key driver of systemic integration of education, research and societal engagement is the proactive development of relationships and regular interaction with "outside actors" in the local/regional system in order to understand and react to their needs. This often requires a number of boundary spanning individuals – i.e. individuals with the competencies, experience and mandate to build networks and longer-term relations with different actor groups, as well as manage collaborative projects or platforms. This role of "boundary spanner" is not generally a formalised function within faculties or departments. Rather, this task is fulfilled on an *ad hoc* basis. At Lund University, LU Open was established as the central support function to play this role, but this unit is currently being phased out as a separate entity within the central administration's section for research, collaboration and innovation. Instead, the faculties will have responsibility for project design and execution – strengthening their contact with societal actors and embedding these activities within core operations (Lund University 2015).
It is important to work proactively with developing collaborative relationships – to get the system to work together. The central administration can play an important role as a neutral 'development motor' for these activities. (L3)
In addition, many interviewees highlighted the importance of the culture and attitudes towards the different dimensions of the knowledge triangle. There is a lack of attention to and appreciation of societal engagement at Lund University. Most activities are undertaken on a volunteer basis by individuals who have the passion or personality to do so.
People don't get paid or recognized in any way for interacting with society. Most people do it on their own time. Societal engagement is not seen as enhancing research and educational tasks, but rather taking time away from 'core' tasks such as securing research financing. (L2)
LU is a rather traditional university – where a focus on research excellence has top priority. It is not easy to change a culture or an orientation towards scientific excellence. It's a long-term process, but also necessary to undertake to ensure that LU is well-positioned [to deliver high quality education and research, and address societal challenges] in the future. (L5)

Observed tensions

There are two main tensions that challenge the implementation of the knowledge triangle at Lund University: the tension between the tasks, and the tension between the role of central administration in relation to the faculties.
There are different ways of interpreting and implementing the knowledge triangle across the faculties (and even across the campuses) of Lund University. In general, most effort is focused on securing financing for and producing high quality research. Education is also a core priority, but may be viewed as a "2nd place" priority behind research. Societal engagement is conducted on a very ad hoc basis (driven

by individual values and passion, mostly on free time). The result is a fragmentation between the various tasks and a lack of clarity about the benefits of strengthened integration.
LU also experiences a tension between having centralized or decentralized (i.e. in the faculties) support functions and platforms for collaboration. Thus, Lund University seems to be navigating between different integrative models. On the one hand is the centralized level, such as the LU Open cluster-model, that actually set off real activities. On the other hand is the current distributed, faculty based model that anchor notions of integration among its faculty and faculties. For innovation and societal engagement to become more "core" and integrated with research and education activities, it is imperative that collaborative activities are embedded within (rather than being islands outside) the faculties. However, the eight faculties have very different structures, financing models, and attitudes towards both the importance and the operationalization of an "integrated" knowledge triangle. This results in diverging views on how resources should be used and which activities provide most value, and barriers to establishing cross-disciplinary collaboration.
Thus, in this study we observe that this navigation between different integrative models appears to be rather inept. The different models seem both to lead to limited ownership of task integration - and most significantly, they say very little about students and education. In addition, both rely on specific constituencies and work modes – techno-administrative professionalization in the first case (leading to - as mentioned - professionalization but also a distance to core activities) and mixed-content faculty management in the other (which may strengthen legitimacy but may lead to dilettantism and segmentation). Thus, there is a need for central management to take on a more proactive role in initiating new activities, providing incentives, and clearly communicating the importance and benefits of an "integrated" knowledge triangle.

Summary of the findings

Lund University is a comprehensive university with a weak steering centre and considerable variation between its different constituent parts in terms of how the different tasks are aligned. This variation shows in the organization of knowledge triangle activities, where recently adopted top-down approaches (enacted by an entrepreneurial vice chancellor) co-exist rather uneasily with bottom-up activities, and where some faculties have a profound and elaborated model of interaction whereas others have only minimal experience of it. There is a general perception that the integration of education, research and societal engagement "doesn't happen on its own". Thus, Lund University has the ambition to foster integration, but seems to be navigating rather ineptly between different integrative models. To foster true integration there is a need for a central strategy, efficient communication, signaling system and support mechanisms (e.g. financing, career merits, central support services), as well as a capable and proactive leadership.

