Reaching World-Class II

Reports of the Scientific and Artistic Advisory Boards in 2014

May 2014

Aalto University

Editor of this compilation: Greger Lindén

List of Abbreviations

ARTS	School of Arts, Design and Architecture
BIZ	School of Business (former School of Economics – ECON)
CHEM	School of Chemical Technology
ELEC	School of Electrical Engineering
ENG	School of Engineering
SCI	School of Science
RAE	Research Assessment Exercise
TEE	Teaching and Education Evaluation
SAAB	Scientific and Artistic Advisory Board of ARTS
SAB	Scientific Advisory Board

Contents

1. Executive Summary

The Scientific Advisory Boards (SABs) were established during 2011. Each of the six schools of Aalto University set up its own board consisting of international distinguished researchers in the fields of the schools. The School of Arts, design and Architecture set up a Scientific and Artistic Advisory Board (SAAB).

Mostly the members are professors at other distinguished universities, but also a few members from outside academia are involved. The number of members in each SAB ranges from five to nine and there are altogether 42 members from 16 countries. The task of the SABs are to assess the activities and plans of the schools, visit the schools and present their recommendations and suggestions in a written report. The SABs visited their schools for the first time in 2012 and produced written reports on their findings and recommendations. The SAAB of the School of Arts, design and Architecture visited for a second time its school in 2013.

The SABs visited their schools for the second time in the spring of 2014 (in the case of the School of Arts, Design and Architecture, a third time). They met with faculty, staff and students, listened to presentations and saw posters on the activities and plans of the schools, and to some extent also visited the facilities of the schools.

This report is a collection of the SAB reports. The reports are given as such, but spelling mistakes and minor details have been corrected. In general the SABs were now very impressed with the development of the schools since their last visit. The recommendations of the SABs are given in detail in the following sections, but a few issues or highlights that repeatedly came up are given here.

- Strategic planning: In some cases, the SABs found the strategic plans to be weak and ask for refocusing of research areas. The schools should also start thinking of the next strategic period with the 2030 perspective.
- Tenure track: The career system was sent as an enabler towards making the university world-class. However, the recruitment process needs to be more transparent and efficient, and communication about how far the process is should be clearer.
- Mentoring: The mentoring programme for junior faculty should be reinforced.
- Artistic activities: Criteria for measuring artistic work should be defined so that its impact can be better communicated and taken into account at the university and externally.
- Multidisciplinarity: Aalto should definitely continue its efforts and support on multidisciplinarity. This is what makes Aalto unique. Any barriers against collaboration within the university should be removed.
- PhD programmes: The development of the PhD programmes is well underway. Best practices from international doctoral training networks should be adopted and international collaboration supported. And the study time should be reduced to less than five years; this would also make Aalto University more internationally attractive.
- Organisation: The university still needs to look at its organisation into units. There may be needs for reorganisation.

The SABs also commented positively on the campus project and saw it as enabling even deeper collaboration between the units when most researchers are located on the same campus. And the Sab recommended working on communications and visibility on all levels. The SABs will visit again in 2016.

2. Scientific and Artistic Advisory Boards at Aalto University

In order to support the development of Aalto University and its six schools, a Scientific (and Artistic) Advisory Board (SAB or SAAB) was set up for each school during 2011. The schools were asked to select prominent international scholars from their own fields to join their advisory board. The objectives of the SABs were to follow, evaluate and support the activities of the schools with focus on research activities, but also to give recommendations on new directions, openings and developments in the school and to evaluate the impacts of the development actions. Particularly, it was stressed that the SABs would support not only the president and the deans in their decision making but also the departments in their activities.

The scientific advisory boards visited their schools at Aalto University in the spring of 2012 and produced a series of SAB reports and recommendations. The Scientific and Artistic Advisory Board of the School of Arts, Design and Architecture made its following visit to its school in 2013. All advisory boards were again scheduled to visit theirs schools for a second (third) time in 2014. Before the visits in 2014, the schools were asked to consider extending (or changing) their SABs before the visit.

The final constitutions of the boards were as follows. The School of Electrical Engineering had five members in their board, the Schools of Chemical Technology and of Engineering each had six members, the Schools of Arts, Design and Architecture, and of Science both had eight members and the School of Business had the largest group of nine members. Each school had also nominated one of the members as chair of the board. Altogether there are 42 SAB members and they work in 16 different countries: the United Kingdom (8 members), the Netherlands (7), the USA (6), Sweden (4), Denmark (3), Japan (2), Norway (2), Switzerland (2), Belgium (1), Canada (1), Finland (1), France (1), Germany (1), Israel (1), Italy (1) and New Zealand (1). Of the members, 39 work at academic institutions whereas three come from other organisations or companies.

The SABs were given the following Terms of Reference:

- To provide a critical evaluation of the strategic plans and goals of the school and its departments, and a critical evaluation of the implementation and effectiveness of the plans in the light of Aalto's strategy and the previous evaluations.
- To follow up on the academic quality of the research achievements, scientific and societal visibility, research environment and future potential of the schools and the departments.
- To assess and present recommendations regarding arrangements, quality and efficiency of the doctoral education (doctoral courses, supervision, funding and results) taking into account how far the implementation of the doctoral programmes has proceeded.
- To look into any school-specific issues determined by the school and to follow up on the SAB recommendations made in the previous meeting.

The evaluations described above are done in order:

- To support and encourage the departments in their activities, development and transformation process.
- To support the Dean in managing and developing the school and in revising and sharpening the strategic plans of the school.
- To provide the president with feedback for developing the whole University.

The reports are utilized by the Aalto University Board in following up the implementation of the strategy of the university. The final reports are published on the intranet of Aalto University and will thereby be available for the all staff and students.

The schools were again given rather free hands to organize their SAB meeting. The meetings were organized during the time period January – April 2014. Before the meeting, the schools prepared background material on the school that was sent beforehand to the boards. A website was used for providing university, school and department-level facts and figures as well as other background material.

The schools organized the meetings in detail. The president of Aalto University met with the advisory boards. Each meeting was held at the school in question with some shorter sessions at other locations, e.g., to show facilities or to meet with the president. The meetings were attended by the dean and vice deans of the school as well as department heads, professors, other staff and in many cases postdocs and PhD students. Each meeting had one or several secretaries that took meeting notes to be used by the SAB when writing their reports, but also to document the meeting.

The SAB and SAAB reports are presented in Chapters 3 to 8. The reports are presented as such, but spelling mistakes and minor details have been corrected. The meeting agendas as well as the terms of reference in full and the practical instructions for arranging the meetings are given in the appendices.

The SABs are due to meet with their school again in about two years.

3. SAAB Report of the School of Arts, Design and Architecture

Scientific and Artistic Advisory Board

- Professor Rachel Cooper, Lancaster University, UK, Chair
- Professor Luisa Collina, Polytecnico di Milano, Italy
- Rector Karl Otto Ellefsen, The Oslo School of Architecture and Design, Norway
- Rector Elsebeth Gerner Nielsen, Designskolen Kolding, Denmark
- Professor Peter Krogh, Aarhus School of Architecture, Denmark
- Director Nik Powell, National Film and Television School, UK (not present in the meeting in 2014)
- Professor Sally Jane Norman, Attenborough Centre for the Creative Arts, University of Sussex, UK
- Professor Takeshi Sunaga, Tama University of the Arts, Japan

We would like to thank the school for its excellent hospitality during our visit and the full and interesting presentations and discussions with all department staff and students. This provided us with significant insight into the excellence of the school, and the impressive international standard of its activities in research, artistic activity and education.

Summary and key recommendations

The amazing development of Aalto ARTS is a result of many individual ambitions and good work. Furthermore the leadership of Aalto ARTS has not only succeeded in bridging the gap between the artistic-based schools and the rest of the university, but also to affect the values and the thinking of the wider university. In addition the leadership has increased the governmental funding during a period of economic crisis, thanks to a convincing and coherent strategy. The school continues to maintain an excellent reputation on an international level as Aalto ARTS; this is a major achievement in the short-period post-merger.

There has been excellent progress on the implementation of strategy, structures and processes at school level reflecting its connection to the wider university strategy. Excellent research activity has been seen in parts of the school whilst in other parts there are areas moving towards excellence. Artistic activity displays some excellent standards and the school is establishing a very effective way of evaluation that will enable it to be valued within the university, for individual promotion and international comparison.

Some of the recent and planned changes in the doctoral school appear to be well focused, and history indicates these were needed. They are well received by the doctoral students, and by academic and administrative staff.

Recommendations

- Embed the school process and structural changes in the departments to establish a level of transparency and consistency of reporting progress against strategic plans and quantitative and qualitative indicators, interpreted as appropriate by the departments.
- Develop and share clear terminology on traditional arts scientific research, artistic activity/artistic research, professional practice.
- Continue to share research practices across the school.
- Continue to develop and embed criteria for measuring artistic activity.
- Continue to support and respect equality between artistic activity (artistic research) and traditional academic research across the school.

