

## Report Template for Review Panels – Overview of Research Field

<b>Research field/Panel (no. and name): 9 Agricultural and Horticultural Production</b>
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### **Strengths**

A few strong groups that have good local leadership, both scientifically and in terms of staff management.

The SITES infrastructure and field experiments (including long-term experiments) seem to be adequate.

### **Weaknesses**

There appears to be a lack of strategic timely leadership at faculty and department level. Groups, where professors have left (retirement, moving up into higher levels of university management), are mostly in a leadership vacuum. It appears unclear where the responsibility for this lies, i.e. with the department or the faculty. It remains unclear whether this relates to lack of strong visible leadership from SLU central level.

There are overlaps between Crop Production Ecology at Ultuna and the CSE group at Alnarp (they belong to different faculties). These groups are even competing. This appears to result from lacking coordination between the two faculties.

Some researchers are not sufficiently pushed in terms of ambitions. They stay within their comfort zone. This means that the full potentials are not being used.

In some groups, the PhD students and PostDocs are relatively old. This is a potential problem for researchers to develop to high standards, which often requires long-term efforts where PhD studies is part of the early career research education.

Teaching should not be a service, but an integrated part of the science. To make this happen, teaching responsibilities and achievements have to be equally valued to scientific output (papers and impact factors) and the importance of teaching at SLU has to be recognized at all management levels.

International contacts are linked to relatively few researchers. Too many researchers are in a local comfort zone, where this is not needed. There is a lack of international stakeholders.

There was no documented coordination of EU projects. Such efforts, which are rewarding in establishing international contacts, requires strong support from the university for project applications and management.

## Report Template for Review Panels – Overview of Research Field

**Research field/Panel (no. and name): 10 / Animal Health**

### Quality of Research

- In general the quality is good to excellent (score 3-5)
- Strong fields are found in all UoAs. For example:
  - o Small animal internal medicine, especially cardiology, feline genetics,
  - o Equine internal medicine
  - o Infectious diseases and immunology
  - o Animal reproduction
  - o Epidemiology
  - o Pathology
  - o Comparative medicine
- Weaknesses are the low number of PhDs and limited international presence (research visits, post docs visits, international meetings etc)
- There was a lack of strategic planning including succession planning in almost all UoAs
- Administration (organization) of SLU seems complex and intrusive as felt by a number of professors and researchers
- There is further potential for expansion and development
  - o Improve already existing scientific collaboration with SVA
  - o The collaboration should be improved with University Animal Hospital
  - o Enhance One health research including low income countries
  - o Translational medicine (between species and from animal to human)
  - o Explore increased EU funding and engaging other funding bodies and industry
  - o Increase attendance at international meetings and membership of influential of committees and boards

### Societal Impact

- Societal impact is good to excellent (2-3) in most of the UoAs
- In all, the impact is extensive, extending from pharmaceutical and biotechnological companies, government agencies, veterinary practices, to dog and cat breed clubs, animal owners worldwide and education (close to users and stakeholders)

### Capacity for collaboration with the Society

- Collaborations exist, but this could be improved and it is necessary to have clear strategic plans to engage with the stakeholders and customers
- Business collaboration could be improved. This could be coordinated at the faculty level.
- Presence in decision making boards would be essential

### General comments about the review process

- We feel that we have spent more time talking about management issues than research
- We interviewed a lot of positive, talented and motivated individuals
- The research was generally well focused on delivering solutions to real life problems.
- We feel that the organization of the UoAs was an administrative process rather than based on natural collaborations.
- it was difficult to evaluate the UoAs based on the paperwork delivered beforehand, but the presentations were generally excellent and the interviews were very informative

## Report Template for Review Panels – Overview of Research Field

**Research field/Panel (no. and name): 11 / Animal Science**

### General Overview of the Research Field

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Highly motivated scientists</li> <li>• Ethical dimension considered in many fields, facilitating a positive societal impact</li> <li>• SLU internationally recognized due to high profile individual scientists</li> <li>• Comprehensive coverage of most relevant research topics</li> <li>• Excellent infrastructure in some key research areas</li> <li>• Integration of research and teaching</li> <li>• Established infrastructures (like INTERBULL center) provide ample opportunities for research</li> </ul>	<ul style="list-style-type: none"> <li>• Many small funding schemes</li> <li>• Lack of sufficient support and critical mass for major grant application writing</li> <li>• Absence of clear career path for young scientists</li> <li>• Scattered localization</li> <li>• Lack of clarity in regard to the target of the research (local/regional/EU/world)</li> <li>• No clear strategy for efficient use of high cost research infrastructure</li> <li>• No core unit for big data management, processing or data sharing and analysis</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Contact with undergraduate students provides a pipeline to post graduate students</li> <li>• Possibilities for new approaches to livestock production – shift in emphasis from production to health, provenance and reduced environmental impact</li> <li>• Possibilities for expanding research further in companion animals and horses</li> <li>• Scattered localization provides good access to regional funding and local society impact</li> <li>• A coordinating role of UoAs in large (international) projects is an ideal means for networking and career development (i.e., young research can be task leader, to become WP leader later on in their careers, and to become coordinator even later)</li> <li>• The somewhat negative perception of animal agriculture (related to welfare, environment etc.) also provides research opportunities. If you have problems, you have to solve them.</li> <li>• Exploitation of big data in relation to precision livestock farming and management (e.g., in breeding, precision feeding, precision medical treatment).</li> </ul>	<ul style="list-style-type: none"> <li>• Increasingly critical perception of animal production and animal experimentation in the society</li> <li>• Decreasing critical mass in some areas of research</li> <li>• Lack of integrated research programs across faculty borders</li> <li>• Lack of clear research focus in some areas</li> <li>• Lack of PhD students, especially Swedish students</li> <li>• A possible negative public perception of technologies in animal production (agriculture = natural)</li> </ul>

The area of artificial intelligence/machine learning in combination with high throughput data will be a key technology of the future and will be required and used in many areas like precision (livestock) farming, but will not be restricted to the animal science sector. SLU might consider establishing a 'big data' core facility, which may be linked to the bioinformatics platform. It will be critical to provide sufficient resources and a clear policy to combine methodological research and development with service functions in such an infrastructure.

The research in the UoAs is often dependent on short-time funding opportunities, and appears to be driven mainly by individual interests and academic freedom. It appears that this combination has resulted in research with high societal impact, and highly motivated and enthusiastic researchers on one side, but also a scattered and somewhat opportunistic research profile. It might be that the benefits outweigh the possible downsides, but it is an issue that could warrant critical assessment within SLU.

## Report Template for Review Panels – Overview of Research Field

**Research field/Panel (no. and name): 12 - Aquatic and Terrestrial Ecology**

*This panel has not presented a written overview. The text below is based on notes taken by the KoN team during the oral report held for the University management.*

- The evaluators were overall very impressed by the Units of assessments.
- Groups are publishing in good journals and at high volume.
- Considering the size of the Swedish population and SLU:s broad mission these groups are performing excellent science.
- The spread/distribution of activities is perceived as good.
- There are no obvious organizational barriers, but some geographical barriers.
  
- The panel observed that a recurring comment from the assessed groups was the difficulty to become a professor. There is a real concern regarding junior faculty and retention of talent.
- Another observation was that a considerable proportion of the research was risk-avoiding – riding on current trends - and not necessary novel. SLU should encourage more “risky” approaches – failing forward.
- There was a lack of large collaborative projects with grand visions (such as Future Forests). These kinds of projects should be granted long-term funding with results expected in a decade or so.
- The gender imbalance is augmented along the career path.
- Interdisciplinary collaboration must be initiated bottom-up. Such collaborations could include Anthropology and Social Sciences to include the human dimension and enhance important research within SLU:s mission.
- UoA:s were well trained to explain the geographical scattering as something positive...
- Strategic planning at the central level – does it trickle down in the organization?
  
- Some UoA appear to have an “identity crisis” as an effect of many, different missions. UoAs with a clear mission achieves good impact. The panel experienced a lack of incentives for engaging in activities related to societal impact. People are in general motivated to make change. There should be a reward system for societal impact both on group-level and individual level.
- Formation of the UoA:s – in general it was difficult to evaluate the UoA:s without knowing how they relate to the university organization.
- The Self-Assessments didn’t give a justified view of the UoA:s. This in particular applies to the description of Impact and Collaboration – probably because researchers are not familiar with describing this in writing.
- Strategic planning is needed when there are open positions – regarding possible shifts between departments/faculties.
- Groups identify themselves with SLU but do not feel that they are appreciated. Rewarding Societal Impact could be the necessary incentives to feel appreciated.

## Report Template for Review Panels – Overview of Research Field

Research field/panel name (no.)	13: Economics, Business and Management and Statistics
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*General observations:* This research field covers five UoAs of varying size across Department of Forest Economics, Department of Economics and Department of Work Science, Business Economics and Environmental Psychology.

The field is largely a social science/economics research and teaching area. Across the five UoAs the staff comprises of 10-12 chairs/professors, around 25 associate professors, lecturers and researchers, 8 post docs, around 20-25 PhD-students. Thus, around 70 researchers plus the research support staff, which includes research assistants, teaching assistants and other similar staff.

A bulk of the research areas are concentrated on various forms of agricultural and resource economics, environmental economics, business economics and management, but also areas like e.g. resource policy, rural development and entrepreneurship and work science is covered. A group of economic policy researchers and analysts is placed within the field, and a translational outreach facility (KCF) has been established within the field too. Several of the chairs/sub-groups carry considerable teaching responsibilities, whereas others less so.

*Strengths and weaknesses:* For SLU, a strong research environment in this research field is indispensable. It is fundamental for securing research and educations targeting the key questions of how we can understand the human-nature relationship, resource based business sectors, and how we can tailor policies and developments for sustainable life. The aggregate size of the research field at SLU, in terms of volume, is sufficient as a fundament for ensuring *research quality and excellence*. Taken together the field seems to have grown in both quantity and quality over the past years, though development is not uniform. It includes several areas of strength and high international research quality contributing the definition of research fields. It also includes areas of good and internationally recognized quality, where room for improvement is more evident. We find that in most of these cases, researchers are aware of this and working hard to improve their standing. Further strengthening of international mobility and collaboration is essential for the success of the fields concerned. We find examples of excellent and outstanding scientific leadership skills and nowhere does scientific leadership seem in shortage at unit and Department level.

We find the uneven distribution of teaching access to be one possible source of weakness for both reasons of intellectual stimuli as well as structural stability. The physical distances at SLU are also an inherent risk for efficiency, intellectual growth and synergy, which seems to be amplified by organizational borders. Finally, the organizational set-up around chairs is potentially also a source of weaknesses, which we return to below.

Regarding *societal impact and collaborate capacity*, there is considerable potential in this research field. There are several strong, promising examples of impact, and the units have on their own taken steps like the KCF facility and the strategy for a stronger integration between the policy analysis unit and research unit. However, the potential is much higher and the field should be supported to pursue this. The exploitation of this potential may be a strength for all parts of SLU, due to the direct policy relevance that this field may add. However, while some research groups have taken commendable steps and some structures are in place, using the full potential requires that SLU overall builds a much more anchored philosophy and approach for this ambition. It requires supporting infrastructure and capacity, which are beyond the means of the individual chairs and research groups.

*The field's future potential:* An internationally leading group of researchers in this field is indispensable for SLU. The field is overall well on track for this and has strong potentials. A number of global agendas and research trends will provide options for funding, for engaging in larger international research collaborations, and hence improving research excellence and quality further. The area should also be well positioned for attracting more students, and perhaps develop additional courses and programs. Finally, the field has the potential to enhance the societal impact profile of SLU considerably.

*Collaborations between UoAs:* The collaborative environment among UoAs and chairs/research groups within the different departments appeared to be frictionless around both research and education. Across departments and faculties, this is less evident, in part because of organizational borders and physical distances. There are obvious areas of complementarity between groups across the three departments and campuses, that should be exploited further both within e.g. environmental and resource economics, business economics and management and within approaches and capacity structures to enhance societal impact. Pursuing increased collaboration across Department of Forest Economics and Department of Economics may also be a suitable response to current needs to develop further the PhD education program.

*Research Infrastructures and Support:* This field has modest demands on infrastructures. However, three of the UoAs express needs for an experimental lab infrastructure to further advance their research agenda. Given such a lab may also be of relevance to other parts of SLU (e.g. environmental psychology, food science etc.), we believe there is a good case for fundraising to such an infrastructure. Turning more broadly to other forms of infrastructure, we identified a clear need for capacity and support for outreach, communication and impact and perhaps improved support for fundraising efforts too.

*Concerns and Recommendations:* In spite of the aggregate number of researchers in the field being sufficient to ensure quality and excellence, and an overall and on average suitable mix of external, teaching and basic funding, we find almost all research units express concerns over scale and appear to perceive themselves as in a vulnerable position. The panel finds this concerning, in particular as SLU appears not to be under financial distress as a whole. It is counterproductive and an impediment to improving research excellence. Such sense of vulnerability likely reduces risk taking by the individual researcher and may result in unwanted staff changes and difficulties in attracting and retaining research talent, in particular for mid-career researchers. We suspect the SLU budget model, the chair-based budget unit and the value-laden rhetoric around the external funding for mid-career researchers creates unnecessarily stressful perceptions among researchers. We suggest SLU considers organizational models that allows for more risk pooling, e.g. at Department level, and communicate a stronger collaborative and collective approach to handle funding fluctuations and other challenges.

We believe we identified a concerning gap in the SLU career model caused by the chair-based professor system and exacerbated by the above funding model aspects. In essence, the system is constructed in a way that is likely to demotivate any strong and talented mid-career researchers to apply for or stay in mid-career jobs at SLU. And certainly so in any research unit, where professors are not fairly close to retirement. This in turn will challenge the performance of new chairs hired, because they will likely face fast turn-over and loss of the most promising mid-career researchers in the unit, and hence lack talented collaborators. We strongly suggest the leadership of SLU reconsiders replacing the chair-based model with a set of tough, but transparent and motivating criteria and incentive systems. In combination with a revision of the budget model, this will eliminate many concerns, create a motivating basis for enhanced performance and increase SLUs strength in recruitment and retention of research talent.

We furthermore recommend the SLU considers options to enhance a more balanced grounding in teaching across the different areas, and the proclaimed aim to double student intake represents a non-zero-sum opportunity to pursue such a goal. This may require careful attention to possibly counterproductive budget and decision systems across faculties, departments and campuses.

We find SLUs focus on societal impact and collaborative capacity in this research evaluation to be commendable. We have some concerns, however, that there is a gap between top management's ambitions for and commitment to this, and the operational and capacity realities in the departments. We recommend that resources are directed away from other administrative activities to develop and maintain society interface structures like advisory and stakeholder boards, communication and outreach etc. Within this field we point to the collaborations around the policy analysis unit and the KCF (Competence Center) as possible models for inspiration.

## OVERVIEW OF RESEARCH FIELD

### Research Field/Panel 14 - Forest Management

#### Introduction

SLU forestry is ranked number one in the world according to Centre for World University Ranking, in which the research component contributes significantly. Our assessment of the four Forest Management UoAs acknowledges this high international stature. However, in our evaluation we attempted to identify gaps in scientific quality and social impact. Below we summarize the strengths and weaknesses identified by the Forest Management panel.

<b>Strengths</b>	<b>Weaknesses</b>
Scientific strength is high	Unit-level strategies for future development needs to be stronger
Some units have good connections with forest industry	Inability to generate fully-funded professor positions and impacts on career paths for younger researchers
EMA (NFI, NILS, etc.) and experimental forests provide excellent infrastructure and data for research and teaching	Some critical fields are not covered by professor position
Campuses shared between SLU and other universities, e.g. Uppsala, Umeå	More dialogue and engagement with stakeholders needed
Research and teaching combined in UoAs	Limited incorporation of social science into research, e.g. economics
Diversity and cultural differences among units	Cooperation among UoAs and with other parts of SLU is weak
Long-term experiments and monitoring programs provide data for research	Gender balance needs to be addressed

#### Future Potential

- Export expertise through international expansion
- Potential for sharing data among disciplines; increased transdisciplinary research; incorporate social science into research
- Potential to be world-leading in new sectors, e.g. circular economy, climate change
- Futuring (systematic thinking about the future) of forest and forestry

#### Collaboration between UoAs

- Draw upon strengths of other people/organizations inside and outside of SLU to help meet objectives; coordinative capacity across SLU
- Collaboration currently is undeveloped; potential to incentivize?
- Use Future Forests as example and vehicle for increased collaboration
- Research infrastructure, e.g. EMA, experimental forests could be the basis for enhanced collaboration within and outside of SLU



## Panel 15 - Molecular Science; Biomaterials and Technology

### General Overview of the Research Field and Recommendation

The panel was impressed by the overall scope, quality and impact of the material and teams evaluated. The panel was in full consensus regarding the following:

1) The research field of “Molecular Sciences, Biomaterials and Technology” contains a wide portfolio of activities, with pockets of excellence in basic and applied sciences. Overall, the topics assessed by the panel lacked coherence. Hence, it is very challenging to find a unifying identity of vision or topic spanning both basic and applied research. For example, there was little common ground between the group performing applied research on forest machinery in northern Sweden and the very basic research group in chemistry in Ultuna situated in Uppsala.

2) The level of infrastructure provided by the university is impressive and the potential for collaboration within the new structures is enormous but unexplored.

The SLU has created a dynamic and diverse working environment, however we noticed following areas of improvement:

#### Regarding Quality of Research

- We identified a general lack of strategic thinking and planning for how to become world leading in respective research areas.
- The research areas within many units are not coherent and could benefit from a greater degree of integration.
- Most units showed a lack of ambition to publish in high impact journals resulting a lower visibility.

#### Societal Impact

- Few units showed, despite a great collaboration with industry, neither deeper strategies nor action plans for how to reach societal impact.
- The outcomes could be improved by better true multi and cross-disciplinary collaborations project, making a higher impact on society.

#### Capacity for collaboration with Society

- Most units have a great capacity for collaboration with society, however this capacity is not exploited to its full potential.

#### Recommendation

- SLU management could ensure that their research and innovation services are used effectively to encourage the research groups to take lead in large international collaborations (e. g. EU-financed programs). Preferably in collaborations that are cross-disciplinary i.e. include economists and social scientists

- An award for students and or postdocs with the best social impact achievements.
- Use the Future Food platform to clarify the overall SLU strategy for future research and societal impact within food-related science.
- A similar approach should be used to clarify the overall SLU strategy for future research and societal impact within biomaterial-related science (non-food)
- University should clarify its strategy for Wood Science and its leadership
- University should clarify its strategy for Microbiology and its leadership
- A more proactive strategy on translation and dissemination would improve the outcome and societal impact.
- Introduce incentives for proper succession planning that not only guarantee a critical mass but also retain built up knowledge from leaving seniors.

Finally, we recognise the challenges faced by the Units that were evaluated by the panel. However, we consider that the problems that we have identified are tractable (i.e. not insurmountable) and can be solved by better guidance and incentives.

**We appreciate that University has conducted this external review and we recommend that this excellent initiative is quickly followed by formation of an international advisory group that meets annually to keep track of progress and ensure that the issues are resolved in the highlighted areas.**

## Report Template for Review Panels – Overview of Research Field

**Research field/Panel (no. and name): 16 / Nature and Society**

### General Overview of the Research Field

#### Quality of research

We were generally impressed by the research of the UoAs in the Nature and Society panel. The research spans a wide range of theories and approaches, with an emphasis of qualitative research methods. We have for many units given a score of “Internationally recognised” but noted that the units are in several cases on their way to “High international” with individual papers already in this category. By paying greater attention to publication channels and active dissemination of their scientific outputs the UoAs would be able to increase their scientific impact.

The research in the Nature and Society Panel is essential for the SLU’s “ambition to contribute the knowledge that society needs to use natural resources in a way that is sustainable in all respects – ecologically, economically, socially and ethically.” The strategy states, correctly in the Panel’s view, that to achieve “a better understanding of the interaction between human and natural resources in the broad sense, a greater element of humanities and social sciences is needed.” We therefore strongly endorse the stated strategic goal that “SLU therefore strives to increase the integration between the humanities, social sciences and natural sciences, i.e. to promote multidisciplinary and interdisciplinary science.”

In examining the material and interviewing the UoAs the Panel has had two critical questions in mind. First: Does the strategy match reality and b) How could the research covered by the UoAs in the panel be strengthened in order to be both strong in its own right *and* fulfil the wider strategic goals of SLU.

Our answer to the first questions is that SLU is still very much on a learning curve. Many social scientists feel that they are expected to play a ‘service’ role in tasks that are determined by other sciences. This is clearly not a route to successful and path creating inter- and transdisciplinary science. It generates frustration and may mean that SLU fails to attract and keep high level social scientists. We noted considerable turnover and difficulties in keeping senior leadership among several of the UoAs we evaluated. This may be related to our concerns about treating the social science units as appendages to the hard science units rather than equal partners. In UoAs that have a tradition of interdisciplinary work within the unit the problem is less severe than in units where the main focus and theoretical frame is in social sciences and humanities. The Panel also note that the recruitment processes for senior staff were in many cases unacceptably long. Especially small UoAs suffer from this.

To correct for the problems experienced by UoAs representing the social sciences and humanities SLU needs to walk the talk and show in recruitment policies, incentive structures and infrastructure maintenance and development that integration means bringing together research areas in mutual respect and balance. Strategic actions within SLU are needed to ensure that UoAs with a social science profile have sufficient resources in order to contribute to interdisciplinary work. Only then can the really interesting interdisciplinary questions be formulated. Developing the Futures platforms is one route. They should be further developed to include possibilities for joint grant writing, seed money for innovative interdisciplinary projects and ‘dating services’ for researchers and data. Good examples exist in other Universities that have struggled with the same challenges. (see for example, DePaul

One systematic problem that arose repeatedly was social science units being invited to dialogue with their hard science brethren late in the process, often after proposal writing or intervention deliveries in the field. We believe a high priority for SLU is to self examine the processes by which the social science UoAs are incorporated into the scientific and outreach programs in the agricultural, biological, and veterinary sciences. This should lead to an active move away from project planning in which social sciences and humanities become 'add ons' to formally meet demands for multidisciplinary.

The second question obviously has many answers that are unit and context dependent, and they are elaborated in the reports on the individual units. Recurring issues include the following:

- Ensure critical mass – several UoA have, due to imminent retirement or other staff changes already lost or are about to lose key personnel. Replacing those, and in some cases considering strategic additional recruitments that is research oriented, is essential to maintain the UoA.
- Many UoAs have a very heavy teaching burden relative to their size. Recruiting researcher-teachers and lecturer-researchers is likely to increase the research and teaching potential of many Units. This change is in line with SLU's strategy, but we think it should be accelerated as much as possible. A better balance intraperson would lead to better teaching and research because of their cross fertilization and enhance a sense of fairness and inclusion within units.
- Stronger research strategies that UoAs develop themselves and implement to truly reflect and deepen the SLU & Faculty strategies – this strategy work should encourage all staff how to formulate their own steps towards the goal of improved research. We have one excellent example. Urban Vegetation, Governance and Management has achieved encouraging concrete results with this approach.
- Bridging the gap between research and teaching, i.e. developing research that interacts with teaching through courses, thesis work and developing teaching that supports research in e.g. experimental studies.
- Ensuring proper monitoring, not relying exclusively on web of science, but truly thinking through how the different elements of the work in SLU can be measured in a way that provides correct incentives for development as opposed to focusing on partly arbitrarily chosen measurable variables.
- For units engaging predominantly in qualitative work, an important part of the publications may occur outside of scholarly journals falling in book chapters and monographs. This affects citation analyses.
- Similarly qualitative work by its very nature tends to take much longer to conduct, analyse, and publish than quantitative work. We recognize this is not true in all cases but as a general trend is
- it describes accurately the conditions. As a consequence publication rates may be lower than in areas relying largely on quantitative methods.
- Some units are spending inordinate amounts of time raising funds to support core research facilities. As but one example, the therapeutic garden in the environmental psychology UoA. Because social science units do not have the capability to charge for various clinical services (e.g. veterinary medicine), we recommend consideration of how funding should be organised for some core facilities.
- There are both disciplinary gaps and redundancies across the units Panel 16 evaluated. Now is an opportune time to bring the social science units together to carefully examine where there are potential synergies across units and where gaps then remain. Such an analysis would assist several impending new faculty hires.

## Societal impact

The UoAs in the panel all have good to excellent societal impact because their research is almost by definition oriented towards societal impact.

There is variation: some solve local issues whereas others also influence policy making at national or European level.

- Truly interdisciplinary research as suggested above.
- Stronger support for digital communication and strengthening SLU's digital presence. By enhancing SLU's capabilities to translate research into practice both in Sweden and around the globe, the possibilities for positive societal impacts would be enhanced. The UoAs need to learn how to show a collective digital presence, not just PR, but they will need technical support from SLU to create platforms that provide digital tools etc. for stakeholders to use, not just web-pages that illustrate individual activities. For example, access to open data, tools for practical applications, educational material for wider use in MOOCs etc. could be developed with central support from the SLU as most of the UoAs are too small to develop their own technical and editorial skills for these kind of activities.
- Learning of good practices across UoAs. There are a number of innovative examples such as alumni networks maintained through social media, outreach activities, extension services, collaborative development and co-creation of research question and studies that could be taken into greater use.

## Capacity for collaboration with Society

Overall the UoAs of the Panel have excellent capacities for collaboration with society. The range of stakeholders is very broad, and the demonstrated actions convincing. Some units may have so much collaboration that it has reduced resources of their scientific work. Part of the educational activities also link to collaboration activities. Strategic discussions on how much collaboration, which routes and methods of collaboration (and co-creation) are suitable and what kind of services the UoAs and SLU is providing relative to other entities collaborating with Society are likely to benefit both UoAs and SLU as a whole.

The work on developing a reward and monitoring system for these activities is strongly encouraged. It should engage the UoAs in a creative effort. A top-down ruling without participation and buy in from the UoAs is not likely to be very helpful.

## Report Template for Review Panels – Overview of Research Field

**Research field/Panel (no. and name): Panel 17 - Plant Protection**

### General Overview of the Research Field

#### We identified some “generic problems”

- Insufficient core funding, with many researchers reliant on soft monies
- Lack of flexibility in moving monies and resources within and between groups in a UoA
- Some short-comings in technical facilities and technical expertise to run specific pieces of equipment
- Lack of focus in research due to the scattered funding system of short term grants
- Jeopardy in leadership with an aging cohort of male professors
- Lack of “home-grown” scholars

More specifically, we were privileged to hear from 2 exceptional groups, one moderate and one problematic group. We assessed the paperwork and presentations of the 4 groups and hereby present our overall findings as a SWOT analysis.

#### Strengths

There are pockets of real excellence in the groups 390\_1\_S - Forest Mycology and Pathology and 632\_1\_LTV Chemical Ecology, both with respect to huge international presence and outputs of high impact and with highly cited papers. These groups are exceptionally well-structured and organized and have strong leadership. These two groups had managed to create a stimulating environment and from this engendered much creativity.

SLU is spread geographically across Sweden with the benefits of access to an array of agricultural and forest systems.

#### Weaknesses

Two groups were deemed weaker, but each had different issues. Within the UoA 390\_2\_NJ Plant Pathology there are simply too many projects spread too thinly over the personnel within this grouping. As such, they are unable to capitalize on some of their very best work and need some advice as to how to raise the impact of their work to, for example by submitting a manuscript to Nature Plants (with the plant breeding story).

Within the UoA 632\_2\_LTV Resistance Biology and IPM there were more systemic issues and leadership problems – discussed in more detail on the submitted form

### **Opportunities**

Within the pockets of excellence, there is a tremendous “attractivity” for the global scientific community that could be exploited either to attract a strong future leader or develop one from within their own team (s).

Large number of doctoral students are attracted to courses offered by these two excellent groups, which the university should capitalize on rather than turning them away. Admin help is needed here to progress such courses effectively.

More funding for Fellowships and perhaps a VC prize for excellence – not necessarily monetary but a recognition / celebration of true excellence would attract and retain talent.

The panel considered that SLU might benefit from a “rebranding” *ie* towards something more attractive to the younger generation – such as Life Sciences or Sustainability

SLU has a cohort of capable researchers – it must retain, promote and more effectively “grow its own”.

### **Threats**

There is no apparent strategy for the succession and succession planning. SLU must do this in a more timely manner and involve the current leaders and exploit their knowledge and expertise to recruit their successors. The threat imposed by a large cohort of aging Profs is a very real one. Recruitment of new incoming professors from abroad and who have no established stakeholder network inability will be somewhat problematic, at least initially.

Greater effort needs to be expended on attracting a greater number of “home” UGs to PhD positions and thence post-docs within SLU.

Risk assessments of projects needs to be more robust or, at least, detailed more obviously.

The process suggests indicates insufficiency in:

- risk management (what are the risks, how to mitigate, when/how follow up on regular base)
- structured collection of stakeholder inputs
- routines for sharing and learning cross units/departments.

**General overview - Panel 18 - Soil & Environment**

The panel evaluated four UoAs. Three of them are from the Department of Soil and Environment and one from the Department of Aquatic Sciences and Assessment. All UoAs deals with different aspects of soil – water interactions and they are to different degrees involved in teaching, research and environmental monitoring and assessment following strategy of SLU. Our comments are organized by the three criteria of the assessment

**Quality of research*****General strength of UoAs:***

- UoAs display a range of strength including some world-leading research based on new ideas, using traditional and modern methodology. Scientific metrics range from good to excellent.
- The most successful UoAs effectively combined EMA and research, using EMA to develop hypotheses and to open new lines of research.
- Interdisciplinary (mainly within the natural sciences) at department, faculty, and university level varies from good to excellent, but is recognized as important by all UoAs.
- UoAs all exhibit support for a creative scientific environment through seminars, knowledge exchange, friendly reviewing of proposals before submission.
- The strongest UoA has good career development support for young scientists and attracts many PhD students; their efforts should be emulated by the other units.

***Weaknesses:***

- Delays in appointing professors has impacted scientific productivity and planning future strategies
- Potential of EMA to contribute to research is not fully realized in some units; reductions in EMA funding threatens scientific exploitation.
- Reliance on external funding weakens ability to pursue coherent strategy in scientific topics and leads to broad range of subjects and goals;
- Multiple faculties within one department resulted in an artificially separated UoA; the panel is concerned about effect of resource allocation and planning although this does not seem to effect research
- There are a small number of young scientists and PhD students in some units.
- Lack of institutional support for advancing new centre on drinking water is concerning.

**Societal impact*****Strengths:***

- Sharing long-term monitoring data and assessment results provides the basis for strong societal impact.
- UoAs exhibit ability to respond to a wide spectrum of stakeholders and respond to demands from private and public sector.
- Some units have developed ability to bridge the gap between societal needs and basic research.
- In general, there is strong collaboration with authorities and private companies.

***Weaknesses:***

- Not all units have or actively seek the support of external collaboration specialists.
- Collaboration/extension duties not well defined.
- Reductions in EMA funding reduces opportunities for flexibility in responding to societal needs.

EMA and related research provides a large potential **capacity for collaboration** with society; but realizing that potential requires **sufficient** human resources. Increasing impact of research on policy requires a more coherent and thoughtful communication strategy at the university level. In some UoAs, interaction with general public could be improved but requires additional resources to be accomplished.

**General comments and recommendation to SLU management**

- **Assessment.** While self-assessment is a good tool, the structure of the form was rather complicated and confusing. The interviews were critical to achieve a comprehensive view of the units.
- **Faculty/Department Structure.** The value added to scientific research of these overlapping and cross-cutting structures is unclear. How do these structures impact resource allocation and support for strategic investments in new initiatives? We recommend simplifying administrative structure.
- **Urgently fill chair for 435\_3\_S.** In general, delays in filling professorships have affected half of the units.
- **Creating new professorship for 280\_1\_NJ.** This most productive and innovative group should be considered for new professorship and new senior lecturer. This should be considered a strategic investment in the future.
- **Improve institutional support for future platform and centre development.** The panel sees great potential for SLU to initiate and support important new developments such as the drinking water center that assembles state-of-the-art science in response to societal needs.
- **Share best practices.** Problems encountered by some UoAs (e.g., in PhD student recruitment, collaboration) have been solved by other units.
- **Include collaboration elements in performance reviews.** Given the importance of collaboration to SLU mission, efforts should be recognized and rewarded.
- **Continue to support EMA as a key element for research, innovation and response to societal needs.**



## Quality and Impact 2018 - KoN2018; PANEL 19 - “Genetics, Molecular Biology and Physiology” STRATEGIC RECOMMENDATIONS

**1. The strategy process** Part of the six UoAs this Panel assessed had developed clear research strategies, whereas others were disconnected from this goal and presented no strategy. We recommend that the latter UoAs be encouraged to present a strategy in a time-limited process. To maintain the momentum of strategic thinking, each faculty could appoint a dedicated Strategic Advisory Board, which would pick up the recommendations of KoN2018 and support implementation of the strategies. All in all, the units at different levels would benefit from a centrally instigated long-term strategy regarding the mission and scientific and societal impact of SLU. In the frame of development of this strategy, SLU is recommended to consider reduction of the duplication of disciplines across the faculties.

**2. Academic leadership** SLU needs to strike a balance between top-down and bottom-up approaches. This requires academic leadership at all organizational levels. The Panel encourages the management to support acquisition of these competencies if deficient.

**3. Research Excellence** The Panel identified outstanding research and weaker performance. We recommend that at all levels the ambition level concerning the quality of research is raised, and PIs encouraged to publish in top-ranked journals and apply for the most prestigious grants (e.g. ERC and Wallenberg Foundation). SLU is recommended to embrace high gain/ high risk research, perhaps with an internal call with its own resources, modelling the ERC application concept and forms, like many top universities do to train their PIs for ERC calls. Talent should be identified early, and they should be coached in writing and presenting.

**4. Succession planning** Waves of retirements have occurred and are expected to occur. The Panel encountered both cases where no plans had been developed to bridge the past to the future, and exemplary planning. Retirements offer opportunities for renewal of SLU. It should be decided at the Vice-Chancellor level, whether to continue the research theme of a leaving professor, or whether to reorient the research theme in accordance with the research strategy and priorities of SLU. Recruitments should evidently follow the institutional strategy.

**5. Research infrastructure** The UoAs were content with their research infrastructures (RI). The Panel recommends that the responsibility of medium-sized RI acquisition be moved from the UoAs to the university-level. Investment decisions should be made according to an institutional RI-strategy linked to the overall research strategy. Most of the interviewees seemed to lack knowledge of Sweden’s national RI strategy and Roadmap and the significance of an RI belonging to the Roadmap, as well as of the opportunities that Swedish state memberships in European RIs (ESFRIs) and the European Molecular Biology Laboratory EMBL offer.

**6. Impact on society** SLU’s mission is excellent research and impact on society. We found fine examples of concrete impact, such as industry-academia collaboration, science advocacy, and capacity to collaborate with stakeholders. An extended strategy for societal impact can be realized *via* a circular pathway to innovation “from field/forest - to the lab - to the industry - and back to the field/forest”. Grogrund was taken advantage of to deliver impact by one of our UoAs, whereas others perceived it only as a funding program, and doubted the transparency of the

funding process. The mission and opportunities of Grogrund need better communication. Life-long-learning is an essential research-based activity whereby SLU can deliver impact on society. The Panel heard of one laudable example of a training program for professionals, and recommends such activities to be modelled across SLU.

**7. Education** Quality research is nurtured by education activities and researchers' contact to students, which is the essence of the "research university" concept. The Panel learnt that several interviewees cannot teach at SLU as much as they wish due to lack of students. As SLU management wishes to double the number of students under conditions where students in certain subject areas are too few, serious consideration should be devoted for analysis on why these subject areas are unattractive. Should these subject areas nevertheless be important for Sweden, the curricula need to be re-designed to inspire youth, the subject area's names up-dated and all of this better communicated.