Chalmers University

Background

Chalmers is a technical university situated in Gothenburg, Sweden's second largest city. Gothenburg has a rich industrial history and a high R&D intensity (Fogelberg and Lundquist 2012). This medium sized university (in Swedish measures) focuses on research and has a close relationship to the region's biomedicine, ICT, transportation and manufacturing industry. This relationship is reflected in Chalmers' position as the fifth university worldwide with highest share of industrial co-publications (CWTS Leiden Ranking 2015) and in its strong entrepreneurial traditions (Clark 1998; Jacob et al. 2003). Chalmers was founded as a vocational school in 1829 based on a donation by a Swedish industrialist. After 17 initial years as a private institution, Chalmers became state owned. This lasted until 1994 when the university transformed into a private foundation with greater autonomy than other Swedish universities (Jacob et al. 2003). Education and research is conducted within 18 departments at two campuses. The educational activities are dominated by the engineering schools.

Interpretations and attitudes

The knowledge triangle is interpreted in diverse ways at Chalmers. One first point of divergence regards whether it implicates something new. According to some interviewees it does not:

I feel that I truly work with the knowledge triangle, but I seldom use the expression, maybe because it's self-evident given the role of the university and because the concept feels artificial. (C1)
Others emphasize that the concept brings much needed attention on the third mission (C2, C3).
A second point regards whether the realization of the knowledge triangle is seen as an addition of activities to the existing tasks of research and teaching (C4), or if it involves their redesign (C5). An interviewee exemplifies the latter view:
The relation between education and societal engagement should not be about activities that 'season' education… but about revising entire educational programmes on the basis of universities' wider role in social development, including the role as a neutral and critical player. (C5)
A third point concerns perceptions about the third task. While some equate the third task with innovation and focus on its link to research (C4, C7), others emphasize that it includes wider societal engagement and the responsibility to contribute to sustainability (C5, Holmberg 2015). As expected, attitudes towards the knowledge triangle and its usefulness for Chalmers vary with these individual interpretations. This is illustrated in statements from two vice presidents:
Through combining research, education and innovation in a fruitful knowledge triangle, we can create arenas for change… We have to train our organisation to enable this. (Holmberg 2015)
We do not work with the knowledge triangle [at Chalmers] because we do not think the concept fits with our integrated picture of the utilization of research and education [research and education as part of utilization]. The knowledge triangle polarises the three tasks by placing them in corners. (C6)
As a middle way between these attitudes, others perceive that the knowledge triangle has a significant rhetorical value, but should not be operationalised (C1, C2).
Attitudes are also influenced by views on the nature of research and the third mission. Interviewees that see science as a public good and advocate "truly" unbiased and curiosity driven research, hold a more sceptical attitude (C4, C7). Others see knowledge triangle initiatives as an opportunity to transform into a university that is better prepared to meet societal needs (MKW, Holmberg 2015).

Organisation and leadership

Chalmers applies a process oriented management model, where education, research and utilization are each led by a vice president. The undergraduate and master's education has its own organisation that procures courses from the departments which are headed by a dean and made up of divisions.
On top of the three processes lay the eight Areas of Advance (AoA)[11] – an organisational structure introduced in 2010 with the vision to "match [Chalmers'] scientific excellence to global challenges" and the mission "to create a unique integration of the knowledge triangle" in thematic areas (Chalmers 2011, p4). The AoA have a vice president with a formal responsibility for the knowledge triangle. The AoA were a response to a government initiative to strengthen strategic research areas that has provided the AoA with significant research funding. The evaluation of the initiative (2014) highlighted the introduction of the AoA as a good example and recommended that Chalmers should be granted increased funds (Swedish Research Council 2015). Lately, rhetorical references to the knowledge triangle have faded (FH), and the AoA have developed into platforms for cross-cutting research and third mission activities with scientific excellence as a primary goal (C1, Chalmers 2016).
Although the AoA is a unique initiative, it may be seen as a natural trajectory for an ambitious university with strong management and industrial traditions. During the last decades, Chalmers has strived to transform into an entrepreneurial university and established radically innovative structures (in the Swedish context) such as a venture capital firm, a seed financing company and a school of entrepreneurship (Jacob et al. 2003; Fogelberg and Lundquist 2012). This has successfully integrated innovative research, entrepreneurial education and action-based training (Jacob et al. 2003). However, these structures emerged as ad-hoc experiments without clear guidelines, were steered by strong individuals and applied different legal structures. This created opacity and fragmentation (Jacob et al. 2003), which increased with additional third mission initiatives, often introduced following government directives. One example is the innovation office, a service function installed in 2010 to facilitate research utilisation. Although the structures have been revised during the latest decade, the sense of opacity and

[11] The areas are Energy, Materials Science, Nanoscience and Nanotechnology, Production, Transport, Life Science, Information and Communication Technology and Built Environment.

fragmentation somewhat remain. Thus, the current vice president of utilisation has a continued strong focus on creating integration, coordination and overview (C6).
Despite Chalmers' AoA and innovation support structure, management schemes at Chalmers seldom target knowledge triangle integration. However, Chalmers is introducing (2016) a faculty fund allocation system and new guidelines for staff appointments that take the three university tasks into account. However, some argue that staff appointments will become less flexible and that a stronger emphasis is put on traditional academic excellence which leaves less room for societal engagement (C2, C3). In addition, there are relevant developments at the individual departments. Some have ambitiously orchestrated the third mission through appointing vice deans of utilisation, developing long-term strategies and key performance indicators, supporting and encouraging employees, raising the issue in salary discussions and through revising the rules of procedure (Hillemyr et al. 2015; HS).

Informal drivers

The culture and values of individuals and research groups related to working with the knowledge triangle vary, even at a specialized university such as Chalmers. Cultures and values have been influenced by Chalmers industrial contexts and entrepreneurial spirit, as well as by traditional academic norms. As regard the link between research and innovation, some researchers with a strong tradition of doing basic research in industrial contexts seem to embrace the integration of cultures, mainly since the academic norms were never traditional in the first place (Fogelberg and Lundquist 2012). Yet, others strongly identify themselves with traditional academic norms and perceive the integration of roles to be problematic (Jacob 2003; Fogelberg and Lundquist 2012). One interviewee explains:
Some researchers need to go upstairs in the ivory tower… think deeply and at length about things and only come out every now and then to say things that amaze everybody… if we only direct our research toward the needs and issues of specific actors... [it] may only be relevant for them there and then… what about the future societal needs? (C7)
The driving forces for linking research and education seem stronger since the tasks often are combined in the same persons. However, division of labour has emerged partly due to the higher status of research. In the words of an interviewee:
There is an overrepresentation [in teaching] of those who fail to cope with the fierce research competition... The Formula 1 race is called research. (C3)
The new guidelines for staff appointments address this issue (C2).
The linkages between education and innovation are often driven by the commitment and interest of teachers who use their networks to introduce practical elements (C3). Although initiatives for strengthening societal engagement in education have been introduced from the central organisation for education, the main driving force comes from the teachers and students themselves (C5).

Observed tensions

Although Chalmers' AoA and innovation efforts have been advantageous, significant tensions related to the knowledge triangle remain. Firstly, the division of roles between the departments, the infrastructure for innovation and the AoA is unclear. The AoA have the responsibility for the knowledge triangle, but the departments hold the human resources and are responsible for the core business. Connections emerging thanks to the AoA mainly include interdisciplinary research between research groups at different departments (C3, C1). Thus, knowledge triangle connections created thanks to the AoA appear to be rare, according to several interviewees. As a researcher puts it:
We had developed our connections earlier [before the AoA]. We had the application, international relations, government relations, etc... For us it has been more of a hassle and created ambiguity… it's getting so much more complex and you do not know what to expect from whom anymore. (C7)
Secondly, there are tensions derived from a perceived distance between the strategic university management level and the researchers that work with the knowledge triangle in their everyday activities. This tension is reflected in statements from two interviewees:
I perceive the steering to be over ambitious… management is trying to steer things that they have little influence over, and limited information about… it is us researchers that run the business. (C7)
The steering is somewhat inconsistent… one moment we should focus on innovation, the next we should be excellent… but we know our business, it is through [the faculty] that the knowledge triangle is realised. (C3)

Thirdly, although the tensions between research and innovation at Chalmers have been perceived as minor (Fogelberg and Lundquist 2012), there is still a distance between support structures and needs of researchers (C6). While some faculty appreciate and utilise the internal support to act entrepreneurially, others perceive that the structures signal a too narrow view on utilization (C7). Also, there is a tension related to the focus on excellence.

I notice an augmented pressure to strive for academic excellence, but there are significant trade-offs… I am concerned because this increased pressure hinders societal engagement... and hinders the development of new venues for research. (C3)

Others are, in the light of the trade-offs and the extended ambition of the university, concerned about the ability of academia to conduct unbiased and curiosity driven research (C7).

Fourthly, significant tensions rise from the division of labour between research and education. In addition, there are experiences of how knowledge triangle activities, initiated by research or innovation actors, impacts education without regard to its core mission.

The education task has [at times] been taken hostage by innovation and research players… that have influenced the content of education dominantly based on perspectives from research and innovation that aren't necessarily in line with those of education… Strengthening the connection between education and the third mission is not about matching students to the direct needs of beneficiaries or introducing individual elements where students are used to reach other types of goals [such as innovation]... Instead, [strengthening the connection] should be about producing students who can formulate problems from societal challenges and observe society with a critical eye in order to push social development in the right direction. (C5)

All interviewees agree that the AoA have failed to include education. The organisation for education and the AoAs have both worked with integrating societal engagement in education, but rather separately (C1, C5, C2). However, interviewees hold a generally sceptical attitude towards a stronger integration of education into the AoA due to the increased complexity it would bring.

Finally, tensions have emerged between bottom-up initiatives by faculty or departments, external initiatives, and University-wide strategic processes and support systems. These tensions derive from the fact that these structures hold different but partly overlapping missions, resources and mandates. For example, the innovation office was created as an add-on organisation following a governmental initiative. Although their activities have been significant for the development of the third mission at Chalmers, they have not been successfully integrated.

Summary of the findings

Chalmers, with its strong managerial tradition, provides an example of an ambitious university by purposefully orchestrating the knowledge triangle through the introduction of a matrix organisation. Yet, tensions have risen as the new organisation has increased complexity. These tensions are identified both vertically from management level down to individual researchers, as well as horizontally between different university tasks (i.e. education, research and societal engagement). In addition, tensions stem from the diverse ways in which the knowledge triangle is interpreted, valued and employed.

Malmö University

Background

Malmö University was founded in 1998 as a state accredited 'högskola' or university college, granting it powers to award first- and second-cycle degrees and with a restrict remit for award of third-cycle qualifications. University colleges also do not carry the same level of entitlement to direct government funding for research as traditional universities. Malmö is the ninth largest higher educational institution in Sweden with five different faculties, providing over 100 programmes of study and 350 courses to well over 20000 students and almost 200 graduate students. The university is spread between two campuses in the city centre and was founded just before the completion of the Öresund bridge, linking Malmö to Copenhagen, in 2000. The development of the institution has been considered a key factor in the transformation of Malmö from a heavy industrial city to an internationalized centre for culture, creative industries and innovation in the Skåne region of southern Sweden.

Interpretations and attitudes

A common sentiment was that that there is little direct reference to the knowledge triangle model at Malmö and in Sweden there are various other terms for knowledge triangle principles. However Malmö's Research Coordinator emphasised a belief that there should be a variety of forms of contact with society, one of which could be innovation itself, for example in testing results of research. This attitude helps to cement and embed Knowledge Triangle principles, and people see that they personally gain from this approach; as a student, teacher or researcher that role changes as a result of these kinds of attitudes and possibilities. In contrast, however, staff at Malmö described misunderstandings about the 'third mission' in Sweden that have led to complaints about such activities being undertaken in addition to education and research. The Dean of the Faculty of Health and Society described Malmö as 'quick and flexible', keen to interact with social challenges, i.e. migration, inequality, health and living conditions. Societal engagement is a core value for Malmö, including 'social innovation' in a very broad sense: 'it's about processes, not things', says the Dean of the Faculty of Health and Society - 'meetings, feelings, experiences.' There is also a 'challenge-driven perspective' that underpins work at Malmö, especially in terms of serving underprivileged groups in society. The kind of innovation that this produces revolves around 'basic needs' and is 'user-driven', focussed on societal needs. Involving external parties in the early stages of research processes is seen as having an impact on what 'knowledge' is for Malmö and is a valued form of interaction. Importance is placed on actively seeking out potential partners, continued dialogue with students, follow up with alumni and feedback on their professional education. One way in which the Vice-Chancellor sees that Malmö could better structure their knowledge triangle activities is by using all the design knowledge they already have inside the university. More research could be done, for example, to evaluate collaborative projects in a way that forms a subject for research in itself. The Pro-Vice-Chancellor feels that social sustainability is a particularly good platform for collaboration and relates strongly to the knowledge triangle as well as to many different societal issues, while still putting the university at the centre. 'I don't think in a triangle way - I try to look at the strategy and the vision that we have', says the Vice-Chancellor, who also states that 'dynamic system thinking is more useful here', and that 'a triangle model is perhaps not so helpful.'

Organisation and leadership

Malmö's Pro-Vice-Chancellor and Vice-Chancellor bring different backgrounds that combine many years of public organisational experience on the one hand and private sector administration and management on the other. The combination of both these sectors in partnership they feel is a major driver of quality in education and research. Both the Vice-Chancellor and Pro-Vice-Chancellor see that societal challenges are 'crucial' to address and that is a core mission for the institution. Knowledge Triangle principles are part of developing Malmö's institutional strategy, as collaboration is a core value for the university. The university is already a national hub for social innovation and out of their focus on societal challenge can come a lot of new ideas, in the view of senior management. Malmö has a strong multidisciplinary approach and is also trying to encourage collaboration between different faculties, for example via research schools and general interdisciplinary education. This is an important profile for the university and is seen as a way to attract potential external funding and collaborators.

There is much innovative work being done by staff and students that senior management would like to harness, in particular by evaluating their collaborations in more detail and therefore providing opportunity for further research projects. The Vice-Chancellor would also be keen utilise these evaluations as a basis for designing future activities. As collaboration is such a strength at Malmö, and one that can be drawn on to promote the university, the Pro-Vice-Chancellor sees that 'there is a huge communication task ahead' with raising the profile of these kinds of collaborative activities with civic society, explaining what they do and how they are beneficial. One example described by the Dean of Health and Society is Malmö's approach to crime prevention research, looking at 'what's happening before, in younger years, in deprived areas'. Civic society is particularly important to Malmö and that kind of focus is a 'newer outlook', according to the Vice-Chancellor. Currently Malmö are looking at integrating knowledge triangle corners from the perspective of helping other stakeholders engage with societal issues, trying to aim at specific challenges. This is a way to concentrate Malmö's efforts in more targeted ways as well as integrating Knowledge Triangle elements.

Malmö continues to integrate knowledge triangle corners predominantly through its overall value-based approach to innovation and inclusivity. For example by developing its own merit system for

employment, taking into account experience with innovation and collaborative processes. The university has a model for distribution of faculty research funding based on an average from the last 3 years' external funding that doesn't discriminate between different sources – EU, regional or corporate – which becomes an incentive for making contacts with outside partners. These inherent structural factors all steer staff towards a more collaborative mindset. Another example is trainee teachers working in the local community who are being used as 'change agents' by creating 'innovation hubs' for education; these links can go on to produce research opportunities.

Senior management would also like to create a common space for faculty, staff and students, where these groups can 'get out of their daily life and work' and where external partners can more easily come in. Malmö has also developed value-based leadership at the Anna Lindh Academy[12] and now has a second program looking at this subject for leadership professionals in large public and private organisations. The Vice-Chancellor says that Malmö will have two sessions at the annual week of cross-party political talks and meetings at Almedalen in 2016 and one of their topics will be funding for research to solve societal challenges, highlighting the need to improve funding in this area.

Informal drivers

As a 'högskola', or university college, Malmö is more heavily focussed on teaching, particularly professional education, and is also a very recently established university, putting emphasis on more practical, socially contextualised benefits. About one third of doctoral candidates are employed outside of academia at Malmö, most often working on their doctorate at 50% time. This brings in a lot of outside influence, says Malmö's Research Coordinator, giving the university a clear 'imprint' outside in the world beyond its doors and providing opportunities for gaining commissioned research. Such staff naturally go in and out of the roles of teaching and research and both provide external contacts that direct the relevance of research.

A core aim at Malmö is to extend research into society and bring society into research. The principles of embedding knowledge flow between actors is 'not really top-down' and is 'built-in' to the core activities of education and research. Often Malmö work with the NGO sector and these kinds of cooperations are embedded, becoming the 'regular way of thinking and acting'. Collaborative efforts are a serious added dimension to teaching and research and experience with collaborative activities now seen as an important consideration in the recruitment process.

Observed tensions

The very many collaborative activities taking place at Malmö could also be used to strengthen the university's research base which is currently rather weak. Senior management feel that they need better facilities for collaboration and innovation projects and that more than just economic goals should guide the steering mechanism of research funding. Hence, Malmö straddles between positions: wanting to expand its research basis (which would necessitate an adherence to the current model of funding competition) but also securing a protected and growing space for interactive activities, which would cater to a broader constituency of interests. Social innovation has, Malmo's leadership argues, different needs from other forms of innovation and specific tools, goals, financing and structures are required to serve this purpose. Both the Vice-Chancellor and Pro-Vice-Chancellor feel that there are structural problems in Sweden as regards funding for higher education, particularly in terms of facilitating engagement with society. In their view all sides must come together to solve societal problems, therefore currently there is not enough incentivisation as funding is lacking, says the Vice-Chancellor, who feels that money is still benefitting traditional universities for structural and political reasons. The Vice-Chancellor, who was previously Pro-Vice-Chancellor at medical university Karolinska Institutet, points to the large amount of financing that goes into life sciences as an example of bias when contrasted against the lack of funding for areas like health and social equality.

Within the knowledge triangle model the three corners are in equal balance, however in Sweden there is a large difference between universities in the weighting of these elements as it depends how innovation

[12] 'Anna Lindh Academy has been formed with the aim to contribute to a new generation of value-driven leader who promotes human rights and democracy both in Sweden and internationally.' (http://annalindhacademy.se/om-anna-lindh-academy)

is incorporated, according to Malmö's Research Coordinator. There is no link to volume of education when research funding is allocated, therefore being able to mix grants for research and education would help alleviate the imbalance in somewhere like Malmö. Malmö leadership also sees an integration of the funding of education and research as necessary to better align the different tasks of higher education institutions. In the opinion of Malmö's Research Coordinator there is also an overall issue of allocating funds via funding bodies, requiring not only staff time to be spent on grant applications but also creating requirements for co-funding that is then drawn from blue-sky projects. At Malmö roughly 80% of revenue is from education, 20% from research, so there is a great imbalance and limited resources to build a good doctoral education that might go on to improve their research base. The Pro-Vice-Chancellor sees that collaborative projects at Malmö can be utilised to boost research, however she feels it is hard to communicate this unique natural embeddedness of Knowledge Triangle principles as a positive competitive feature of Malmö University that can attract further external investment.

Summary of the findings

As a relatively new university, founded in 1998 as a 'högskola' that gave the institution limited access to research funding and expansion of postdoctoral education, Malmö has predominantly been oriented around education and vocational training, and its profile is highly education-driven. As a result, they have been pushed to find innovative ways of seeking external funding and expanding their research base, primarily through collaboration with the local community, either via industry, NGO and state sector partnerships. Malmö sees societal engagement as a core value that forms an identity of serving society, differentiating it from older and more prestigious traditional universities. Given the lack of available funding for research, staff and students are still drawn to Malmö precisely for its community-driven approach to university activities. Malmö is a national hub for social innovation and prizes its engagement with civic society, encouraging staff and students to be inclusive and look outward beyond the university in their work. As such, collaboration and integrating education with research and innovation is almost part of Malmö's DNA, making specific 'models' such as the knowledge triangle obsolete in everyday parlance for staff. However their innovative approach to doing less with more by using collaboration to maximise investment in research highlights not only good examples of knowledge triangle principles in practice, but also shows the tensions between existing structures for research funding in Sweden and the principles of integrating education, research and innovation. Malmö is also an example of where creative approaches to integrating the knowledge triangle corners through societal engagement can be underfunded due to a preoccupation by funding bodies with industry collaboration over civic engagement, or when, as in the case of research council funding, societal impact is disregarded altogether.

General observations and implications

Historically, the articulation between education, research and societal engagement has been one of the key characteristics of Swedish universities, more so than in other European countries: universities took on a broad range of tasks already from the mid 19th century (engaging with primary schools, municipalities, the health care system, cultural institutions, etc.). The expansion of Swedish industry and the Swedish public sector in the 20th century was accompanied by the inception of new academic research programmes, curricula reforms, and an intense and often personalized interchange between different societal spheres – all resonating with the corporatist trait of Swedish society (Rothstein 1992). Political rifts of the 1960s, and the growing complexity of the Swedish state (with intertwined tendencies in industry, and in organizational life in general), together meant that the often highly informal linkages between universities and surrounding society were replaced by a more formalized (and compartmentalized) system of orchestrating education, research and collaboration. As an outcome of this upheaval, collaboration emerged as a separate, rather than integral, part of education and research, while education and research were increasingly funded and regulated according to their own specific logics. Recently, mounting attempts have been made to realign the three, under different banners: the specification of the "third task" in the 1997 research bill was the first in recent history, followed by recurrent assertions of the virtues of task interplay. Sweden notably acted as the vanguard of the knowledge triangle during its EU Presidency in 2009, and the metaphor of a triangular interplay has been subjected to a variety of initiatives since. However, and this is our first general observation, the

articulation between the three tasks has continued to be difficult to attain at the policy level: organizing higher education is largely a matter of containing costs and controlling measures of quality assessment (procedural focus), while research activities are funded and regulated in light of their contributions to the knowledge frontiers in the respective areas (legitimation focus); collaboration in its turn has largely followed the path of the teacher's exemption and emphasised tangible outcomes such as patenting and spin-offs (commercialization focus). What was once joined together has thus been torn asunder, and there is a striking lack of a coherent policy discourse for a conjoined idea of education, research and collaboration – they have different stakeholders, different organizational facets, and policy logics, and changes in their interplay is bound to cause imbalance. This notwithstanding, we find a variety of experiments underway to move out from the compartmentalization iron cage, and there is a clear political ambition to foster aligned patterns, at all levels: in funding streams, career paths, in networking, and in academic work.

In practice, the various initiatives to create directionality to education, research and collaboration have been met with a bewildering variety of practices and ways of interpreting and acting upon notions such as a "knowledge triangle". This means, for instance, that alignment between tasks is highly personalized. We find – even within the same universities – quite distinct understandings of how the three tasks resonate and how alignment might function, and what goals it might serve. Two typical patterns stand out, though: first, that the knowledge triangle may serve as a way to elevate education by setting it on par with research, and that collaboration in turn would function as a vehicle for educational reform; second, that research is better aligned with commercialization and other measures of valorisation. Examples of task integration are scattered and there seems to be a lack of an "integrative culture" in the universities under study. Instead, "heroic efforts" form the basis of successful examples rather than systematic models, reward systems or strategies. This leads us to our other observations.

Practices vary because of policy discord but also due to weak or disjointed incentives. Financial gains and organizational prestige have largely been elicited from research, and the incentives here clearly do not favour pedantic interaction with education or collaboration; instead, concentration is rewarded – on publications, fund raising (in a self-reinforcing way, as funding from other sources is often the precondition for new contracts) and on scientific networking. Educational engagement, or for that matter collaborative networking, have therefore depended on committed individuals rather than on systematic incentivizing.

This pattern is a product of weak incentives also on the organizational level, where even seemingly robust examples of task integration – such as those evidenced in the case of Malmö – face constraints, in relatively weak research funding, in narrow conceptions of impact, and in pedantic regulations of educational profiles. The more research-intensive cases of Chalmers face reverse constraints; the heavy emphasis on research here has decoupled education from research, as many of the strongholds in research have only limited connection to education below the PhD training level. The areas of advance (Chalmers) or the their equivalents in Lund have evolved into quasi-research institutes, with streamlined procedures for hiring research-oriented staff and for aggressive fund raising – often strongly encouraged to do so by their host universities. While Chalmers and Lund are mainly challenged by internal tensions, Malmö struggles with the lack of compatibility between its model of doing research and teaching - deeply embedded in societal context - and the steering mechanisms of the national system, which puts a premium on scientific impact and impact defined as valorization.

A final observation concerns the governance of universities. Even though we earlier stressed the historical tradition of role and task alignment in Sweden, this was clearly not the outcome of poignant leadership. It was rather the offspring of a specific form of network- and trust-based relations between the top echelons of Swedish society. When this form of governance was obsolesced around 1970, it was replaced by a combination of bureaucratic steering and various measures of representative decision-making. While this model had the advantage of being legitimate in the eyes of the state, students and non-professorial staff, it fostered an unstable blend of rule-based steering and strong devolution of responsibilities. Appointed leadership has since had an unclear mandate, while collegial mechanisms are rather diffuse, making it difficult to pinpoint the locus of organizational responsibility. On the other hand, universities in recent times have elevated the value of role integration, and there is no lack of verbal commitments to the knowledge triangle and other symbols of task alignment. However, this highlights – paradoxically – the projectification and compartmentalization of the knowledge triangle, as it risks becoming yet another layer of steering (or be equaled with collaboration) rather than – as the

concept indicates – imminent to all activities of universities and other higher education institutions. Further efforts will therefore be required to embed task integration in funding streams, recruitment, leadership, reward, and mobility.

While Sweden in many respects pioneered an integrated practice – if not always in strategy or policy – of task integration, the strong forces of de-articulation have made their mark on Swedish universities: on a policy level where different political constituents and policy networks are formed around the different tasks, on a strategic (organizational) level where university leadership models struggle to identify the means and ends of its different tasks and activities, and in daily practice where the integration of different activities risks flying in the face of rewards, expectation and incentives.

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