- Be proactive in generating innovative artistic and research activities across the university and externally and communicate the excellent examples of work already being produced.
- Exploit new funding allocations within the university, i.e. that artistic output is measured at all funding allocation levels.
- Continue to apply to a diversity of external funding organisations, especially EU and international funding bodies.
- Continue to use university funding to support collaboration across the school and the university on societal and global challenges. And consider the best place for allocation of discipline-specific seed funding and cross-disciplinary seed funding.
- Review and consolidate the research group models, how they operate and are led, optimally they should have professorial leads, and collaborations with other disciplines and artistic activity.
- Make research structures clear, i.e. groups, factories and platforms.
- Continue to embed the well-thought-through process for supporting doctoral students in each department and enable more synergies between doctoral students across the school.
- Define the role of visiting practitioners' contribution to the school and departments.
- Continue to put in place the rationalisation of the student intake, retention and completion at all levels.
- Look forward to the great benefits that will occur from co-location in a new building.

Achievements and potential

A follow up on the academic quality of the research achievements, scientific and societal visibility, research environment and future potential of the schools and the departments.

Research achievement: Outputs and social visibility

- Every department in the school has maintained a very good level of research achievement and artistic activity, at an international level, ranging from internationally good to internationally outstanding.
- The school is starting to take advantage of being part of the larger university, which may have great impact, for example the multidisciplinary research projects.
- The number of funded doctoral student completions has risen.
- The school gained significant visibility through Helsinki World Design Capital 2010.

Research achievements: Infrastructure and environment

- Excellent work has been undertaken in developing the school-wide structure and processes in place to support departments.
- There is much increased self-awareness of each department and more awareness of each other.
- We congratulate the school on developing the formal approach to research professors and artistic professors. Such as putting in place the tenure track and professor of practice systems, alongside the career track for lecturers. This includes enabling the growth and attraction of tenure track professors to the school.
- It is a great to see that the school has achieved a re-allocation of the artist contribution to budget setting, and hence an acceptance of the contribution of artistic activity to the school and the university.
- The school is advanced in its development of criteria to evaluate artistic activity equivalent to research activity.

Future potential

Now that the school has undertaken much of the reorganization of systems, structures and processes necessary for a successful merger whilst maintaining the level of international brand activity for ARTS, it can now focus on the content if its work. It can put further energy into developing global and local research challenges and artistic activity that can lead and enhance its own work and that of the whole university. The staff is encouraged to exploit current work, whilst taking the lead on research and artistic challenges they see opportunities to address. This will strengthen the national and international profile of the school.

Strategic plans and goals of the school

An evaluation of the strategic plans and goals of the school and its departments, and a critical evaluation of the implementation and effectiveness of the plans in the light of Aalto's strategy and the previous evaluations.

Strategic plans and goals

There has been excellent progress on the implementation of strategy at school level whilst reflecting its connection to the wider university strategy. This has been achieved by a strong leadership team and creative approaches to interpreting the university strategy fit for purpose to the school.

The areas of focus presented by the school were interpreted by the panel as strong clear underpinning values that operate across the school goals and can be applied in all departments. The general culture reflects an acceptance and commitment to ARTS as a strong and vibrant part of the wider university. However the interpretation of the four university goals of Research Excellence, Pioneering Education, Ground-breaking Art and Social Impact are interpreted at department-level in a more pragmatic fashion, which can lead to uneven understanding, implementation and evaluation.

Challenges

People

- There are still difficulties and concerns in relation to the career structure and opportunities between tenure track professors and professors of practice; we recommend more communication about these processes, why they exist and the requirements for progression.
- The body of researchers and postdoctoral researchers play an important contribution towards the research culture of the departments and school overall, with differing levels of roles and responsibility, from leading projects to leading research groups. Many had been relied upon to generate external income for themselves and colleagues. We understand the contracts and systems for appointment for these staff have been regularised at university level, however it does not yet seem to have translated to the departments in terms of a standard procedure for the length of appointment, career support and advice, and roles and responsibility. All such personnel should be the responsibility of senior academic staff such as professors.
- It is recognised that all students benefit from and contribute to the research and artistic culture of the school, however in some areas the master's teaching is undermined by teaching focus on doctorates, and vice versa, this is uneven across departments, and needs some consideration.
- It was noticed that there is an opportunity to appoint professors and researchers across departments for both research and teaching activities. However this cannot produce efficiency in teaching delivery if the course delivery (timetabling and credits) remains inconsistent between departments.

- Further consistency of work load allocation across departments is necessary to enable education, research and artistic activity targets to be achieved. In addition we note that senior academics have experienced administrative overload, leaving little time for research and doctoral support in some departments.

Funding

- We note that a shortage of external agencies to support research and artistic activity has been expressed. However the creative and imaginative skills with which the staff is endowed must enable them to find ways to attract income to support new areas of research important to ARTS and the wider world.
- Now that postdocs, who traditionally wrote funding applications, are on short-term definitive contracts and therefore considering their own careers, beyond Aalto, it is important that a new mechanism to support for development of funding applications by senior staff at departmental level is developed
- There are rather significant differences in the allocation of governmental funds to the different departments compared to output measured as the annual number of bachelor and master graduates.

ARTS 2013	Architecture	Design	Art	Media	Film/TV/Scenography
No of bachelor and master graduates	108	132	114	68	30
Governmental funds (GF)	4,228,000	7,638,000	5,583,000	4,948,000	4,324,000
GF per Graduate	39,148	57,864	48,974	72,765	144,133

For instance, the Department of Design has about 18,000 euros more to spend on educating one graduate compared to the Department of Architecture.

Structures

- There is still some variability in the clarity of how departments support research and artistic activity.
- There are wide variations on the formation, leadership, definition, activity and output from research groups across departments and the relationship to education structures and general research focus. Research groups need to be led by a professor. Research groups need to consider sustainability over the long term.
- There is inconsistency on the representation of research strategy across departments, which makes it difficult to evaluate and compare achievement.
- Factories may be in jeopardy if they no longer operate as intended and no longer operate as cross-disciplinary or loose profile.

- There is some confusion on the role of platforms vis-à-vis factories and large research projects. This could be improved for external observers, especially through the Aalto website.
- Platforms are very good for cross-pollination across the university.

Facilities

- The school on three locations hinders further integration and collaboration, a common campus is very important. All staff see the opportunity that will be gained from merging of the campus and feel held back by the disparate campuses. The new building is essential to the development of ARTS research and cross-disciplinarity.

Profile and external communication

The school has an excellent international profile and reputation, however the panel noted it was not exploiting the artistic activity undertaken by its staff, such as 'The Helsinki School' or the individual and group artistic outcomes in shows, prizes, products, building, fashion etc. to the degree that it could through its website and social media; this must not be left to the individual artistic practitioners to promote through their own websites.

Doctoral education

An assessment of the arrangements, quality and efficiency of the doctoral education taking into account how far the implementation of the doctoral programmes has proceeded.

The students the panel met were proud to be doctoral students of ARTS and Aalto and were in a very good position to be ambassadors for Aalto, its research and artistic activity, nationally and internationally.

Doctoral arrangements, processes, procedures and guidelines

- Although only relatively recently been organized, there are guidelines, handbooks and codes of conduct. The students and staff are most appreciative of the systems being put in place. However some feel they have been in a situation of constant change, hopefully this will now stabilize.
- There are still some differing approaches to recruitment across the departments. Doctoral studies were the individual business of each department, including language, methods courses. Now the school has taken responsibility and there is much more scope for cross-school course provision.
- The individual project plans, compulsory credit system are to be commended.
- There is and has been a distinction between the Doctor of Science in Architecture, from the Doctor of Arts in the remainder of the school; Architecture has some concern that they might lose the significant and important connection to science, and hence international and professional reputation. This is an important consideration. As is the international focus on PhDs as a higher qualification that is the global standard. The panel noted that the doctorate can be translated as its equivalence outside the Finnish system.

Doctoral research structures and support

- The panel noted good support for students through their application process, and ongoing support through regular seminars and writing clinics. Also that the structure is young and the supervisors are doing their best to adapt and respond to it.

- Students were very appreciative of an annual budget for presenting papers or entering competitions, and also the encouragement they receive to continue to push their practice and external profile for which they receive credits.
- It was noted that in some departments there was a concern about the availability of supervision capacity (e.g., in Architecture) and they feel alone in being able to address this. This of course will influence the ratio of enrolment versus completion, which is poor in places.

Quality of the doctoral research

The doctoral students appear very strong in terms of intellectual capacity, and research outcome and capacity to push the research boundaries. The dissertations seen by the panel were of excellent quality and innovative. A major strength is their ability to cross-fertilise their education, experience and knowledge. Cross-disciplinarity is one of the major international attractions for ARTS.

- Doctoral students saw the value of the factories both as support mechanisms and enablers to cross paths. Indeed students wish there were more connections through seminars to include architecture, which is currently run under a different support system.
- Some doctoral students reported that prior to the merger or new systems they could recruit MA students to support projects but are unable to do that now. This they felt inhibited the effectiveness of delivery and ability to share knowledge and expertise.

Challenges for doctoral research

The panel notes that the structures and process for administration of doctoral students had been substantially improved at school level, although the implementation within departments is still a little inconsistent.

The panel recognized a vibrant community of doctoral students who engaged with the work of the school, whilst noting there is a substantial group of hidden or 'sleeping students'. It would be excellent if these registered students could be encouraged to take part in the community or remove themselves, to enable the full focus of the school to be placed on the active community.

Recommendations

- Continue to develop equality of provision and supervisory capacity across the departments.
- Continue to develop supervisory capacity within and across departments to avoid turning down excellent candidates.
- Develop strategies for topics, themes and groups that support the overall research and artistic goals of the departments in order to facilitate long-term sustainability of research.

School terms of reference

An assessment according to the additional terms set by the school and a follow-up of the SAB recommendations made in 2012.

Issues on artistic quality and assessment.

All departments are working on developing criteria for the assessment of artistic research/artistic development work. The board recommends developing these criteria further. Initially it is important only to select a few criteria. One of these should concern how the artistic work informs and supports the education of ARTS.

The board recognizes that there is still some work to be done in distinguishing between the outcome of the staff's private practice and the artistic work the staff conducts at ARTS.

It is still recommended that staff members with an artistic background have time to conduct artistic research/artistic development work as part of their employment at ARTS. With respect to this, the Department of Design has some good examples to follow.

Furthermore the board still urges ARTS to make sure that the number of artistic activities (collected in the database) is validated by a third party.

Conclusion: ARTS is further along than most art schools in equating artistic development work/artistic research and scientific research.

Reflections on each department

Each department presented to a subset of the panel, the following reports reflect the insights they gained and the challenges they identified. We thank the departments for their time and the reports they made to us.

Department of Design

Achievements and potential

The department has improved all of its figures: The amount of professors has grown from 16.3 (2012) to 18.2 (2013); other academic staff from 46.2 to 51.2, degree students from 2.2 to 7.3, research professors from 6 to 7.

The amount of BA students has increased from 38 to 46, MA students from 66 to 86, PhD students from 4 to 5, international referee publications from 11 to 16, other scientific publications from 46 to 62, and artistic activity from 10 to 25 international projects!

The improvement is quite impressive, not least the amount of scientific publications, and shows that the art-based school has been able to develop an attractive academic environment for doctoral students and professors alike; many of them international. At the same time the department has been able to articulate their artistic work through international exhibitions, competitions and books. These activities have contributed to an outstanding visibility.

SAAB also attaches great value to the fact that the department has made it possible for some lecturers to conduct artistic research on their own. To exemplify this, the department has presented a ceramics project and an international fashion magazine conducted by two of the schools lecturers.

The future potential of the school

1. The Department of Design is world-class and should exploit this position even more; the success should therefore lead to further investment. SAAB also recommends that the department focuses more attention on getting partners from industry (the external funding went down from 2012 to 2013). Furthermore the department should be able to attract more international funding, partly from the EU. Horizon 2020 is an opportunity that should be pursued. To achieve this goal the Department of Design needs both academic time and contribution the developing the project content alongside knowledge and support on the technicalities of bid development.

2. The department could also affect the allocation of governmental funding by defining new and clear criteria for artistic quality and with this as its stepping stone suggest that more governmental funding is allocated to artistic output rather than first and foremost to scientific output. The new committee on artistic research could help push such a strategy further.
3. Such a strategy could also support the department and ARTS in developing a clear career track for staff with an artistic background, so that lecturers could get positions similar to those of assistant professor and associate professor, but without needing to make their work scientific. A true equalization of artistic research and scientific research by setting up slots for artistic/practice-based professors.
4. Today the Department of Design already offers a strong collaborative environment. This could be developed further so that lecturers and professors with an artistic background conduct artistic research/artistic development work with MA students. This would imply that the amount of artistic work, included in the universities' figures, could increase.
5. A funding structure for artistic development is also needed at the departmental level.
6. Develop more cross-cutting initiatives. The Department of Design has the potential to be even more 'edgy 'and proactive in the development of the concepts across the university.

Strategic plans and goals

The Department of Design has followed up on the previous evaluation from 2012 and 2013:

1. Integration of research, practice and teaching.
   Follow up: One example: Well-being, Handling mind, Suburb 2072. Another: Living+ for better living environments.
2. Emphasize the practice-based research.
   Follow up: New professor, research team, several books and conferences.
3. Development and interaction of research:
   Follow up: 17/45 researchers non-Finnish, half of articles internationally co-authored.
4. More faculty with different research profiles and nationalities
   Follow up: Out of 17 PhD´s 12 have an international background and/or come from another field than design.
5. Beyond User Centered Design to Service Design etc.
   Follow up: The department has developed both its education and research so that service design, co-design and emerging interdisciplinary fields are now integrated.
6. More research papers in refereed design journals.
   Follow up: Done.

Furthermore the department has clear strategy objectives for 2014 – 2016. As follows:

1. Reorganise doctoral curriculum to ensure the quality.
2. Consolidate the research teams.
3. Tenure review of research professors.
4. Create a design research forum to improve collaboration between MA and research teams.
5. Living+.

In terms of education and research SAAB notes that the education has become more focused, not least concerning the MA programme which now includes Decrease and Concentration, Product and Spatial Design, Collaborative and Industrial Design, and Fashion and Collection Design.

SAAB also assesses the decision to cut back on the number of research fields to acquire more volume to be a wise one.

Challenges

The Department of Design has changed considerably without compromising on Aalto's strong position in arts and crafts in Finland and internationally. This is an impressive achievement. The board assesses that the department uses all of its resources to the full and now needs to also address issues of consolidation and reflection.

Conclusion

The department has done a lot to improve both on educational, research and artistic levels. It has pushed the culture to deliver and has a coherent environment where teaching is informed by research, artistic work and knowledge from practice.

The board notes that the Department of Design has a strong desire to contribute to the strategy and development of ARTS and Aalto. There seems to be no contradiction between the ambitions of individuals and compliance with an overall strategy. The department is successful in balancing consideration for individual needs and interests of students and staff and the demand for an overall strategy. This makes it strong and provides excellent conditions for making its influence count; also in terms of funds.

Department of Architecture

Achievements and potential

The quality of the Department of Architecture historically speaking is very much linked to the quality and international reputation of Finnish architecture. The department is internationally recognised for educating (after many years of schooling) practicing architects of high quality. A challenge is to develop the department in various fields of research without losing the inherit qualities of their tradition. The general impression of the board is that the department still struggles to come to terms with an operational concept of "research" and "research activities" and its difference from "professional practice-based research" (as classified in the school as artistic activity).

It is also important to note that the Department of Architecture is still located in Otaniemi, and that the stress on transition in the department should not be underrated. It might be the case that research activities and evaluation of the research and artistic activities for the department appear slightly immature at this point, in comparison with other departments because they have less opportunity to share reflections.

Outputs and social visibility

The department has a very good reputation, both at national and international level. The research activities dealing with wood architecture and technologies are highly advanced and internationally recognized.

The department has the capacity to attract international postdocs, lecturers and professors that are fully integrated in the structure; it has international collaborations and has interesting international cooperation projects. Less evident is the visibility of the outcomes of research and practice-based activity in international contexts (only one example about China has been described).

The department is highly involved with the high-level architectural practice. For example members of the department have been extremely successful in two international competitions: the Helsinki Library and the new building of ARTS at Aalto University. For this last competition a professor won the first prize and a student the second prize. The outcome of the practice-based activity of the members of the department has a high visibility, for example during the year of Helsinki Design Capital. In some cases the department has been able to match the private professional activity of its members with the research activity in its focus groups (for example the new concept for hospitals, etc.).

Infrastructure and environment

The department has in the last two years recruited two new professors, two postdoctoral researchers and one lecturer attracting candidates internationally.

The department has elaborated a clearer structure (related to education-research and creation) based on five focus groups: Base (history of architecture), Space (public and private space: e.g. sustainable pavilion, transformability of small spaces), Land (landscape: e.g. community gardens and ecological gardens), Smart (Living+, wood research activity) and X (design methodologies, digitality research by design, service design and wellbeing). Each group, with the exception of Land, is led by at least one professor. There is evidence of good collaboration between MA students, doctoral students, post docs, lecturers and professors.

The Department is involved in a relevant number of projects funded by Tekes, Finnish Wood Research Oy, Aalto University, etc., mainly in the field of wood architecture, sustainability, health care and urban planning. In comparison with the other departments the Department of Architecture has a good capability of attracting funds in relation to a limited manpower.

Interdisciplinarity has been further developed though different departments and schools thanks to some projects related mainly to wood technologies, sustainability and energy. Outside the university the department has established an “Urban Academy” in collaboration with the University of Helsinki.

Future potential

Taken into consideration the modern history of Finnish architecture and the national cultural significance of Finnish architecture, the potential of reinterpreting the disciplinary education and practice is vast. Architecture is grounded on an interdisciplinary knowledge basis and the discipline has a capacity to confront major challenges in modern society. Given the international reputation, the department has a competitive advantage in twinning and networking with major international partners in the field.

The five focus areas should be further developed and reinforced. Master students and PhD students can contribute to this process. The department depends strongly on the potential contribution of future professorships, for example in the field of landscape and in building technology.

There is potential for professional practice to be further integrated in the strategy of the department, thereby expressing its own identity, value and criteria for its evaluation and making visible its contribution to education, to research and to society.

Strategic plans and goals

The vision of the department, the objectives and the key actions are clearly listed. In their vision they are highly interested in contributing to the profession and to the contemporary society both critically and constructionally. Interdisciplinarity (informed by technical, humanistic and social sciences) and internationalization are taken into account. An interesting matrix between themes and the focus values defined by ARTS has been elaborated. More innovative areas of research like service architecture, wellbeing architecture and digital manufacturing are included in the newly developed matrix and will be further developed in the years to come. From 2013 a steering group for research and doctoral education has been established and the role of the Head of the Research has been created.

Challenges

- Future campus

  The department is the only department of the school to be located in the Otaniemi Campus (only recently Media has moved as well to the new campus). This brings a lack of day by day collaboration and exchanges with the other departments.

  The department looks forward to the construction of the new common building in order to share the same space and to reinforce the sense of community among students, researchers and professors.

- Coming to terms with the concept of research and artistic activity

  Traditionally the knowledge production and the knowledge transfer in architectural education were based on experiences from practice. The concept of research as used at the department covers academic research, artistic research, practice-based research and innovations and new knowledge coming out of the practice of architecture. This set of interpretations is in a way only a problem in relation to the reporting needed to acquire university funding. It is a substantial challenge to deal with these regulations for reporting on a national basis, but there should be substantial effort to establish systems for assessment of all these different kinds of activities within the ARTS at Aalto University.

- The relationship to practice

  The strength of the department historically speaking is the strong link to the practice of architecture. Requirements for research-based education seem to be putting this situation under stress. The challenge is to keep up this strong relationship while developing profound research activities. This may only be done by linking the different activities within the department.

It is interesting that the department seems to develop research projects that are closely linked to the (private) practice of the teachers. This is a way of handling the relationship that might be developed in an interesting way.

- General framework

  The five focus groups recently established seem not to be equally developed yet. The expected additional professors could reinforce the less developed teams. Otherwise a major re-focalization should be suggested. Generally speaking the choice of the different focus groups might be tested and reconsidered, especially related to the future possible international research role of the department.

- Priorities

  Priorities for R&D activities at the department seem to have followed the priorities of the different professors. In a situation with very limited resources available, the department has to make very specific priorities.

- The development of excellence in research

  The school has an international reputation for excellence in architectural education in the meaning of buildings. From the limited information that is available to the SAAB group, it seems that fields like urbanism, landscape architecture, and architectural theory and history have not acquired the same excellence. The impression of the group is that research excellence is found within the research on wood construction and the general use of wood in building. It is interesting that this output is found in a research group that has been given priority; internal funding has proven to be sustainable and is able to combine technological research and architectural academic research with practice.

- Interdisciplinarity

  The relationship between the department and other parts of the university is much more clearly understood at this point of time than in 2012. The department clearly sees the advantage of cooperating with other departments at the university and the need for interdisciplinary (transdisciplinary) research. Architecture as a discipline has a history of linking to technology and engineering. The knowledge base of architecture, however, is far wider, and the social challenges that the discipline handles has to be met in a multidisciplinary way. The Urban laboratory, which is developed together with the humanities and social sciences at the University of Helsinki and together with design and media competence at the Aalto University, seems to be a very good example of an interdisciplinary research project that can lead to substantial social impact.

  The challenge is to choose, give priority to and sustain these kinds of interdisciplinary projects.

- Doctoral candidates and doctoral studies.

  In 2013 the department had totally 83 doctoral students enrolled; 1 doctoral degree was given. This might be an unfair example; only 2 of the 83 students are full-time research students. In the department there is a tradition of using a substantial amount of time completing the master's in architecture, combining education and work and ending up with the diploma as a very competent practicing architect. It seems like this tradition is passed on to the doctoral students. Our opinion is that the doctoral students should be looked upon as a resource, recruited to defined research areas and research projects, and be given supervision because this improves faculty research activities. The handling of the doctoral program and the doctoral students is an important challenge for the Department of Architecture. A clear structure for the doctoral study plan didn't emerge, as well as a strategy in order to reduce the time to graduate of MA students and PhD students.

- HR present situation

  The department seems to be mainly run by a few professors. Probably the high involvement of the professors in their professional practice and the few postdocs and doctoral students don't permit a faster further development of the department.

- HR policies

  The policies for recruitment and tenure tracks are a challenge. It seems like research and education might turn out to be competing activities. In order to keep to the excellence in education and combine this with the development of excellence in research there is a need to consider HR policies. Today tenure track is reserved for research-based competence. This might be opened up to involve also practice-based and artistically-based recruitment to secure practice-based knowledge production in the department.

- Funding

  Whilst there is excellent funding from external bodies, there is great potential to achieve greater levels of external funding, especially in conjunction with partners from across the university.

Recommendations

- Coming to terms with the concept of research by developing good criteria for the different typologies of knowledge production in architecture.
- More thoroughly discussed and profound priorities of research activities in the department.
- A total clean-up of policies for handling and taking in doctoral candidates, linking the chosen candidates to research projects that are given priority, and giving substantial support in terms of supervision and administrative supporting systems.

Department of Art

Outputs and social visibility

The achievements since 2012 include:

- Pori department and visual culture merged with the Art Department.
- More focused research areas in alignment with new master's programs.
- More efficiency in doctoral teaching and tutoring.
- Achievements related to definition of focus areas.
- Faculty members have produced more publications.
- Research is now well connected to teaching and artistic activity and societally significant.
- Artistic activity is increasingly international, diversified and related to research.
- The department continues rigorous work in developing all aspects of artistic research – in dialogue with partners, e.g. with international forums such as the Society of Artistic Research and national forums like the TaHTO doctoral programme of artistic research (together with the University of the Arts Helsinki).
- There is continued value of art teacher training to inform and disseminate Aalto ARTS knowledge and expertise nationally.

The department has improved on all indicators except staffing, i.e., increase in student completions, publications, artistic activity and funding, whilst a decrease in staffing. For example, the Art Department reported excellent results in doctoral completions in 2013 with 7 completed doctoral degrees (41 % of all in ARTS), 89 publications, 75 presentations/expert advisory/esteem activities, and external funding for four doctoral students. We were able to examine these theses and found them to be of an excellent standard.

More attention has been paid to allowing the faculty members to do artistic activity and to conveying its relevance to research and teaching. As a result it is clear that great benefits are resulting for the department. The department is also able to demonstrate the social impact of artistic research and activities, for example Kaisa Salmi's large-scale performance in the Lahti park Fellmaninpuisto titled 'Fellman Field', that results in a great deal of national exposure and social impact.

Further artistic activities were reported including 46 exhibitions. Exhibitions include individual achievements by faculty (and groups). Exhibitions are often connected to research and education with strong societal impact, for example, the 55th International Art Exhibition – La Biennale di Venezia that opened on 1 June. *Falling Trees*, curated by the Gruppo 111 collective (Mika Elo, Marko Karo and Harri Laakso).

The school delivers a comprehensive programme of doctoral studies courses, not only to its own students but also to students across the school. It also has put in place a consistent approach to supervision, defining the roles of the supervising professor, thesis advisor and student.

Infrastructure and environment

There is clear leadership and vision for the transformation into one Department of Art. There is clear use of teams and collaboration to build the research and artistic culture and generate output and impact.

The Art Department has used the Aalto change programme to rethink the focus, philosophical and practice-based approaches in the department, at all levels. There has been a significant development in the way in which they have been able to classify their research and artistic activities. They have identified three focus areas Visual Culture in Action; Art Education as Mediation; Contemporary Art in Context, these they have set within ARTS focus areas. This has been developed in discussion with all staff and appears to have been an initiative that has drawn everyone together and has been embedded in 'Art at Aalto'.

These discussions also resulted in the reorganization of the education programmes, which connects the department's research and artistic philosophical approaches to the education, whilst supporting an initiative to continue to contribute to the education and research culture in Pori. Further emerging structures/initiatives have facilitated the integration of education, research and artistic activity in an exciting manner, for example the Biofilia project. This research environment is further enhanced by the Aalto Artist in Residence program.

In summary there is a clear and elegant approach to developing the structures that support and develop research and artistic activity and that connect it to key indicators of publications, outcomes and education. This environment is one that helps all staff understand their role and contribution to ARTS' vision. It is also very clear and accessible to external stakeholders.

Future potential

This supporting environment that is now in place alongside the excellent approach to research and artistic activities presents great opportunities to take the Art Department forward, to deliver research output and social impact as well as pioneering education. There are great opportunities from the solid platform to develop cross-university, national and international collaboration. We look forward to seeing the department articulate its future vision beyond 2016.

Strategic plans and goals

The department presented excellent strategic plans, clearly articulated, against which they illustrated progress with evidence and examples of such progress. This was extremely impressive. The strategic objectives were articulated that three levels Research excellence, Ground-breaking Art, Pioneering education and Societal impact, against each three specific objectives were articulated and progress against each one was presented. This approach exhibits confidence of a well thought-out plan and implementation strategy which is world class and internationally leading, clearly linked to the school and university strategy. This is a significant improvement since the last SAAB report in 2012.

The department has successfully used this excellent approach to strategy implementation to encourage collaboration across the disciplines in art and with external collaborators which has achieved excellent results. Cross-school and university collaboration and interdisciplinary work is still emerging but where it is, it is having excellent results and exposure.

Challenges

The department is continuing to reflect on its development which is extremely encouraging, they see themselves the need to continue to find ways to explain the 'value' of art research and artistic activities, and to enable this to be articulated in a consistent and clear manner that is agreed and accepted at university level. This too will enable them to develop and have agreed discipline-specific criteria for tenure track promotion of both doctoral research-orientated academics and artistic practice-orientated academics.

They have also identified the need to review the research groups, to continue to enable research themes and groups to emerge, which regulate more effectively their activity and the links to the focus areas and education program.

Recommendations

- To continue to embed all department activities around the focus area.
- To maintain the excellent approaches to strategic planning and implementation, whilst reviewing and amending in relation to the external environment and emerging issues and opportunities.
- To review the research group structure and operations.
- To continue to deliver to targets on student completion and retention.
- To maintain and enhance the international quality of research, doctoral thesis and artistic activity.
- To develop a recording system for research and artistic activities that is externally and internationally accessible. (Reseda in English.)

Department of Media

Achievements and potential

The Media Department is composed of 5.5 research professors, 3 practice professors, 1 senior researcher, and 6 postdocs on fixed-term contracts. Its Photography, Graphic Design, and New Media programmes have been integrated to constitute distinctive but synergistic entities. The resultant critical mass makes the department a key player within the school and university, building on Media Lab's track record. Since the 2010 reorganization, there has been much constructive work across the programmes, and highly original research methods developed at Media Lab have fed into and become well embedded in Photography and Graphic Design. The structure of the six thematic research groups has proved effective (ARKI, Crucible, Learning Environments, Media Concepts, Sound and Physical Interaction, Systems of Representation), providing a good anchorage for the planned development of new strategic themes.

Overall, there has been a significant increase in publications across all three department areas, in terms of both peer-reviewed academic outputs, and cultural and artistic outputs.

Assessment criteria for the latter, being developed at school and university level, will benefit from Media input in light of its significant and pioneering track record.

Outputs and social visibility

The Academy of Finland mentioned the achievement of Media Lab in their report as following; "The Media Lab has a somewhat different distribution of research classes. The Lab reports that there is …. a broader focus than just digital media." Research in Art and Design in Finnish Universities, Academy of Finland (2009).

The panel was presented with a well-organized, thematically coherent, compelling set of achievements for the 2010-2013 period, including the following items:

- "Design workshops" by invited lecturers are open to Aalto and public participants.
- The "Spring Doctoral School" (three days) program is likewise established and open to Aalto and public participants.
- 14 dissertations have been published across the areas of media, photography and graphic design. The quality of copies provided indicate robustness of the doctoral examination and review process.

More than 40 peer-reviewed conference papers were published in 2013. The department has developed a range of online publishing formats recognizing the increased both national and international demand for

open source publishing in public research. Photography has received recognition in the form of awards and significant exposure in international media. The department is very active in presenting prestigious national and international and seminars, symposia and conference award winning photography and organizing internal and international conferences. The mix of prestigious external speakers and strong internal academic participation appears particularly constructive in consolidating Aalto's research profile and confidence.

The development of new digital publication formats and genres is exemplary. Through its commitment to shared social values and open source type ethics, this development demarcates the Media Department as a kind of "cloud source" for publications in the global network.

Future potential

The department has a strong tradition of including artistic activity in research endeavours. Results are of undeniable quality, and offer significant opportunities for articulating and thus capitalizing on the underpinning theoretical and methodological premises. Indeed, the Media Department appears to be well placed to claim development of unique knowledge-building competence, consolidating the dialogical relationship between theory and making underlined by Richard Buchanan in his 2009 RAE report. This work is now positioned to be incisively framed internationally.

Connections already underway with other school departments (e.g. with Design, and with Film, TV and Scenography through animation practices), and that are likely to benefit from the new conjoined campus (notably with Architecture), are further extended by links to the University of the Arts Helsinki (sound, with the Sibelius Academy), and Aalto science schools (e.g. a shared post in computing science). These offer potential for future development and more formally structured joint activities. Seminars ensured within each area and across the department serve as a backbone for research, as do courses on media theory and culture which convene all staff and post-graduates.

Strategic plans and goals

The department goal is to produce visionary knowledge, practice, tools and understanding for culture and society through research, design and artistic practice within the broad field of media. With a high sense of social commitment, this goal has been realized through a variety of educational projects and artistic development works. The strategy is focussed on methodological development in artistic, design and media practices combined with theoretical reflection. This relates well to the school and to Aalto's broader strategy regarding research excellence and trend-setting art.

Challenges

This department is being developed by a relatively small staff, who must sustain large, intensively engaged student cohorts. Targeted doctoral completions are ambitious in line with school and university imperatives (from 14 over the 2010-13 period, to a planned five per annum); this puts pressure on supervisory capacity. There are currently 76 active doctoral students; while the 6 postdocs can ensure supervision, continuity may be compromised by fixed-term contracts. An interaction design tenure-tracked professorial post sought since 2010 remains desired to build on current competencies and synergies. Quality doctoral candidates must be refused because of insufficient supervisory capacity (14 applications so far this year).

Aalto's understandable emphasis on doctoral research is creating exciting challenges, as well as a risk of overlooking the feeder role of bachelor and master's programmes for doctoral cohorts; these programmes respectively draw local undergraduates and graduates alongside growing international post-graduate student numbers. Graphic Design alone is pursuing bachelor, MA and doctoral programmes; the bachelor programme is being discontinued in Photography; Media Lab was launched with an MA programme. Consequently, MA and doctoral recruitment plans need to be carefully weighed up, in both quantitative and qualitative terms. The department's commitment to interconnected teaching and research is appreciable, and requires skilful management of activities and strategic priorities.

Recommendations

Challenges raised by 2009 RAE recommendations, which mentioned consolidation of posts and resources as a pre-requisite for growth, need to be revisited. Although staff student ratios have considerably improved, the department's successful development and potential now merit further consideration to optimise returns on investments. Commendable transformations to the school's funding structure, integrating notions of "rewarding" performance, should provide scope for reviewing resource allocation models.

The highly original research methods developed in the Media Department deserve to be more publicly acclaimed. The panel hopes that this year's 20th anniversary of the Media Lab, thriving in its new guise with the integration of Photography and Graphic Design, will offer opportunities to celebrate these achievements. Through its reflection on the changing profile of who is an artist and what an artist does, its contributions to open source communities, and its ethical commitment to wider social issues, the department offers outstanding new forms of knowing grounded in creative behaviours and skilful artistic developments. It is henceforth well placed to articulate and communicate its uniquely practice-informed methodological approaches to shaping our broader "media society".

Doctoral education

An assessment of the arrangements, quality and efficiency of the doctoral education taking into account how far the implementation of the doctoral programmes has proceeded.

Like most departments, Media remains burdened by unclear measures regarding management of large numbers of doctoral students, including enrolled students who are in fact inactive. The question of "sleeping" doctoral students, who would seriously tax supervisory capacity if they were to "awake", is obviously a school- or university-wide problem, but is particularly worrying in the context of a department that is under much pressure to mentor its thoroughly engaged, potentially growing doctoral cohort.

Research structures and support

The department has initiated a doctoral program, offered to the whole school, but mostly on the basis of the identified needs of the enrolled PhDs in the Media Department. The doctoral education in the department comprises of 3 PhD programs with the following division of enrolment: 38 (8 FT) in the Media Lab, Graphic Design 15 (2 FT), Photography 23.

There is a well-established application process for PhD students. It should be considered how this might include a screening process to find PhD students that also practically (financially) can complete a doctoral program.

Challenges to doctoral education

The department has a well-suited ambition of producing 5 doctoral dissertations per year. The department has contributed to doctoral education and research dissemination as such by developing and maintaining valuable new publication formats: e.g. the Journal of Artistic Research.

Department of Film, TV and Scenography

Achievements and potential

A major department review has led to a new suite of bachelor and master's degrees on offer from August 2014, with 10 majors in each of these programmes. Degree student numbers have grown; the recent appointment of a distinguished tenure-tracked professor in scenography (August 2013), and ongoing recruitment of a tenure-tracked professor in film, augur well for future development.

Discussions revealed significant international, Nordic region, and national research networks in a wide range of areas including film narratives for urban planning, "critical costume", the scenographic "event-space" (performative/ performance/ performing space), neuroimaging methods for study of "enactive cinema", poetics and politics of documentary film, and research into the effects of screen formats on cinematographic expression. Faculty member affiliations and international network memberships are solid; four imminent vivas (scheduled for spring/ summer 2014) indicate this relatively small department's potential to contribute to the school's wider research culture.

Infrastructure and environment

In terms of the research environment, discussions and documentation suggest established and emerging research activity with good potential, carried out by researchers with obvious competence and commitment. Strong collegial discussion and leadership is henceforth required to identify strategic priorities and ensure a holistic department profile. The fact that Costume Design, Production Design, and Scenography MA options are listed under "Theatre, Film and Television" (rather than "Film and Television") indicates parallel development of two separate, very differently resourced entities within the department. While distinctive components can successfully co-exist – and indeed constitute a valuable aspect of the founding legacy of Aalto School of Arts, Design and Architecture – careful nurturing of a shared identity is all the more necessary in such circumstances.

Physical infrastructure requirements and conditions vary widely across the department's research activities. "Enactive cinema" work entails close collaboration with Aalto University science partners (Brain Research Unit), and work on 360° cinematic formats likewise demands solid technical resources. More recently developing areas of "event-space" and costume show appreciable initiatives via links to the University of the Arts Helsinki, and notably the Theatre Academy. Access to Lume Centre infrastructure is however described as prohibitively costed for certain department projects. Given Lume's prominent position on department documentation, and its acclaimed reputation within and beyond Aalto more generally, this inaccessibility of key resources for Arts players is regrettable and urgently needs to be addressed.

Outputs and social visibility

The publications list for research staff includes prestigious items amongst refereed articles, book chapters, and monographs, and confirms strategic value of the recent tenure-tracked professorial appointment in

scenography. Ongoing recruitment effort in Film should aim for similar returns to boost research profile and potential, and attract competence that is likewise based on core disciplinary strengths while manifesting strong potential for interdisciplinary synergies. The department activity is evident on international academic networks in areas pertaining to screenwriting, documentary film, costume, scenography, etc. Aalto assists its staff to ensure conference participation and co-organisation; in many cases, Aalto researchers have instigated and are leaders or co-leaders of international research groups which are producing significant outputs.

There is acute awareness across the department of the need to establish criteria for peer-review of art practice as research, and thus ensure that artistic projects and experiments benefit from more robust acknowledgement within research evaluation exercises. Recognition of its artistic outputs, in keeping with wider initiatives underway at school level, will obviously strengthen the department's profile.

We witnessed good examples of research that is enhancing the department's and the school's social visibility. Research into film as a means for collectively developing narratives to aid the design of public spaces has clear social ramifications. Work on screenwriting as a tool for developing company strategy indicates clear connections to corporate sector partners (since both these projects are led by a doctoral student, sustainability of research potential is an important concern). High social visibility will be gained by the department's involvement in the Technology Academy Finland's Nokia-partnered Millennium Pavilion celebrations (April-May 2014), through design of a pervasive game for 10-15 year olds. At the wider department level, this might be construed as building, directly or indirectly, on earlier Tekes-funded research (2009-11) into the dynamics of large screens, shared spaces and social activity. The integration into projects of doctoral students from other departments (e.g. Media student engagement as photographer on a scenography publication) indicates valuable cross-department mobility.

Future potential

The panel believes that the Department of Film, Television and Scenography represents valuable potential, which requires strong leadership and concerted discussion. Researcher reports to the panel indicate strong commitments but also a need to develop a collegial identity, and to agree longer-term strategic priorities to clearly put the department "on the map". The panel noted several untapped opportunities for developing narratives around research strengths and outputs, which require concerted discussion i) across the entire department, and ii) across the network that has been established with Aalto University and external partners.

Strategic plans and goals:

The department's strategic plan was not explicitly formulated or sufficiently legible to allow assessment of plans and goals by external panelists. Issues of inadequate or inequitably accessible resources, competition for funding and infrastructure, and limited parity across the different disciplines within the department need to be clearly articulated and addressed as needed.

Challenges and recommendations

The panel was concerned by the disparate nature of the reports presented. While these represented distinctive individual activities, the overall department identity was hard to perceive. One of the challenges and recommendations is therefore the creation of real dialogue, to establish shareable terms and goals across the department.

Infrastructure challenges, pertaining to limited access to Lume, constitute a significant issue that needs to be promptly addressed, to capitalise on strong emerging research energies. Engagement with other Aalto departments and schools (e.g. with the Brain Research Unit via the Enactive Cinema project, and with the Media Factory and Architecture Department via scenography and costume projects), needs to be encouraged, and possible obstacles dispassionately and concretely addressed. It was difficult for the review panel to discern priorities amongst the various issues raised, given the marked differences across areas of activity and terms used to describe them.

Concerns regarding future doctoral student recruitment opportunities likewise require clearer articulation in order to be addressed by externals. The necessity to engage external supervisors and project leaders in areas lacking sufficient levels of internal competence is also a concern, which needs to be discussed in a wider context of strategic prioritisation. There was no mention of the Elomedia programme in the department's doctoral recruitment; the role played by specific programmes of this kind needs to be spelt out clearly, to underpin longer-term doctoral cohort planning and its alignment with priority investment areas. Professors of practice were described as – legitimately – leading teaching-focussed activities, while the university's broader imperatives to develop research were lauded, yet seen as often incompatible with means and resources "on the ground".

Overall, the panel felt that the department's potential for development needs to be underpinned by well formulated strategic priorities, aligned with the competence and experience of its staff. Recent and ongoing recruitments should substantially enhance the team's ability to articulate these priorities, and the department's goals within the school and university.

4. SAB Report of the School of Business

Scientific Advisory Board

- Professor Michael Myers, University of Auckland, New Zealand, Chair
- Professor Lars Bergman, Stockholm School of Economics, Sweden
- Professor Alnoor Bhimani, London School of Economics, United Kingdom
- Professor Joep Cornelissen, VU University Amsterdam, The Netherlands
- Professor Eileen Fischer, York University, Canada
- Professor Marian V. Jones, University of Glasgow, United Kingdom
- Professor Herbert Moskowitz, Purdue University, USA
- Professor Martin Ruckes, Karlsruhe Institute of Technology, Germany
- Chief Financial Officer Jussi Siitonen, Amer Sports, Finland

Summary and key recommendations

Since our last report in 2012 the school's progress has been remarkable. The swiftness with which our previous recommendations have been implemented has exceeded our expectations. We commend the dean and the school's leadership for making tremendous strides towards becoming one of the Europe's leading business schools.

However, the difficulties of becoming a leading business school should not be underestimated. Competition amongst business schools worldwide is increasing as many, like Aalto, are seeking to become world-class.

To support the Aalto University School of Business goal to become a world-class comprehensive business school by 2020, we make the following nine recommendations. These recommendations are based on the visit of the Scientific Advisory Board (SAB) in January 2014.

1. Increase faculty numbers.
2. Proactively hire and offer more support to international candidates.
3. Accelerate the hiring process.
4. Improve communications especially to the Finnish business community.
5. Develop a transparent system for allocating teaching workload.
6. Emphasize disciplinary excellence in research; advance multidisciplinary excellence through teaching and societal impact.
7. Improve the research infrastructure to support disciplinary research.
8. Continue to reflect on the positioning and contribution of the research centres.
9. Continue pursuing the focus of the PhD program; clarify, stabilize and extend to four years the funding for PhD students.

These recommendations are explained in more detail below.

Achievements and potential

Since our last report in 2012 the school has made tremendous progress. In the short time since then, the school has successfully implemented a tenure track system, installed a visiting professor scheme, and taken steps to revamp the doctoral program. These individual steps have not only made it possible to attract some international faculty, they have, most importantly, already taken root throughout the entire school

and have created a research-oriented culture with a strong international focus. The swiftness with which these changes have been implemented has exceeded our expectations.

The feedback we received was that the leadership of Dean Björkman and his team has made a large, positive difference. Faculty morale is high, the faculty is highly motivated and energized, and there exists a good collaborative spirit within the school. Alumni activities have been expanded and corporate connections improved.

Hence we commend the school's leadership for these significant accomplishments. The school has taken major steps forward towards becoming a world-class business school. However, while we know that the school has much potential, the set time frame is very ambitious. The school should not underestimate the difficulty of achieving the goal of becoming one of the top ten business schools in Europe by 2020. One of the biggest challenges for the future will be ensuring that the school has sufficient financial resources.

Strategic plans and goals of the school

The Aalto University School of Business Strategic Plan for 2013-2016 was approved by the school and university on June 18, 2013. The long-term goal is to become a "world-class comprehensive business school by 2020" and to be counted amongst the best business schools in Europe.

The SAB fully supports the strategic plan. The SAB endorses the management principles of engagement and openness, the continued efforts towards research excellence, and the focus on student-centred learning. The SAB also agrees that the school has a responsibility to make a significant contribution to society.

The school has made tremendous progress since our previous visit in early 2012. However, given that the strategic plan was approved just six months ago, we believe it is perhaps too early to assess the school's progress in meeting the targets that have been set. The one point we will make is that the goal to become one of the top ten business schools in Europe by 2020 is very ambitious, given that 2020 is just six years away.

We provide a more detailed evaluation of the school and departments below.

Doctoral education

The School of Business has made impressive progress in revamping its doctoral program. The new structure, with separate specializations in Business, Economics and Finance, allows for customization of the curriculum as appropriate to the disciplinary requirements of each area. The common core, comprising courses in methodology, research communication and academic writing, provides for the necessary coordination within the school, between the Business School and other schools at Aalto, and between the Business School and other partners or affiliates. The SAB regards it as appropriate that a total of 60 ECTS credits will continue to be required of all doctoral students, with some rebalancing towards fewer common core credits (12) and more specialization credits (48).

The new emphasis on attracting and training students who will be motivated and prepared to take placements in academic posts in peer universities meets with the SAB's enthusiastic approval. The steps taken toward meeting this goal (altering the deadline for applications to be consistent with those at comparable institutions, selecting only full time students, requiring standard tests such as GMAT or GRE, and introducing supervision plans to ensure students receive a uniform high quality of oversight from their advisors) are all entirely appropriate. The decision to guarantee at least two initial years of funding for all

doctoral students who are demonstrating appropriately high levels of performance is also a commendable step in the right direction.

The SAB recommends that the school should continue pursuing the focus of the PhD program, and in particular should clarify, stabilize and extend to four years the funding for PhD students. This recommendation reflects our support for the initiatives undertaken, but also our perception that the funding-related dimension of this initiative remains under-developed. We formed this perception because neither faculty nor students we interviewed seemed clear on two key questions related to funding. First, it is unclear whether students are expected to teach in their first two years as part of their funding package, whether they were required to work as research assistants, or whether some other kind of work (other than doing coursework and starting research projects) was required. Second, it is unclear to both students and faculty whether students can count on receiving funding beyond the first two years of their doctoral program if they are receiving good grades in their courses and performing well.

Our sense is that students should not be required or indeed allowed to teach in their initial years of doctoral studies, although working as a teaching assistant in the first two years is not unreasonable (and definitely recommended later). At a minimum, however, expectations in this regard should be clarified. It is also our conviction that, since students are expected to take four years to complete their doctoral studies, it is only reasonable that they be funded for four full years, assuming they consistently meet specified performance criteria. Until guaranteed four year funding is in place, it will be difficult to attract the best and brightest students nationally and internationally. North American programs routinely offer full funding for four years.

School terms of reference

The tasks of the SAB in the School of Business are

- To provide a critical evaluation of the strategic plans and goals of the school and its departments, and a critical evaluation of the implementation and effectiveness of the plans in the light of Aalto's strategy and the previous evaluations.
- To follow up on the academic quality of the research achievements, scientific and societal visibility, research environment and future potential of the schools and the departments.
- To assess and present recommendations regarding the arrangements, quality and efficiency of the doctoral education (doctoral courses, supervision, funding and results) taking into account how far the implementation of the doctoral programmes has proceeded.
- To look into any school-specific issues determined by the school and to follow up on the SAB recommendations made in the previous meeting.

The evaluations described above are done in order:

- To support and encourage the departments in their activities, development and transformation process.
- To support the dean in managing and developing the school and in revising and sharpening the strategic plans of the school.
- To provide the president with feedback for developing the whole university.

In 2012 the SAB made 12 recommendations for the School of Business. We are pleased to report that most of our recommendations have been implemented, although a few remain as work in progress, and one is

still to be done. The one outstanding item on which no progress was made was workload. In 2012 we recommended that teaching loads should be explicitly specified and that there be clear criteria for allocating the number of contact hours per year that are normally expected of each faculty member. Given that we still believe this to be an important issue we have reiterated this recommendation once again in this report (recommendation 5).

Recommendations

1. Increase faculty numbers

   In order to become one of the top business schools in Europe, it is our view that the school needs to have a certain critical mass of faculty who are able to publish high-quality scholarship in the best outlets and provide academic leadership. We acknowledge that the school has made good progress in this regard, and we are pleased to see that the school has recruited 32 new professors on tenure track or in tenured positions (as of October 2013). However, as mentioned in our previous report, we believe that the existing faculty resources are still insufficient. In our discussions with departments, a common theme that emerged was the need for more high-quality recruitments, especially of internationally known scholars who can mentor and collaborate with more junior scholars. Hence, we support the vision of the school, as stated in the strategic plan, to have 95 professors on tenure track or in tenured positions and 20 on the lecturer track by the end of 2016, with the proviso that a good number of these should be international candidates (see recommendation 2 below).

2. Proactively hire and offer more support to international candidates.

   Currently, there are too few international appointments at the early career (postdoc, assistant professor), mid-career (associate professor) and senior levels (full professor). This observation reflects the step-change that is needed in not only hiring more faculty (recommendation 1) but also hiring promising and high calibre faculty with international experience. We believe that such international experience may involve Finnish nationals who have worked for periods of their career abroad, but in line with key indicators (such as in EQUIS and the Financial Times ranking of business schools) we also advise the school to target non-Finnish colleagues for recruitment. A higher percentage of international faculty will add considerably to the research capacity and international ethos of the school, and is consistent with its aim of becoming an international school with strong roots in the Finnish business community.

3. Accelerate the hiring process

   In our discussions with departments and senior faculty it emerged that one of the barriers to hiring strong international candidates was the length of the recruitment process. In a world where competition for the best international scholars is increasing, taking up to 10 months or more to hire a new person is infeasible given increasing rapidity of movement in the international job market. We understand that some excellent international candidates have been lost due to the long recruitment process. Hence we recommend that the university and school should significantly streamline and accelerate the hiring process, especially for distinguished international scholars.

4. Improve communications especially to the Finnish business community

   Members of the Corporate Advisory Board mentioned that the Finnish business community has strongly supported the establishment of Aalto University. However, questions are now being raised in the business community about the return on their investment. It appears to us that there is an urgent need to improve communications, especially to the Finnish business community. The business community and the public in general need to be better informed about Aalto's progress. Failure to improve communications could result in a loss of support for the university. However, some faculty mentioned that the current communication services being provided by the university are not proactive. This current weakness needs to be addressed.

5. Develop a transparent system for allocating teaching workload.

   In contrast to most leading business schools, the School of Business, like Aalto University as a whole, neither has well-defined teaching loads for individual faculty members nor a transparent system for allocating teaching loads between faculty members. The general perception seems to be that each faculty member should teach two or three courses per academic year. However, the courses offered at the school differ significantly in terms of student numbers. They may also differ with respect to associated responsibilities such as grading and tutoring.

   The SAB acknowledges the risks associated with overly detailed teaching load definitions and work load allocation systems. Yet the SAB recommends the school should define minimum and maximum teaching workloads and associated responsibilities, and to develop a transparent system for allocating expected teaching workloads among faculty members. The system should be simple, but take differences among courses (e.g. student numbers) into account. The system should also include "teaching discounts" for the development of new courses and programs as well as for specified administrative assignments.

6. Emphasize disciplinary excellence in research; advance multidisciplinary excellence through teaching and societal impact.

   An important element of Aalto University's mission is the cooperation across disciplines. Recognizing the strong benefits of multidisciplinary excellence to society, the school should make an effort to advance multidisciplinary excellence through teaching and societal impact. In the realm of teaching, multidisciplinary excellence could, for example, be increased by offering courses particularly relevant to students of programs outside the school and/or by offering programs with a strong interdisciplinary focus. In the realm of societal impact, multidisciplinary excellence could, for example, be fostered by offering platforms that facilitate entrepreneurial activities by students and/or by providing advice for entrepreneurs in all business matters.

   Excellence in multidisciplinary research, however, requires research excellence in the individual disciplines. While the school has made tremendous strides towards its goal of becoming a world class business school and be recognized as such, at this stage it is important that the school continue to place its emphasis on research excellence in the individual disciplines. Concentrating efforts on research excellence in the individual disciplines allows the setting of clear goals for

excellence and thereby provides strong incentives for all members of the school to conduct high-quality research. Disciplinary excellence is also a main factor for attracting excellent scholars in the individual business fields to further improve the research excellence and the international visibility of the school. This does not, of course, preclude the involvement of members of the school in multidisciplinary research projects.

7. Improve the research infrastructure to support disciplinary research

   There appear to be opportunities to improve the library's services and to clarify the funding and cost allocation principles of the research databases and administrative services.

   Research databases are critical to support high-quality research. The current funding model for databases is under review with the school planning to get them funded externally in the future. However, many departments commented that external fund providers consider databases as a basic infrastructure which should be funded by the school. We suggest that the school should clarify the funding model to ensure the continued availability of these databases. We also suggest that departmental needs for electronic collections should be regularly reviewed. Some departments mentioned that the library's collection of the relevant electronic resources was not as comprehensive as it should be.

   The quality and the availability of the shared administrative services were mostly considered sufficient. The cost allocation principles of these services, however, were not transparent for all the departments. Our recommendation is that the cost allocation principles should be reviewed and communicated to each department.

8. Continue to reflect on the positioning and contribution of the research centres

   SAB's report in 2012 noted that the position and role of the then 3 research centres was unclear and recommended that the school reflect on and decide the role of each. It was recommended that the decisions be made with regard to the centres' strategies and contributions to the missions of the school and appropriate metrics be developed to assess those contributions. This year two centres remain, CEMAT and CKIR. The SAB understands that discussions are continuing with regard to the role of the centres in teaching and PhD supervision. It was not clear to us whether this would involve the integration of individuals into the school thus dissolving the centres, or whether the centres would continue to exist whilst redefining their roles at university or school level.

   In discussing the current and historical activities of the centres, we considered the accumulated experiential knowledge in negotiating, securing and managing large scale European projects and grants to be invaluable, as is the reputation of the centres with external business and policy communities. Much of this experience is vested in individuals and could be transferred or shared with the business school and across schools through knowledge exchange activities. Given the likelihood that large European research grants, industry-higher education collaborative research, and research with relevance and impact are high on most European policy and business school agendas, relevant experiential knowledge should be retained wherever possible given the considerable resource and time allocation that would be required to start from scratch. For these

reasons we recommend that discussions continue to focus on the integration of either the centres themselves, or the primary functions of the centres, including experienced individuals into the business school. We recommend that these discussions should consider their roles as trusted partners in the external community, and potential providers of intermediary functions between departments in support of single and particularly cross-disciplinary research. Perhaps KPIs for the centres could be developed reflecting future impact, societal impact, and the securing of large-scale research funding.

9. Continue pursuing the focus of the PhD program; clarify, stabilize and extend to four years the funding for PhD students.

   As mentioned earlier (in the Section on Doctoral education), the SAB is impressed with the way in which the school has revamped its doctoral program. However, we suggest the school should clarify, stabilize and extend to four years the funding for PhD students. We believe that offering four years of funding will enable to school to better compete for the best and brightest students nationally and internationally.

Reflections on each department

Department of Accounting

The Department of Accounting includes two groups: accounting and business law.

There was a recognizable change in the atmosphere amongst the accounting group since the last visit: from being rather reserved to a more positive attitude towards developments at Aalto. The new tenure system was considered mostly positive though some concerns about candidates' evaluation process were raised, especially on how strictly publications are required vs. a more holistic view on the candidates' competence. The focus of the department is on teaching, but there appears to be a constant shortage of teaching resources.

The PhD student intake of 0-2 students per year is considered good especially from the students' perspective; now the department can provide better supervision. The department's role in high-quality research was considered challenging due to the fact that the current publication profile of the department does not fit with the current requirement to publish in first-tier internationally refereed journals. However, the required infrastructure services for the department are fine.

The Law group consists of four professors one of whom is a new appointment since the last evaluation board. Discussion indicated that the new dean had made considerable headway in incorporating the integration of Law into the Business School but there are still challenges. Key issues include the prominence and high level of specialisation within the group, need for funding for development, identification of suitable bridges for integration with the school, and consideration of suitable metrics for performance at least over a transitory period. While prominence and specialisation in Finnish law are significantly important with regard to reputational bonding and the status of the business school with the Finnish corporate and legal fraternity, it also represents the most significant challenge with regard to the internal integration of Law and to the school's internationalisation strategy. The scientific culture of the school requires publication in high-level journals of international standing while the specialist knowledge of the group is predominantly on aspects of Finnish law, normally published in the Finnish language in the form of monographs by single researchers.

Inevitably there will be trade-offs between the need to maintain output and reputation in established ways, whilst engaging in knowledge transfer and collaborative teaching and research across an internationalising business school. We suggest there needs to be more understanding across the business school as to what added value Law could bring to business disciplines. This might be done through a multi-way process between the rest of the school and Law in which issues of mutual interest are discussed.

The law professors suggested that developments in their area were inhibited by the current funding model which is teaching-performance-based, and relies on generalised metrics. They also commented that the tenure track process for their subject area lacked clarity, given that their publication strategy differs considerably from the American model. With regard to morale amongst the group, there was uncertainty about the future especially amongst the most long-standing members of the group. There seemed to be no clear or immediate sense of how to move forward but collectively they saw the new professorial appointment as a step in the right direction.

Department of Economics

The faculty members in economics have excellent research records and several members regularly contribute to the public debate about economic policy and related issues in Finland. The department clearly benefits from the co-location with colleagues from Hanken School of Economics, the University of Helsinki and a Finnish research institute.

A key issue is the role of a department of economics within a business school. One role is to develop knowledge and to provide specialized education in economics. However, the number of business school students specializing in economics tends to be rather small. Thus another role could be to offer courses in economics designed for students who are specializing in business. The role of such courses is to deepen the students' understanding of both of macroeconomics and various applied microeconomic fields.

Against this background the SAB recommends the department to focus more on a set of somewhat broader courses in economics for business students particularly at the master's level. However, in order to be able to attract PhD students, the department also should offer a highly specialized "research master" program, perhaps in cooperation with Hanken and the University of Helsinki.

Department of Finance

Coming from a high level of excellence, the Department of Finance has improved further. Several members of the department have had papers accepted in the top journals of the field. Furthermore, the department has been able to attract international faculty and has seen strong interest by high-quality scholars during the current round of recruiting. The department possesses all the prerequisites for excellence in research: a very successful PhD program, a seminar series with top international scholars, and a research infrastructure, mainly in the form of databases, on a par with international standards. It is important that these essential pieces remain in place. Given the department's emphasis on behavioural finance, it appears sensible to expand the research infrastructure by establishing a laboratory in which scientific experiments can be conducted.

Department of Information and Service Economy

The Department of Information and Service Economy consists of three groups: information and systems science, logistics, and management science.

The information and systems science group within the department consists of four professors and two lecturers. One strength of the group is its international visibility: members of the group have been very

active in international forums and the number of citations to their research work is impressive given the small number of faculty. Another strength is interdisciplinary cooperation that takes place between the department and service factory. The group is positive about the direction and recent changes at Aalto and share the goal to increase the number of publications in first tier journals. However, to achieve this goal they will need more high-quality recruitments, international visitors, and a greater certainty of funding for PhD students.

The logistics group within the department consists of 5 professors and 1 lecturer. Since the last visit of the SAB, the group has become stronger with some outstanding junior appointments. The group believes that to become world class in their field they need to co-operate with and participate in international research associations. They also need to have internationally respected visiting professors to help them publish their work in the best outlets.

The management science group consists of 5 professors, 2 lecturers and 2 teachers. Since the last visit of the SAB, the quantitative methods and management systems subfields have merged into one discipline. The group has become stronger with some outstanding junior appointments. A strength of the group is the active engagement in the international scientific community as editors/associate editors, reviewers, conference/track organizers, and leaders of scientific organizations. The number of citations to research work is also good.

One concern expressed by the group was the difficulty in launching new programs. For example, there is an opportunity to launch a new program in business analytics and data science, but so far no resources have been forthcoming. It would seem that a new program in this area would provide an ideal opportunity for collaboration between the management science and information systems science groups within the department, and perhaps even with marketing.

Department of Marketing

The marketing department is one that has undergone much change since our last visit. Of the existing complement of faculty members, 25 % are internationally trained, including two new senior members of the department. The department is performing well in terms of publications in FT 45 and JUFO 3 journals.

Within the group, there is a tight-knit sense of community among both faculty and doctoral students. Two international visitors who will spend 4 weeks/year visiting the marketing group should further enhance its cohesion and stimulate its members to pursue high calibre work.

A pressing concern for the group is how to staff its courses. Currently, the group relies extensively on doctoral students to teach, and there is a sense that this model is unsustainable, yet no clear sense of what the alternatives may be.

Department of Management Studies

The Department of Management Studies is the largest department in the school, and covers a range of units (each with a specific disciplinary focus): organization, general management and the philosophy of management; international business; entrepreneurship; and organisational communication. A strength of the department is the fact that it covers a range of topics and disciplines (not uncommon of management departments in general) and this breadth provides opportunities for interdisciplinary scholarship and teaching (e.g., linkages between organisational communication and IB, or between strategy and sustainability). The department has recruited high profile researchers who bring visibility as well as publications in leading academic journals. Notable is that it also has a significant social impact around the

theme of sustainability and through connections of researchers with local businesses. A key opportunity for the department will be to incorporate the four units in such a way that besides their disciplinary focus and excellence opportunities for interdisciplinary collaboration are identified and exploited.

It seems fair to say that the entrepreneurship group within the department is in a state of flux, given the retirement of senior members of the entrepreneurship group, and the very recent addition of new members. It is also a small group, with three members, two of whom are newly hired. That said, the group is optimistic about its role in the institution and confident of its ability to perform as is expected in terms of research, teaching and social impact.

New efforts to form collaborations with other schools at Aalto and with entrepreneurship faculty at Hanken are in progress, which should help further develop the capacity of the group in terms of both teaching and research. The challenge for the group is to realize its potential and start to produce research of the calibre expected across all departments.

The group of organizational communication within the department involves specialist researchers and lecturers who focus on the area of corporate and organisational communication. The unit has recently been repositioned, following the outsourcing of the foreign language teaching. The unit focuses on a range of themes and topics (such as business English as a lingua franca and organizational discourse analysis) that reflect the training and background of staff, and provide strong potential for collaboration with colleagues in management and international business. A key challenge for the unit moving forward will be to connect with mainstream topics and researchers in strategy and international business. On the educational side, the unit has recently launched a master's programme in corporate communication, which reflects the profile of the faculty and demonstrates a strong relationship with professional practice.

The International Business (IB) group within the department comprises 6 members of whom 5 are professors. The IB group is productive, forward looking, and aware of the implications of internationalisation and their role in it. To some extent, however, they have become victims of their own success and immediate challenges stem from the involvement of several of their faculty members in senior administrative roles, as well as uncertainty about succession issues. The IB group is in international collaboration in doctoral education with other institutions. While these collaborations provide strong signals of internationalisation, they also have an administrative burden which is carried by the IB group. This burden potentially challenges their ability to sustain high levels of research productivity. It is clear that faculty currently feel overworked and better resourcing would be appreciated.

Conclusion

As members of the SAB, we fully support the goal of the Aalto University School of Business to become a world-class comprehensive business school by 2020, and to become one of the best business schools in Europe. We commend the university and the school for the progress that has been made over the past few years. The school is clearly moving in the right direction.

However, the difficulties of becoming a leading business school should not be underestimated. Competition amongst business schools right around the world is increasing. We hope the nine recommendations that we have made in our report will go some way towards helping the Aalto University School of Business to achieve its strategic goals.

5. SAB Report of the School of Chemical Technology

Scientific Advisory Board

- Professor J.W. (Hans) Niemantsverdriet, Eindhoven University of Technology, The Netherlands, Chair
- Professor Wout Boerjan, Ghent University, Belgium
- Professor Enrique J. