

Research Quality and the Role of the University Leadership

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Preface

The Association of Swedish Higher Education (SUHF) Experts' Committee on Quality has research quality as one of its focus areas. The mission is to collect and discuss experiences and knowledge on how it may be possible to support and improve research quality in universities, to facilitate the exchange of ideas and to disseminate knowledge through written reports, seminars and other activities. Universities should in this text be understood as any higher education institution (HEI) carrying out research activities.

Research quality is a truly complex issue. We do not claim to have fully investigated the topic. We have however held a number of interviews with leading experts and gone through a substantial amount of literature. It is obvious to us that this is a topical field of major importance, and a field that is given attention on the agendas of many universities. Thus, the report is timely and can hopefully provide input for the ongoing debate and discussion on how to build and maintain research quality. To that end, the report is a starting point for discussion rather than a conclusive handbook.

We would like to express our gratitude to the many experts, researchers and colleagues who have devoted their valuable time to meeting with us, reading report drafts, giving their comments and participating in seminars.

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1. Background and mission

The academic peer-review system is an essential key to a continuous and international research quality control and evaluation system used for a multitude of purposes such as recruitment, publication and funding. It is a fundamental academic system for self-regulation and quality assurance that is accepted and used worldwide. However, a more strategic interest in research quality has been noted in recent decades as universities have been required to make priorities in terms of research activities, expected to invest in research profiles or centres of excellence, and exposed to performance-based funding streams.

One way to reach better decisions, where research quality is a variable, is to evaluate research output and compare performance by measuring and analysing publication and citation data. Bibliometric analysis has become an indispensable tool for governments, funding agencies and universities when deciding on the allocation of grants. Basically, this is a past performance approach where past success is rewarded.

However, besides evaluating past performance, it is also relevant to discuss how to improve preconditions for research and how to create and support successful research teams and environments. This includes an attempt to understand underlying factors, or clusters of factors, that may explain why successful and high quality research develops in some environments and not in others. An obvious question is how university management at all levels can contribute to the creation of high quality research and what approaches may be available for consideration.

Universities, as well as funding agencies, commonly work with both approaches, i.e. keeping track of past performance while designing and implementing various research support initiatives. In terms of funding, a number of initiatives by national or international agencies aim to create long-term funding for major research programmes or centres of excellence, thus promoting efforts to build research quality (*cf.* the so-called strategic programmes funded directly by the Swedish Government). Specific scholarships for young and talented researchers, long-term individual funding or similar schemes by individual universities or funding agencies are all examples of how to direct funding to persons or groups where future potential is believed to exist.

Panel evaluations as a university-wide evaluation activity is another initiative where past performance data is combined with an evaluation of research environment and future potential. Panel evaluations can also be supplemented with advice on what to do, essential conditions or accomplishments that need to be met. Information is normally given in a format where comparisons can be carried out between different scientific areas, and can thus be used to guide decisions on priorities or funding.

Focusing on past performance or future potential is not an easy balance, but this is a situation that is well recognized by contemporary university management. It is, for obvious reasons, not easy to design and implement perfect bibliometric instruments, nor is it apparent which research support actions would be most beneficial for future research quality.

On a more profound level, the changing expectations placed on universities and university management may reflect a change in the role of universities. Universities have changed from being heavily regulated institutions with a major focus on collegial decision-making a few decades ago to become interactive high performing institutions that are expected to be active partners in social development and growth.

They are increasingly accountable for resources spent as well as successful fund raising, with an increased focus on deliverables as measured by bibliometrics being an example of this. Autonomy policies alongside more complex funding as well as evaluation systems and a continuous growth in funding from non-governmental partners have also created a need for more deliberate and responsible management within universities. A number of new challenges have thus surfaced. Responsibility for the university's research quality is one such challenge.

In this report, we thus focus on the creative and high quality research environment. The report sets out to provide some inspiration and "food for thought" on the issue of how to create and maintain creative and successful research environments within institutions for higher education. The report discusses challenges when assessing research quality and some of the major basic conditions that need to be considered in a university setting to create successful environments. A set of deliberate approaches, policies and tools that may be utilized by university management is also suggested. Our target reading group is university management – vice chancellors, deans, department chairs, etc. The ongoing debate on bibliometrics is also covered by another working group organized by the Association of Swedish Higher Education.

Topics and findings in the report are the result of a literature review combined with expert interviews. We have met with leading experts in the field in Sweden, representing policy research, researchers focusing on research quality from different perspectives and researchers with their own experience from having built successful research environments. A draft report has been discussed at seminars to which interviewees have been invited and with the overall SUHF quality working group. A number of experts and researchers have also been invited to submit comments and remarks.

We do not claim that this is a scientific report based on an exhaustive literature review and a fully developed research methodology and subsequent findings. However, we have covered the insights of several experts and major topics from the wealth of literature available, and we have also summarized and focused more on conclusive remarks rather than scientific reasoning and review. Somehow it seemed appropriate to make this "disclaimer" in the first section of a report where research quality is the main issue addressed. Of course, the synthesis of the information generated by the interviews and identified in the literature, as well as the conclusions drawn, is influenced by the authors' background and their preunderstanding. Our agenda has been to contribute to a deeper understanding of how high quality research is created in the university setting as basis for further discussion.

2. The context – the university as an organization

The core question of this report is the role of the academic leadership in shaping successful research environments in terms of delivering high quality research. What can, and should, be done by the leadership within the scope of the available opportunities after taking external restrictions and the academic freedom of individual researchers into account? Approaching this question requires some background on what characterizes the university as an organization and, specifically, university decision-making.

HEIs are, first of all, many different things as reflected in Magna Charta Universitatum (European University Association 1988). Universities provide higher education and research results but are also an inherent part of society, intertwined with trends and changes in politics, welfare and the economy. Thus, universities are part of contemporary society even though the idea of academia and universities are several centuries old. Besides teaching and research, expectations for innovation capacity, democratic value promotion or contribution to labour market politics may be legitimate expectations implemented in government policy on education and research.

Several different models may be applied for the government and organization of universities. On one hand, universities may be viewed as a republic of scholars as they were when first formed as occasional guilds with few or no obligations to outsiders. On the other hand, universities may be viewed as stakeholder organizations as they have become an increasingly integrated part of society and societal development (Bleiklie and Kogan 2007; Cole 2010).

An important feature of the republic of scholars is the professional self-regulation and faculty control over research and teaching, while an important component of the stakeholder organization is the presence of laymen within the university and a stronger focus on university deliverables than on internal procedures. Most present-day universities tend to be organized somewhere between these two extremes. The move towards the middle has been accompanied by national research assessments and strategic research funding schemes, the creation of internal management structures parallel to the academic system, external representation in governing bodies and a change from *primus inter pares* – a prominent group member who takes the lead over a group of colleagues – to chief executive officers (Bleiklie and Kogan 2007).

These two different knowledge regimes also represent different sets of demands that may come into conflict with each other. Tensions thus arise. Without further ado, we would like to present a set of tensions that may be part of a contemporary university setting.

Republic of scholars	Stakeholder organization
<i>Truly independent or “no-one cares”</i>	<i>Vibrant part of society or “others decide”</i>
<i>Academic excellent elite at the expense of weaker colleagues</i>	<i>Societal relevance with the help of both weak and strong research</i>
<i>Operational creativity which is swift but non-reliable</i>	<i>Modern bureaucracy as a combination of efficiency and annoyance</i>
<i>Risk-taking and track record to guide future</i>	<i>Innovation as requested by stakeholders</i>
<i>Programme responsibility at individual or group level</i>	<i>Strategy formation by larger groups or decision-making bodies</i>
<i>Flexible but random</i>	<i>Continuous but boring</i>

Box 1: Two knowledge regimes and some features of each (modified after Torsten Nybom)

The challenge is to strike the right balance between these two knowledge regimes, which may differ between institutions, or within the same institution, and change over time.

Contemplating the republic of scholars – the pros and cons of collegial decision-making, and the *primus inter pares* leader

Universities have strong traditions of collegial decision-making, although this is increasingly challenged by notions of executive and corporate efficiency and responsiveness. The principle of the leader as “*primus inter pares*” and collegial decision-making permeates the academic culture and is an important part of the overall running and steering of academic institutions. This leadership has been important for the development of the characteristics of universities, and has also allowed the university concept to survive through the centuries. The republic of scholars thus has a long history and has been able to survive for a long time.

On the positive side of collegial decision-making is the thorough discussion and academic direction of collegial decision-making procedures, whereby the long-term sustainability and development of science and scientific environments are a strong focus. This decision-making is carried out on behalf of colleagues. For this reason, it should include a continuous concern of the university, and decisions reached should be well grounded among colleagues. It is also a procedure where scientific rigour and peer review have an impact, ensuring that quality issues are a continuous concern. A collegial model is also in itself a quality mark as it builds on, and develops, an open discussion and dialogue from different perspectives. It should be open to new insights, surprises and challenges as part of the search for knowledge and sound judgments on university issues or academic content. The leadership that needs to be demonstrated in a collegial environment must build on these qualities and thus create a specific academic leadership requirement that is valid both for groups (such as faculty boards) and for

individuals (such as deans and department chairs). In other words, collegial decision-making is meant to be a way to ensure that the academic values, on which the idea of the university is built, are safeguarded and that decisions are fair, well-founded, and legitimate.

A commonly mentioned downside of collegial decision-making is, however, consensus paralysis. Hasty, unfounded decisions are avoided, but well-needed decisions may also be delayed or not made at all. There may also be a reluctance to tackle tough and negative decisions, which may affect individual researchers directly. Problems may be left unresolved, since collegial decision-making tends to favour the *status quo* at the expense of change, problem-solving decisions, risk-taking and future visions. It may also be hard to develop a clear strategic plan and then implement it, as this may include a capacity to reach decisions based on priorities. In practice, however, universities do change but the events may often be the result of an organic process that is largely reactive in nature and triggered by external pressure or crises. Changes as a result of reflection and strategic proactivity are probably less common.

Primus inter pares leaders have the advantage of being listened to, since they are seen as credible and legitimate by the faculty (Goodall 2009). They also have a deep understanding of the core business of universities, informing their strategy and decision-making. They personify the quality standard of a university, and send a signal to the faculty and external bodies that the leader appreciates scholarly values.

Managerial tasks often have limited appeal to researchers, except for the role of research leader. It is sometimes said that academic leadership is enjoyable when it works, but there is nothing closer to hell when it doesn't. It has been compared to the no-win situation of herding cats. Most academics and researchers will – like cats – seek to exercise as much independence as possible. Basically, there is a strong resistance against authority among academics, given that research is questioning and ground-breaking by nature, and this spills over to the attitude towards their own leaders (Haikola 1999).

The system for appointing leaders that is used in many universities, with a strong component of elective and collegial processes, may also create a weaker platform in terms of executive powers. *Primus inter pares* leaders selected for their academic merits may be amateurish and lukewarm when it comes to administrative tasks, and when having to deal with staff issues, educational matters and the bigger picture – being primarily researchers at heart. At worst, they may have problems dealing with their loyalty towards their own discipline, and may be judgmental towards and undervalue other research areas. They may also be unwilling to pursue strategic decisions that go against close colleagues – the same colleagues that will be positioned on the same level, or higher, once their term of office ends. This dismal picture of the *primus inter pares* leader should in no way be seen as representative of the majority of academic leaders – many are more than well-suited to their challenging task – but it describes the risk inherent in this type of leadership of which we need to be aware.

Republic of scholars and stakeholder organization – conflicting or complementary models?

The other side of Box 1, outlining the stakeholder model, suggests that governance of universities could be executed alongside the demands of external as well as internal stakeholders. Each stakeholder may have legitimate claims, and universities need to attend to these and ensure that they deliver the expected outcome. It is important to understand that the stakeholder model has become more natural, since the university sector has moved from consisting of a handful of elite institutions closely linked to state interests in the early 20th century to become a democratic mass movement involving a high

percentage of the population and major organizations today. Universities are a much more visible and important institution, involving more people and spending more resources than ever before.

One consequence of this is that universities become of interest to more stakeholders with profound and well-articulated claims that are legitimate and influential. Political bodies, industry, funding agencies and public organizations all have their own requirements. Some are well organized and their interest is made known in many different ways. It is obvious that external stakeholders are a part of the university landscape and need to be addressed when discussing research quality and research approaches, both on the level of researchers as well as by university leadership and the university sector. A balance between different stakeholders is needed and a more fundamental problem arises if the university sector does not defend its own academic values when trying to define the balance between different stakeholders. We will return to this issue in the final section of the report.

3. What constitutes high quality research – and how is it measured?

Research serves many purposes and goals, and an elaborated definition of high quality research is not within the scope of this report. Here, we rely on the implicit, lived definition used by the academic community, i.e. high quality research is research that stands the test of being scrutinized by highly recognized peers within the field, has a substantial impact on the development of the research field, and finally, provides a useful contribution to society in the short or long term, either directly or indirectly. A complication is that some research may be regarded as having low quality at the time, but eventually lead to something valuable and of considerable interest, and vice versa.

The same quality criteria are applicable to the more recently developed field of research in close relation to the performing arts. Consequently, the leaders of the artistic research movement have lifted documentation, peer review and international dissemination of artistic research results to the top of their agenda.

When summarizing research on what characterizes successful research environments later on in this report, “high quality research” is defined as creative, ground-breaking research, often as a result of small, step-wise advances that result in a new way of thinking about a problem (Hollingsworth 2008). The major challenge is how to measure research quality in a reliable way.

The interviewees put forward that no assessment method gives the whole picture, which leaves a significant risk that alignment to the preferred system of measurement will yield biased results. The measurement generates indicators, which can prove to be poor representations of whether the research is reasonable or even its quality and impact. The timescale used is another factor that may create a bias. A short time frame may overlook long-term achievements and overemphasize short-term performance. Even though assessment methods are important for the strategic process, these disclaimers should form a general background to assessment activities and their results. An unbalanced strive towards measurable productivity may also stifle creativity in that it promotes risk aversion and favours uniformity, and keeping old boundaries.

Peer review – the prevailing assessment model

Peer review has widespread, deep and strong support in the research community (Sense about Science 2009). The interviewees underscored the importance of collegial acceptance for an assessment system to be sustainable. Peer review is a versatile method, especially since it is hard to stipulate detailed goals and purposes for research activities. It is flexible and allows questions that are very hard to quantify but that are nevertheless important. The personal judgment of the reviewer can process very complex issues, i.e. they can handle multifaceted qualitative information, the richness of which tends to get lost in fully systematized quantitative measurements. It also allows external colleagues to inspire the research activities with new ideas and constructive feedback, and may be used to identify future potential in a way that bibliometric data cannot.

Weaknesses in collegial peer assessment

It is clear that collegial assessment also has limitations. It is sometimes compared to democracy which, quoting Churchill, is the worst form of government except all the others. Some interviewees mentioned that peer review tends to foster self-defining, protectionist tendencies, as a large number of peers may

subscribe to a common view, which may or may not favour the research quality overall. This may lead to a limited openness to new and creative approaches and favour mainstream ideas. The often more senior standing of the reviewers may lead to conservative results and prejudice, and be less favourable for younger and female researchers. Nepotism also influences decisions. Researchers with a reviewer affiliation tend to be favoured when their application for funding is reviewed (Sandström and Hällsten 2008; Wennerås and Wold 1997).

In her book *How Professors Think: Inside the Curious World of Academic Judgment* Lamont explores the processes that take place in review panels (Lamont 2009). She found that panellists often deviate from the ideal.

They aim for fairness, but the taken-for-granted aspects of social life – the cognitive structures they use routinely, the multiple networks of which they are a part – may lead them to assume that what appeals to them is simply best.

She found that panellists tend to form alliances with like-minded panel members and that they sometimes engage in “horse trading”, e.g. they may accept one grant, that they find mediocre, to win support for another. Timing is also an issue. As discussions often take place proposal by proposal, views might alter as discussions move on, but previously discussed proposals may not always be reassessed in light of emerged insights. Many reviewers also tend to have a preference for work that is similar to their own or that reflects personal interests, including interests that are unrelated to their academic expertise. Reviewers also tend to link their opinions on applicants’ characters to their proposal.

Also, some panellists are eager to reward scholars who demonstrate specific moral traits. These traits, which are considered separately from the content of their bearers’ proposals, appear to be tied directly to the evaluators’ idealized view of what makes academic life a worthy pursuit – the determination, humility and authenticity that reveal a real depth of commitment to one’s vocation.

In spite of these flaws, Lamont concludes that cynicism should be avoided, since it might lead to more arbitrariness and less care being put into the peer-review process. She stresses that thoughtful discussion among panellists can adjust for personal biases and lead to better decisions. This is why meeting each other is important, and cannot be replaced by ranking proposals at a distance. Her most important recommendation is to ask more questions of oneself when reviewing: “When I think that a proposal is exciting, how does it relate to my own agenda?”

According to some interviewees, peer review also has limitations in terms of assessing thematically diverse topics. Certain parts of the issue may be hard to assess or only a part of the assessment group, or none, may have the required expertise for the issue at hand. A small degree of uncertainty in a detail or section may mislead the decision as a whole. This problem has grown with the increase in cross-disciplinary funding schemas.

The interviewees also referred to peer review as being an expensive and burdensome method, as it calls for detail, interest and time spent by professionals. The increased burden of more publication-related review and other types of assessment may seriously endanger the overall quality of peer-review processes.

Although there are problems with peer review causing delay, not always being able to detect fraud and malpractice, being biased, leading to conservatism, disadvantaging interdisciplinary research and

imposing burden on reviewers, there do not seem to be any other practicable alternatives (Research Information Network 2011). And, even though problems are present, peer review is still delivering reliable results in many circumstances. It may thus be the practice of peer-review processes that are problematic – not the peer-review principle per se.

Bibliometric studies

Bibliometric studies, as a statistical compilation of historic peer-review events, are having an impact in academic planning (Heinze et al. 2009; Münch 2008). Bibliometrics is a powerful method of aggregating peer-review results for a larger academic unit or a specific research area. It is also a cheaper method than regular direct peer-review studies, which makes it easier to carry out and repeat. The limitation is, however, that it captures past performance only. The technique also favours natural sciences and medicine, while social sciences are under-represented and humanities often ignored, as is artistic research. Different publication and citation cultures also bias the results, and research presented in languages other than English is marginalized.

Field normalization is increasingly used to compensate for this (Rauhvargers 2011), and there have been recent attempts to design bibliometric approaches that are better suited for social sciences and humanities (see e.g. the national model used in Norway).

Documentation traditions are also discussed and changed within different disciplines. The publication of research in journal articles is becoming increasingly common in the social sciences and the humanities, and the documentation principles adjusted to artistic research are being developed. One example is the launch of the electronic, open access Journal of Artistic Research (JAR), which is adjusted to artists' modes of presentation, instead of having the traditional journal article format.

4. Factors associated with high quality research

The characteristics of successful research environments differ across universities and different scientific disciplines, and generic solutions are few or absent. Nevertheless, the emergence of successful research environments is not completely at random. When the path to success is analysed in depth in empirical studies, some common denominators surface as crucial in achieving success as defined by traditional criteria. These criteria include high quality publications, external funding, major scientific breakthroughs and peer reputation.

Below, factors of importance in generating high quality research are brought together from the interviews and from empirical research – primarily Bennich Björkman’s research on characteristics of innovative university departments within the social sciences (Bennich-Björkman 1997), and the research by Hollingsworth and Heinze focusing on factors associated with major discoveries in nanotechnology and human genetics (Heinze et al. 2009) and basic biomedical science (Hollingsworth 2008), respectively. The potential literature that can inform this topic is large, including contributions from areas such as organization, management, economics, psychology, history and sociology. We chose to build on a narrow but informative set of empirical studies as an introduction to the area. Another potential limitation is the fact that Bennich-Björkman’s study is more than ten years old. We find it unlikely, however, that what characterizes fruitful departments in the social sciences has changed dramatically in that time. Given the trend towards larger departments, however, many departments at that time may share more features with today’s research groups than today’s departments.

As will be seen below, some enabling factors and barriers are decided by the institutional environment, i.e. governments, research councils and foundations. Others are in the hands of the institutions themselves, in part or in whole.

Inside the university – factors of importance in shaping high quality research

According to several interviewees, research is generally a bottom-up generated process and too much top-down steering may be counterproductive. Organically grown research groups may be cramped by being forced into a formal structure. A general notion among the interviewees is that research leaders or teams need to be free to define their research agenda within their area of expertise, and also to communicate with research colleagues and have access to funds as well as staffing tools.

Focus

Having a purpose that is recognized by all members of the group seems to be crucial. In science, highly creative research teams tend to evolve in a context where there are broadly defined problems, based on which carefully recruited individuals are free to define focused research questions (Heinze et al. 2009). In social sciences, successful groups tend to have a well-defined research focus, and a strong sense of intellectual community. Less successful groups feature a multitude of research directions, and individualism is the prevailing norm (Bennich-Björkman 1997). Individualism is not eradicated in the innovative groups, but is disciplined and ensures that group members’ work is interrelated, making collaboration meaningful.

Leadership

Group leaders play an important role in fostering a creative environment. Both in science and in social sciences, a devoted and well-recognized research leader that plays an active role in daily research activities (Bennich-Björkman 1997; Heinze et al. 2009) is part of the road to success. Scientific leaders in successful groups/departments tend to have a clear vision (Hollingsworth 2008) – and this is true for both science and social sciences. They carefully recruit new members that complement the group; they build bridges to other knowledge domains, and support junior researchers.

Group composition and climate

Complementary knowledge and skills, strong social glue between members in the team/department and an atmosphere of mutual curiosity and interest are also critical, both in science and in the social sciences (Bennich-Björkman 1997; Heinze et al. 2009). Interaction and collaboration facilitates the development of trust between group members, which in turn encourages risk-taking and creativity. Daily attendance and social interaction are more common in innovative departments (Bennich-Björkman 1997). Except for people getting to know each other, which facilitate collaboration, many social activities evolve into research discussions. A professional atmosphere with seminars, research discussions and interaction around professional issues are also inherent features of successful groups (Sundqvist 2010). In the less successful environments, people prefer not talking about their research – it is part of the private domain. Bennich concludes that social life might be even more important in social sciences than in natural sciences, due to the informal interaction in the laboratory in the latter.

Spending time in other groups and having visiting researchers also contribute to creativity, as does job mobility (Heinze et al. 2009). Groups that produce high quality research tend to have a flow of people in and out of the group. They recruit from the outside, bring in visiting researchers and encourage the PhDs that they have produced themselves to move on to other research groups. Environments that keep their own intellectual offspring risk inertia due to homogenization (Hollingsworth 2008). At the same time, one of the interviewees underscored the fact that turnover cannot be too high, since this may impact negatively on the social climate.

Group size

According to empirical research, high quality research often takes place in small groups. In science, highly creative research teams tend to consist of 6-8 researchers, including senior and junior researchers as well as PhD students. Small group size favours several of the qualities mentioned earlier on. It allows for the group leader to be actively involved in research and stimulate scientific exchange within the group. Small groups also tend to be less hierarchical, thereby unleashing the creative potential of all individuals, and allowing for productive mentorships between juniors and seniors (Heinze et al. 2009). Some interviewees also point to the importance of the group size. A relatively small group lends itself to intellectual exchange between all members of the group, and is flexible. New paths can be taken on quite easily.

Smaller groups tend to grow as their creative accomplishments are rewarded. This growth may be necessary to realize the potential of the creative accomplishment, but it reduces the potential for creativity, since the hierarchical structure increases (Heinze et al. 2009), institutionalized routines are developed (Hollingsworth 2008), and direct leader involvement in research decreases. Eventually the original members of the group disperse, and if no new leader with a radically new agenda turns up, the department/group may become inert. This means that it is difficult for any research department to

remain at the cutting edge for more than two or three decades unless they have multiple excellent groups.

At the same time, some interviewees raised the major drawbacks of small groups such as poor sustainability. Research units depending on one or two seniors are vulnerable. According to one interviewee, it is a basic instinct among research groups to disapprove of merging. Still, not creating larger units may lead to the complete erosion of the research area in the long term. When correlating British Research Assessment Exercise outcomes to group size, medium-sized groups seem to be most effective (Kenna and Berche 2010). They are small enough to allow for intra-group interactions without breaking into sub-groups, while still being large enough to be viable. It should also be noted that the optimal size of research groups varies across disciplines, and some environments are unavoidably small by nature, e.g. languages and artistic research. In those cases, cross-disciplinary research and international outreach become crucial in achieving the necessary intellectual input.

Alternative organizational models for research groups

Given the existence of well-formulated and well-founded research ideas, research can be organized in several ways (Benner 2004). On one side is the “virtual” research group that has been established in an organic way. Virtual groups are characterized by having a direction, but no explicit research programme. The flow of people in and out of the group is smooth and continuous. The interaction within the group is non-prestigious and the leader focuses on creating a social context, rather than directing thoughts and ideas.

In other cases, a comprehensive research programme and defined research goals, a clear division of labour and a predefined timeline builds a successful research environment. Instead of the smooth flow of people, there is a carefully considered “hiring and firing” policy; instead of allowing a free search on general topics, there is a set of issues that are addressed according to plan or research areas in which different team members are expected to contribute. Such research groups will create a formal structure themselves if there is none there to support them.

A compromise between these two extremes would consist of a research team that is vaguely connected by, for example, being at the same department during the same period of time with the same set of senior professors as role models and providers of funds and networks. A continuous dialogue among the team members, incoming and outgoing scholars, and a flow of publications, PhD students and projects makes up what will be recognized as a successful department or team.

Each model for success is built on a deep and genuine interest in research and a belief that contributions can be made. A collegial dialogue, a core research interest or research focus, curiosity and funds are some of the issues most commonly associated with successful environments. A lack of one or more of these issues would consequently constitute a less successful or failing environment.

Time factors also need to be considered. Funding streams and funding agencies change from time to time and may prefer, or require, a specific research team set-up. Thus, different models may be more efficient in terms of funding depending on the preferences of funding agencies and private and public funding programmes.

The department/research group and the higher education institution

The wider context is also important, especially in science. Successful teams are often autonomous to a large degree, but embedded in larger organizational structures that provide a rich technical and intellectual infrastructure, including the possibility for frequent interaction with other groups with complementary knowledge and skills. Organizational arrangements, e.g. being under the same roof and having shared spaces where spontaneous interaction can take place, are means of stimulating this (Heinze et al. 2009).

The relationship between academic leadership and research success

Successful institutions hosting several environments where major discoveries have taken place present a typical style of leadership with regard to strategy, funding, environment and recruitment (see Box 2) (Hollingsworth 2004). These leaders tend to know the culture of their organization well, and can articulate it, and have themselves been active researchers, often in new fields of science. They know how to combine sensitivity to tradition and risk-taking and they are capable of both handling short-term issues and moving the organization into new areas.

Leaders who have:

- 1) a strategic vision for integrating diverse areas and for providing focused research,
- 2) an ability for facilitating obtaining funding,
- 3) a capacity to facilitate the provision of rigorous criticism of science but within a nurturing environment, and
- 4) an ability to recruit sufficiently diverse personnel so that research groups are constantly aware of significant problems

Box 2. Characteristics of academic leadership that are conducive to major discoveries as summarized by Hollingsworth (Hollingsworth 2004).

The importance of the leader being *primus inter pares* is supported by indications from other research. On average, the research quality of a university, as measured by the outcome of Research Assessment Exercises, improves some years after it appoints a president who is an accomplished scholar (Goodall 2009).

Goodall has listed suggestions directed to vice-chancellors, pro-vice-chancellors and registrars based on studies of leadership and productivity in universities (Goodall 2010). The suggestions point at the importance of steering by incentives, recruiting the best leaders and staff, controlling quality through hiring panels and noticing the work of talents in the organization. One should also be able to make unpopular decisions, pursue strategic change without flip-flopping and minimize bureaucracy. It is important to be accessible, to clarify the interdependency between administrators and staff, and to provide management training to young scholars. Finally, a head should strategically select council members and educate them, attend to the wellbeing of staff and the existence of meeting points throughout the university, e.g. pleasant lunch restaurants.

The challenge residing in large institutions

Research organizations that grow tend to become bureaucratic, and divided into an increasing number of scientific disciplines with sharp boundaries (Hollingsworth 2008). Institutions with over-institutionalized routines tend to constrain creativity in their sub-units. An increasing number of sub-units also mean that cross-disciplinary communication between researchers decreases.

Delegating recruitment and responsibility for extramural funding exclusively to these sub-units constrains the making of major discoveries. So too do hierarchical organizations with centralized

decision-making about 1) research programmes, 2) number of personnel, 3) work conditions and 4) budgetary control.

Hyperdiversity may also stifle ground-breaking research, since it renders effective communication across different actors more difficult. Thus, diversity is needed for pioneering research, but too much diversity is detrimental to it.

The department/research and the wider scientific community

Communication with groups in *external* organizations with complementary knowledge and skills is also important to creativity. Often, most of the in-depth communication on specific research matters occurs with similar groups outside the institution, while the interaction within the institution relates to skills and knowledge that the group does not possess itself. Competitive pressure in the wider scientific community seems to be of less importance to scientific accomplishment (Heinze et al. 2009).

The institutional environment – societal control over universities

A relatively weak environment surrounding the higher education institution, i.e. limited external steering, has been found to possess greater potential for scientific breakthroughs (Hollingsworth 2008). Weak institutional environments have a modest influence on the appointment of scientific personnel, the existence of a particular scientific discipline within the organization, level of funding, level of training for scientific appointments and norms of scientific entrepreneurship. Thus, weak environments allow for autonomy, flexibility and variation within the structure. A weak environment can host different types of institutions that vary in forms and ideas, and this variety tends to be favourable for scientific breakthroughs. Although it is getting stronger, American universities tend to have this relatively weak institutional environment while, for example, German and French universities are embedded in a stronger institutional environment.

Funding agencies

Empirical studies of successful research environments confirm the importance of long-term funding based on trust that scientists will do their work as well as they can (Heinze et al. 2009). The main reason is that it provides flexibility and creativity. Flexible funding lets the researcher swiftly shift to a more fruitful research direction, which is especially important in high risk research (Hollingsworth 2008).

Several interviewees criticized the heavy emphasis on funding through grants, and underscored the need for long-term stability to generate high quality research. The current situation in Sweden is the opposite of this. Having tenure is no longer a precondition for receiving external grants, meaning that external grants are used to finance the researchers themselves, leaving little resources for carrying out research. Even tenured researchers often have to finance their own income from external grants. This, on the other hand, may be seen as a more or less unavoidable consequence of a quickly growing university sector. The increase in the number of students is difficult to balance with corresponding growth in research funds to new or existing institutions.

Another drawback of the grant system, raised by several interviewees, is the burden that it puts on the researchers. To some degree this is constructive. Applying for grants forces the researcher to sharpen ideas and designs, and reviewing other researchers' applications provides a good picture of the state of the art within a specific research area. In an ideal situation, however, grant-related work should not be a main component of the everyday life of the researcher, which is now often the case. Many researchers

commit a substantial amount of time to applying for grants and reviewing other researchers' applications.

As central governments and funding agencies are involved in funding science, some of the HEI's autonomy and own strategic power are lost. Relying too much on external grants limits the researchers' ability to decide on the focus of their research, which may lead to a risk that research becomes opportunistic and conservative, driven by where the money is to be found (Hollingsworth 2008). The current situation, whereby government research funds are increasingly tied up by co-financing agreements with external funding agencies, further emphasizes this. There is a need to be strategic in terms of research funding and to carefully assess the research group agenda against available funding.

Funding agency behaviour is sometimes a barrier to creative research (Heinze et al. 2009). Agencies sometimes have a conservative influence on research by not being updated on the cutting edge of the research field. Moreover, since funds are allocated based on the researcher's track record, younger researchers with new ideas may not come through. Agencies often want reassurance such as details of likely results, which is difficult to provide if research is explorative (Heinze et al. 2009), and they often prefer research with short-term societal benefits than high-risk research (Hollingsworth 2008). The demands on accountability increase and put a heavy administrative burden on the scientists (Heinze et al. 2009).

Commercialization of science

The strengthening of the institutional environment in the American system of science has increased the activities aimed at the commercialization of science (Hollingsworth 2008). This increased focus on (direct) commercialization in the American university system may contribute to technological innovations and economic growth in the short term. The outcome of this development is however still debated. For example, only a limited number of universities seem to have been able to turn their intellectual property (IP) rights into economic revenue. And at the research group level, demand for IP has sometimes been found to lead to conflicting goals between IP and publications. Recent studies have however also shown that research groups with close industrial links also tend to have a positive publication record.

Furthermore, not all research fields are suitable for commercialization. A general policy of increased pressure to commercialize may be counter-productive and disfavour the creation of knowledge for the common good. A research field can contribute to economic value creation in society, while being unfit to enter into direct commercialization. It may not provide *direct* economic value creation, but is nevertheless highly embedded within society. At the same time, the 'packaging' of knowledge through the format of IP may create access to an otherwise distributed and complex body of knowledge, which may be beneficial not only to the private sector.

A common view is that long-term economic growth depends on advances in fundamental or basic knowledge and high-risk research – and that there is no way of knowing in advance which contributions in science will make an important contribution to society. The conclusion is that autonomous research is important in order to achieve future societal and economic goals. While this view is probably true in a general sense, it may also underestimate the role of the multitude of ties that, for historical reasons, exist between basic research and various contexts. Several important science fields were established to address specific problems, and have developed close ties with the industrial or societal context in which

they evolved. Thus, 'basic research' also has ties to non-academic objectives (Rosenberg and Nelson 1994), and relates to societal expectations of future applications.

On a more profound level, the discussion on HEIs' research contributions to industrial growth and competitiveness is part of the discourse considering which stakeholder interest should govern university research. On a group level, industry links and commercialization may be a highly appropriate way to support research quality, and in such cases it may be promoted and supported. On an institutional level, however, it is a much more complicated issue where the HEIs' broad societal mission and the pluralism in the inner life of the institution may be less appropriate for all-embracing policies on commercialization.

Linking research and teaching

According to the interviewees, a close relationship between research and education may help to create sustainable institutional environments with a richer and more dynamic inner life. In her study of social science departments, Bennich-Björkman noticed that at all departments that were innovative with regard to research, academic staff were engaged in both teaching and research (Bennich-Björkman 1997). It seemed to be a key element in the "ideological identity" of these departments. In the unsuccessful departments, on the other hand, there was a split between sole-teaching and non-teaching academic staff. This created tensions in the department, since those who devoted their time to teaching felt inferior to the researchers.

The other studies cited here do not bring up the importance of linking teaching and research. One reason may be that it has not been found to be important to research quality; another reason might be that they have studied research organizations with limited teaching activities.

The symbiosis between research and teaching, which is often taken for granted, has also been challenged: "...the common belief that teaching and research were inextricably intertwined is an enduring myth. At best teaching and research are very loosely coupled." (Hattie and Marsh 1996).

Studies have shown that compulsory teacher training impacts positively on education quality, in the sense that this increases teachers' use of methods that have been proven to stimulate students' learning. There is, however, no evidence supporting the suggestion that learning improves if the teacher is an active researcher (Gibbs 2010). A research environment can only impact positively on educational activities and students if developing research-teaching links is made an explicit priority and arrangements are made for this. Having faculty routinely carrying out both research and teaching is simply not enough (Gibbs 2010).

Faculty members with a strong research orientation may have a tendency to put a weak emphasis on teaching (Gibbs 2010). As was the case in Bennich-Björkman's study, there are however examples of strong academic microcultures that conduct high quality research, while also taking teaching very seriously (Mårtensson et al. 2011). In these departments, teaching is valued as a collegial responsibility and a matter of personal mastery at the individual level. Departments that manage to serve both purposes equally well share several of the characteristics of successful research groups, as described earlier on. They tend to have a high degree of internal trust, they support new teachers, they have an active leadership, they are externally oriented and they have a shared sense of purpose.

5. Leadership – ways to stimulate high quality

When combining the evidence presented in the last chapter, an ideal type of research environment emerges. It is characterized by a small, focused, self-governing research group managed by a committed scientific leader that is involved in daily research activities. The social climate is good. Junior researchers are consciously supported, the culture is conducive to frequent interactions, and there is a mutual curiosity between researchers irrespective of position. Complementary competencies are sought for, resulting in a strategic flux of researchers in and out of the group and the establishment of external partnerships. The group is embedded in a larger organizational structure, providing a good infrastructure including technical resources and meeting points for interactions with researchers from other research areas. Funding is generous and long-term, giving room for experimentation. Time spent on applying for and reviewing grants is reasonable, and the administrative burden is eased by professional administrative support. Finally, research is linked to education in a mutually nurturing relationship. This ideal type of research environment seems to be applicable to most, if not all, research, be it natural sciences, social sciences, art – or any other creative work for that matter.

As for the ideal type of societal environment surrounding a university, it is preferably relatively weak; the existence of external rules and regulations is limited, permitting autonomy, flexibility and apt variation within the institution.

A relevant question is how successful environments with the features of the above ideal situation can be created or stimulated by the actions or considerations of university management at different levels. The question is also relevant with reference to a continuous growing emphasis on university autonomy and requirements for strategic priorities at a university level. It is expected that universities are able to make strategic decisions on the research being carried out and to determine where to invest and divest.

Before trying to answer this question, there is a need for some reservation. Even though the ideal type research situation describes the most consistent characteristics of environments that produce high quality research, there is of course room for great variation. Different discipline cultures have different norms and traditions, and one reason is that they require different approaches to be fit to purpose. There may also be exceptions from what seems to be fairly evident generic qualities. There are, for example, introverted environments that are successful – maybe just because they have been able to pursue inventive ideas without being curbed by the prevailing paradigm. There are also examples of researchers that are successful, although they spend a substantial share of their time working alone. A strong environment surrounding the university with regard to external rules and regulations, e.g. regarding the appointment of scientific personnel, may also have its advantages. It may support groups, e.g. women and young researchers, which traditionally have not belonged to the informal power centres within the institution. This might be conducive to high research quality, if it means that all competent researchers are made use of, irrespective of their background and alliances.

Gaining institutional perspective – evaluating past performance

It is valuable for both lower (departmental) and university management to gain a perspective on the organization as a whole. This may be achieved by using tools based on peer review, primarily assessing past performance.

First of all, there is obviously a major difference between measuring the quality of research recently performed and the value of top professors' CVs on one the hand, and creating a research environment of the future or knowing if a small, but promising, research group is the success of tomorrow on the other hand. Good performance as measured by bibliometric results may reflect a research environment that was flourishing several years ago, but that has declined considerably since then. Poor results, on the other hand, may reflect old sins in a now prospering group, or be explained by the group being newly established. This is why bibliometric data has to be complemented by additional information.

Panels have been used at the local level and recently also in self-initiated university-wide evaluations. Peers are invited to evaluate either a department or a field, as in the national studies performed by the Swedish Research Council. These panels are often used in combination with bibliometric indicators.

It is, with the limitations inherent in the evaluation systems, possible to make informed budget decisions based on past performance. Such decisions could either be a careful reconsideration of a certain budget percentage throughout the system or major investment decisions for a limited number of defined purposes. Panel data would be more appropriate for the latter, which often also have a greater impact on research performance, while continuous bibliometric data would be fairer for the former.

Some departments, or research groups, will occasionally run into troubles and cease to be productive. They are identified as low performers in bibliometric measurements, people suffer from the lack of progress, PhD students are recruited to a subject where there is a lack of scientific scholarship and rigour, and conflicts may arise among those remaining after potential high performers have left. In such cases, it is necessary for university management (department heads, deans or vice-chancellor, depending on the size and structure of the organization) to take action as quickly and firmly as possible.

Using the collected data – past performance meets strategy

One challenge is to take the next step and make strategic use of the knowledge gained from evaluations of past performance. It is therefore of great value that these types of evaluations are matched up with the strategic cycle of the organization, so that action points can be evaluated against goals and demands and be incorporated into a long-term strategy.

There is a balance to be dealt with between detailed decisions on, for example, budget allocations and broad strategic considerations. Too much detail in the university's decision-making, at all levels, collegial or by the university management, prevents academic freedom and creates a situation where the decision-making systems assume responsibility for issues best decided by active researchers.

It is however believed that overall quality will benefit from strategy. Whether this is done at a research group, department, faculty or university level is of less importance. One problem is that many universities lack a "strategic requirement" within the organization while being quite elaborate in terms of the decision-making details on how to reimburse travel expenses. Thus, focusing on strategy is also a cultural shift where some universities need to move from "ignorance" of current and future research to "interest" in strategic development. University top management is responsible for having an overview and ensuring that strategic discussions (and decisions) take place. Strategic direction, in terms, for example, of major investments, coordinated work to access cross-disciplinary programme research funding, long-term orientation of research funding or research agendas, has to be decided on.

The possibility to govern universities strategically should not be overemphasized. Detailed strategies at a university-wide level on research content are bound to fail (in most cases). The idea is, however, that there is a level in each research-focused organization where strategic discussions are appropriate and productive. A strategic agenda may be vague and have a simplified structure. It is more important to demonstrate a long-term interest in discussing the future of the research, and it is a management responsibility to emphasize and re-emphasize the requirement for such discussions and agendas.

An important challenge for the university management at all levels is to create a sense of belonging. Having a sense of the bigger picture, i.e. identifying with not only the research group, but also the department, the faculty/school and the university as a whole creates the opportunity for strategic decisions that may not favour or benefit one's own unit directly, but indirectly by making the institution stronger in some other way.

Creating scientific infrastructure

In the light of the evidence base presented above, major investment in infrastructure is one way to attract researchers and to promote the growth of a certain research area (often at the deliberate expense of other areas). Even if significant scientific growth and quality appear more organically, it is of great value to the process to attract researchers and visitors with outstanding instruments and other types of infrastructure.

Another type of infrastructure is the creation of cross-disciplinary meeting points around specific issues or subjects where researchers and research groups can promote a curiosity-driven research debate. These types of venues are also important to the humanities and social sciences, although instrumentation is of less importance.

Designing effective recruitment processes

The European Charter for Researchers. The Code of Conduct for the Recruitment of Researchers (European Commission 2005), focusing on how to make Europe attractive to researchers, underscores the need for sound recruitment processes. The charter also calls for increased attention to the multifaceted skills that are required from researchers.

The empirical research presented earlier on confirms the importance of individual researchers for the quality of research. A research leader should have a clear vision, carefully recruit new members that complement the group, build bridges to other knowledge domains, and support young researchers. These points are crucial to the recruitment procedure. Many of our interviewees make references to the fundamental importance of recruitment processes and human resource policies. Recruitment has to be designed to be a tool in the creation of creative and sustainable research environments. Thus, the specific needs of the department in terms of academic and personal profiles of persons sought needs to be established and maintained throughout the recruitment process. The expectations on the researcher must be articulated. Who do we need, and is this really that person? This includes paying attention to qualifications beyond mere scientific skills, e.g. the capacity to mentor and inspire others, and to build fruitful collaboration. Although somewhat simplified, a dysfunctional researcher should be seen as the responsibility of the university; either the recruitment process, or the university's continuous support of the researcher, was substandard. If there are no candidates with the right profile and the situation admits it, the recruitment process should be cancelled, and efforts should be made to identify and approach those who match the profile and then rerun the process.

The recently launched Researcher Development Framework (Research Information Network 2011) may support the recruitment process in defining the skills that should be sought for among the candidates. Based on numerous interviews with experienced researchers, it articulates the required knowledge, skills, behaviours and personal qualities of researchers at different levels. In this framework, the knowledge, intellectual abilities and techniques to do research are specified, as well as the personal qualities and approaches needed to be an effective researcher. Needed skills regarding research governance and organization are made explicit, as are the knowledge and skills needed to work with others and ensure the wider impact of research.

It should be remembered that universities are free to define recruitment procedures (within some limitations). A number of things can be done to ensure a good recruitment process: competence profiles can be discussed and defined, traditional peer review can be combined with search committees, interviews and references can have a broader foundation for the hiring decision, the process can be sped up and so on. However, it may still be a problem that recruitment processes and hiring decisions are carried out separately from the strategic discussion and a discussion on the best overall use of the funds available.

The challenge is to design recruitment processes where peer review has an impact as well as the strategic needs of the department, alongside the process being legally safe and transparent for applicants. Role models for open, safe and sound processes can be found in other parts of the world and may be subject to closer examination. Here it is of great importance to move beyond the recruitment policy of the research councils and finding the best group leader, also considering soft matters such as group size, social skills and research profile. Teaching qualifications should also be genuinely attended to, given the importance of securing research-teaching linkages. These considerations should all be a part of the departmental strategy process.

Except for identifying the best researchers in accordance with the strategic ambitions of the university, the attractiveness of the institution to the best researchers is equally important. Can the university accommodate the needs of the accompanying family, for example? Are the intellectual environment and the resources attractive to talented researchers? Is the culture welcoming and inclusive?

Attending to the inner life of departments and research groups

Several of the characteristics of successful research environments point towards the importance of “soft issues”, such as team-building capacity, good social climate, frequent interactions, mutual interest in each other’s work, curiosity, respectful listening, being unhierarchical, etc. Attending to such questions has not been a top priority in the academic community, where science itself has been in focus and other issues have been subordinated. Consequently, these attributes have happened to develop spontaneously in some environments, but have been consciously strived for less often. Nevertheless, these soft issues seem to be highly associated with the quality of research. Sahlin has put together a simple recipe for creative environments that includes many of these qualities, and corresponds well with the empirical research that has been presented in this report (see Box 3).

<p><i>Creative environment</i></p> <ol style="list-style-type: none">1. Generosity2. A sense of community3. Qualifications4. Cultural diversity5. Trust and tolerance6. Equality7. Curiosity8. Freedom of spirit9. Small scale
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Box 3. A simple recipe for creative environments (Sahlin 2001)

An increased focus on these issues is warranted. It should be a natural part of the strategic building of fruitful research environments, and attended to by the academic leadership, both individual leaders and boards, as well as by the researchers themselves.

As this climate is hard to establish in a larger group, group size is also a matter for consideration. Creative research is often difficult to undertake in large research groups.

Taking good care of young researchers

The empirical data shows that successful research environments tend to care for young researchers. The research leader knowingly supports younger researchers and they are respected partners in the scientific endeavour. Many successful researchers bear witness to the importance of having had a senior researcher that acted as a mentor and paved their way. These mentors act as role models, generously share their knowledge and enthusiasm, lend their good reputation, and give the novices access to important networks. Of course there is a potential downside to this. The informal character of the bond may contribute to nepotism, and the young researcher may become too dependent on the senior researcher. This way, the mentorship might introduce unfairness and have a conservative effect on the research.

There are a number of deliberate actions that can be taken to improve young researchers' chances of succeeding, in addition to well-balanced mentoring. One way is to provide career opportunities and show the university's commitment to talented young researchers. They need to be able to see a potential future where the steps are logical, achievable and trustworthy. Create positive recognition for good or excellent research performance, including among young researchers.

Encourage mobility among researchers in general and for younger researchers in particular. Encourage, and fund, post-doc stays. Postdoctoral experiences provide young researchers with a new perspective and create an incentive to move after graduation.

Young researchers need help to create networks in their core subjects, as well as in the university environment in a more general way. Create networks for research-specific purposes at national or international level, create university cross-disciplinary networks, introduce mentorship programmes, for example for promotion activities, etc. Joint researcher training courses and infrastructure between universities often lead to higher quality and an increased number of potentially fruitful contacts.

Providing researchers with tools to develop their knowledge and skills

As evident from the empirical studies, researchers need skills that go beyond their scientific expertise, especially when research is carried out in close interaction with others. The university must offer courses in e.g. teaching and leadership, and must try to convince sometimes reluctant researchers that these skills are required in any modern research organization, and even more so at a complete university, where research is an integral part of a broader mission.

The previously mentioned Researcher Development Framework (Research Information Network 2011) was, among other things, designed to be used by institutions in making decisions about their strategic approach to the development of researchers. The framework may be used by researchers themselves to evaluate and plan their own personal, professional and career development. It may also be used by managers/supervisors of researchers, as well as trainers, developers, human resources specialists and career advisors in their role of supporting the development of researchers.

Increased attention to generic skills will most likely make researchers better equipped for research and teaching, but also more attractive to non-higher education employers. Most PhDs indisputably end up outside the university, and this contribution to the rest of the society is as important as providing academia with new researchers.

Ensuring good administrative support

High quality research cannot be achieved through administrative efforts, but poor administrative support may bring an otherwise fruitful research environment to its knees. In Sweden, researchers carry out administrative tasks, for which they are overpaid and poorly equipped. Either the university has to offer them the opportunity to develop these skills, or it has to offload the researcher and let specialists carry out these tasks.

Efforts should be made to bridge the non-constructive divide that is sometimes prevalent between academics and administrators, and replace it with the idea of contributing different skills to achieve a joint goal. The core business of the university rests on academics. They are absolutely necessary, but not enough. They need the complementary skills provided by professional administrators, and administrators have to be aware of the conditions that characterize the core business to effectively fit their contribution into it. Academics and administrators are interdependent and, given that getting to know each other facilitates collaboration and understanding, they should meet more often (Goodall 2009). More attention should be given to “third spaces” where core activities and the administration are intertwined.

Promoting positive academic leadership

Based on empirical research, it is obvious that good leadership at all levels is central to the development of successful research environments, and that it should attend to the principle of *primus inter pares*. At the same time, it is clear that academic leadership faces challenges that are different from other sectors, and that are specific and must be addressed.

Given the key role of the academic leadership, efforts have to be made in creating attractive management positions and promoting willingness to assume management responsibilities. Provide due support in the form of mentorship, leadership courses and compensation for lost ground by allowing for a repatriation period, i.e. some research funding for restarting once the term of office ends. At the same

time, be cautious in burdening successful researchers with leading too large groups or too many projects, since hierarchical structures are barriers to creative research (Heinze et al. 2009). Make sure that the best leaders are recruited by investing in thorough recruitment processes.

In this report, the focus has been on successful research environments, and the leadership required in achieving this. Most universities have to attend to more than this, given their broad societal mission. This also has to be considered when defining the qualities in the academic leadership. *Primus inter pares* cannot exclusively pertain to mere research qualifications in its limited sense. A successful academic leader must also have legitimacy when it comes to matters of education and teaching (and with regard to other skills as well, e.g. leadership skills). The best researcher is not necessarily the best teacher, and may express a dutiful but unenthusiastic interest in teaching matters. Whether leaders have to be *primus inter pares* in both teaching and research, or in one or the other, depends on the department's and/or the institution's mission and profile. (Today, there are established criteria for assessing teaching qualifications that can be used to decide on whether a candidate is *primus inter pares* teaching-wise.) The bottom line is that the leadership has to have a genuine strategic interest in all areas that are important to the university's success.

An alternative view of the *primus inter pares* leader is that you become *primus inter pares* by being elected by your peers. You may not necessarily have to be the *best* researcher, nor the *best* teacher, but possess qualities that make your fellow scholars trust you as a leader. To receive legitimacy, however, you would probably have to possess a minimum threshold of scientific credibility and teaching experience.

Building a strong relationship between research and education

It cannot be claimed, based on the literature reviewed, that excellence in research is dependent on parallel excellence in teaching. However, it may still be a strategic interest of a department or a university to enforce high quality in both research and education.

Several interviewees referred to the increasing divide between research and education – and lament it. The divide is partly due to diverging development processes. While education has been increasingly oriented towards massification, research is increasingly focused on excellence. The difference in recognition also contributes to the imbalance. Research efforts are rewarded by the system, while reward mechanisms for excellent teaching contributions are less developed.

Nevertheless, nearly all interviewees stressed that a strong link between the two is needed to create a complete and dynamic university culture. Potential benefits may include an environment where staff can be trained in both competences for future careers, where students are provided with research insights as part of their training, where recruitment for research can be facilitated, and where several career paths and areas of excellence can overlap and feed each other.

One interviewee suggested that there is plenty of scope for improvement, claiming that there is a largely unexploited potential in allowing education to stimulate research. Emerging research ideas might, for example, be tested in the educational setting, and students might actively take part in research activities in a more extensive way than is currently the case. Thus, education may provide a “test bed” for research ideas, and advanced level students can be part of research efforts. Such links, however, require a strong academic leadership in order for this to happen.

In conclusion, efforts should be made to strengthen the nexus between research and education in a mutually nurturing relationship – it is part of the uniqueness of universities' contribution to society. Research has always formed the basis for the student experience with regard to subject knowledge, but there is room for improvement when it comes to getting students to attain genuine research skills themselves. Conversely, students could contribute more to research in various ways, in addition to constituting the recruitment basis for future researchers. While the nurturing of this relationship primarily rests on the universities themselves, funding agencies also have a responsibility in accepting that researchers have to engage in teaching as well.

Professional conduct – increasing awareness of how trustworthiness of peer-review processes and soundness in collegial decision-making is safeguarded

Obviously, the peer-review system has much strength, and there do not seem to be any better alternatives in spite of its flaws. To be able to defend the system, however, it has to be practised in a responsible way. Bias caused by systematic unfairness to individuals or groups can be prevented by rigour in selecting reviewers and by reviewer training (Research Information Network 2011) – even if an evaluation of a short training course proved to have limited impact (Schroter et al. 2004). Reviewer training should involve discussions on what constitutes responsible reviewer behaviour. Based on her research on grant panels, Lamont has summarized what characterizes a good panellist (Lamont 2009). A good panellist shows up fully prepared, demonstrates intellectual breadth and expertise, is succinct, speaks across disciplinary boundaries, and respects the other panellists' expertise and sentiments. Sound panel deliberations also follow the rule of deferring to expertise and observing disciplinary sovereignty. Good panellists defer to the expertise of others if they are not competent themselves, and follow the rule of cognitive contextualization, i.e. they recognize that different standards should be applied to different disciplines. In particular, multidisciplinary panels may have to make explicit their shared perspectives as well as their differences. Finally, a well-functioning panel maintains collegiality. They may occasionally engage in dynamic discussions, but they always keep a respectful tone.

Blinding of reviewers is often used to ensure unbiased assessment, although anonymity is often hard to preserve since there might be revealing clues in the paper or reviewer comments. Another approach is to maximize transparency through open review, making reviewers accountable for their viewpoints. The downside is that this openness might cause cautiousness and suppress just criticism (Research Information Network 2011).

Since short training courses of reviewers seem to have limited impact, training might have to be delivered in some additional way. Doctoral education is where researchers' attitudes and working behaviour is shaped, and an increased focus on the elements of peer review during these formative years might be well placed.

Doctoral education is similar to workplace learning. Although parts of the education are formal, much of the learning takes place in the everyday environment via informal observation and interaction with other researchers. This way, the supervisor and other senior researchers are important role models. Of course, supervisors already introduce their doctoral students to the peer-review system, but what if it was done in a more profound way? The coverage of issues on peer review could be strengthened in the continuing education of doctoral supervisors, including a thorough discussion on the personal attributes required from a high quality reviewer. Discussions on the strengths and weaknesses of the system of collegial decision-making might also be incorporated in doctoral education, as well as in leadership courses. Foremost, these meta-discussions on professional conduct and academic quality assurance

processes and decision-making should be lively at all levels, from the university management to the department.

Making it happen – the role of collegial decision-making

The suggested strategies for stimulating high quality research call for wise university governance, balancing powerful steering when needed and deliberate passivity when appropriate. It should provide good opportunities for the growth and maintenance of creative research environments, and take action when research environments are dysfunctional – hovering between “do not disturb” and “intervene”. Decisions on research programmes, number of personnel, work conditions and budgetary control should not be centralized. The university management should however be proactive in defining the university’s agenda in relation to the surrounding society. It should make the necessary strategic decisions, while safeguarding the qualities inherent in the collegial system. Finally, higher level management should be actively involved in issues concerning research funding and recruitment.

Is the current system of university decision-making capable of doing this? Strategic discussions are issues that are well suited for a reflective and mature discussion by collegial boards. Many interviewees agree on this, but are also hesitant in the current faculty board capacity to discuss and make decisions at a strategic level without becoming lost in disciplinary conflicts of interest and *status quo* decisions. Collegial boards may have difficulties in reaching bold decisions on the future of the university beyond next year’s budget cuts or increases. In that case, strategic discussions have to be organized differently, by department groups or in university-wide settings.

A collegial decision-making model often fails to identify and act in terms of low performing research groups. The tendency to leave serious problems unresolved for an unreasonably long period may affect research performance and quality. Research groups where substantial resources are spent but not much is gained in terms of research output, and where research education and research networks are of low quality, may be allowed to continue. Performance-based subsidies, decided on through collegial measures, may create a step-by-step closure of a particular research area, but this may take a substantial period of time. Problems may be aggravated during the period and PhD students can end up having been recruited to a low performing group. Problems of this kind need to be brought to the attention of university management (at an appropriate level) and acted upon. A collegial decision-making procedure needs to be given both tools and leadership to be able to do this.

6. Recommendations and policy level issues

This section will, first, summarize recommendations or issues of importance for research quality previously discussed and, second, highlight a few areas on a general policy level which we consider to be of importance for research quality from a university system perspective. It should be noted, however, that there is no “one way” or a “quick fix” to ensure high quality research. There are many different university settings, different research approaches and different success criteria depending on research areas, scientific traditions and university strategies. What we suggest is a much more considerate and deliberate approach on all levels in a university, a sincere interest in research quality by decision-makers as well as research leaders, and mechanisms to ensure a monitoring and guidance of high performing research groups as well as correction and intervention when performance is below standards. Our recommendations can be categorized into the following groups:

Monitor and analyse

This includes issues where the main focus is to ensure a good overview, to have correct information and to oversee research groups in the university. It includes the following:

- Gain institutional perspective – evaluate past performance
- Use collected data – past performance meets strategy
- Pay due attention to the inner life of departments/research groups

Act

This category includes issues where defined and direct action needs to be taken in order to achieve strategic goals. Action is not only required by university top management, it may be more appropriate to include many of the issues suggested as part of the responsibility of deans and department chairs. The items listed below are not meant to be final or exhaustive. They are more of a summary of notions that have been discussed in the report and that may be core elements of a university agenda to promote research quality. They have to be further elaborated on, questioned and added to.

- Nurture successful departments/groups and provide them with as much autonomy as possible
- Ensure long-term funding of promising research
- Intervene promptly in departments/research groups that are dysfunctional with regard to processes and/or outcomes
- Create a good scientific infrastructure with regard to technical and intellectual resources
- Design effective and deliberate recruitment processes
- Take good care of young researchers
- Provide researchers with tools to develop their knowledge and skills
- Ensure effective administrative support
- Promote positive academic leadership
- Build a strong relationship between research and education

Policy

A third category includes issues that are more general and require long-term policy making efforts. We consider these issues to be of fundamental importance for the continuous development of research quality in the university sector and for the discussion on why research and universities are important and how high quality can be achieved.

- Renovate the system for collegial decision-making
- Articulate the specific values to which universities respond and the way in which this contributes to a wider societal development

To a certain degree, it is only possible to act upon the policy level issues presented above within a single university. They include major cultural properties of the university sector and may thus be subject to a comprehensive and sector-wide discussion. We would like to emphasize two such areas, taken from the policy category presented above. These areas could be subject to SUHF initiatives in terms of creating a “think tank” providing the university sector with policies, initiating new recommendations for university practices and making the interest of the “republic of scholars” manifest.

“Renovate” the system for collegial decision-making and the peer-review system

One issue that has been brought up for discussion by interviewees, is debated in literature and has been an underlying topic throughout this report is the functioning and quality of the collegial system. Since it is a fundamental issue for HEIs, we conclude that it needs to be subject to a closer investigation and analysis. It has not been possible to do so fully within the scope of this report, but we suggest that this is made an area for further discussion, analysis and, potentially, action and policy-making activities.

The notion of a free academic space, both ideologically and politically, is inherent in universities. It is a fundamental conclusion that the collegial decision-making system for quality control is indisputable. As mentioned, it is used for a multitude of tasks such as recruiting, funding and publishing. It is organized through academic councils and decision-making bodies within universities, as well as through peer-review assignments in connection with publication and recruitment decisions.

In spite of this, we must be prepared to discuss the pros and cons of the collegial decision-making system, including both peer review and collegial decision-making, if for no other reason than in order to make active decisions on what should be left to history, and articulately defend the core elements that should be preserved. A collegial system based on open, constructive, well-founded scientific discussions should be preserved most actively, while tendencies towards group thinking, academic abuse and nepotism should be dealt with. The system aims at safeguarding the quality of research and teaching – not protecting members of the academic community from external assessment.

The tasks for which the peer-review system is needed seem to have increased over the years. The number of recruitment and promotion evaluations has increased, the number of applications for funding where peer review is needed has increased, and the journal publication tradition has been adopted by more scientific areas. Peer-review assignments tend to take up more and more time for individual professors. At the same time, professors tend to write more and more applications for funding, positions and promotions.

The contemporary situation is that the most important quality control system – the collegial peer-review system – is put under a great deal of stress. It cannot easily be changed by individual universities or individual (research) funding agencies.

We would suggest three areas within the collegial system where renovation may be needed:

- The collegial working environment: Research groups are, from a collegial point of view, autonomous in terms of research questions and research orientation, but they are also the most immediate working environment for researchers/educators. The culture nurtured within a group is thus of importance for the performance of the group. Mentoring and coaching of colleagues is one responsibility of the group. Networking and deliberate group enhancement processes are others. Would it be possible to facilitate the quality of collegial working environments through deliberate activities and actions?
- The collegial peer-review system: Peer reviews are used for a large number of purposes. Many have been mentioned in the report. These can be internal promotion reviews, panel reviews of research performance, recruitment reviews, publication and application reviews. It is a system with strong quality assurance components, although not always free from criticism. It may be biased in terms of gender issues, it may be so heavily used that quality can be questioned and it can be too time-consuming or too widely used. Would it be possible to find a more up-to-date peer-review system where the quality assurance can be kept and the dysfunctions can be avoided?
- The collegial decision-making system: Collegial boards or councils are often used within universities to reach decisions on issues where academic judgement and rigour are required. Such boards are normally elected. It is however not evident what kind of decision power collegial decision-making is best equipped for and for which development stages of a university or research environment that collegial decision-making is a necessity. Would it be possible to design a more appropriate division of labour between the collegial decision-making on the one hand and managerial decision-making on the other hand?

The role of the university in society

A second fundamental issue that has been part of the discussion so far, and also brought up by our interviewees, is an ambiguity on how to describe and understand the role of universities in society. What are the relevant expectations, how should commercial and academic needs be balanced, how should this role be related to the political system, etc. Although universities are responsible for proactively creating environments that are conducive to high quality research and teaching, as reflected in this report, they depend on their relationship to the rest of the society in doing so. The role of universities in our contemporary society is clearly a topic that needs to be addressed in the strategic university management. Thus, when outlining agendas, it would be helpful to have an insightful and deliberate analysis of expectations, stakeholder positions and the long-term position of the university as a starting point. We thus suggest that the fundamental question of the role of the university in society is an area where universities, as a cluster, need to pay some attention. The main reason should be that if this is not done by the sector, the position will be carved out by stakeholders outside the sector.

The self-evident position of universities in contemporary society is challenged from time to time. Requirements for more audits, competition from other research providers and setting up parallel

educational systems are all indications of a challenged position. Politicians can sometimes be quite outspoken in terms of criticizing university performance and calling for better efficiency measures. Universities are confronted with signs of distrust alongside increased autonomy. There is a constant tension between the role of the universities as independent societal institutions with a long-range mission to strive for the common good, and contemporary society's immediate concerns and wish for instant usefulness – where the universities are expected to contribute effectively to the knowledge-based economy. A thought-through balance between these legitimate aims is needed to reach priorities that ensure the fulfilment of both.

Basically, this is a confrontation between the republic of scholars and the stakeholder models for governing universities which were discussed in a previous section. The number of stakeholders has increased as the university sector has grown and become an increasingly integrated part of society and a dominant actor in terms of knowledge production and dissemination.

A meeting between powerful stakeholders and the republic of scholars is troublesome if only some stakeholders have the power to articulate their claims while others are silent and not present in the debate. It is even more troublesome if one of the weak stakeholders is “the republic of scholars”, i.e. research professionals, professors and university representatives. If that is the case, single stakeholders based outside universities may be able to execute a one-dimensional impact on policy-making for universities while the university sector is unable to respond or defend academic values.

Stakeholders include tax payers (in a general sense), industry, welfare organizations, funding agencies, etc. It is not a question of whether the claims are legitimate or not, it is a question of the asymmetry in how well different claims are articulated and communicated. In some cases, the university sector could initiate a discussion with stakeholders to reach a common understanding and to integrate different sectors' strategic agendas. Funding agencies, for example, with at least partly collegial structures may be invited to discuss funding schemes that are a better fit with university strategies and priorities. Industry representatives may be invited to discussion long-term research agendas. And so forth.

In some cases it may thus appear as if the university sector is among the weak stakeholders and this therefore leaves the field open for others to set the agenda for debates and decision-making aiming at university reforms, claims and priorities. It is obvious that “the republic of scholars” needs to articulate a contemporary version of the reason for the existence of universities. Such an articulation is perhaps best described as a university-based “think tank” and a “voice” that is able to articulate the specific values to which universities respond and how these contribute to a wider societal development. This puts an emphasis on the continued activities of the Association of Swedish Higher Education.

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The content in the final report rests with the authors. The views and conclusions expressed in the report are not necessarily shared by all interviewees and experts.

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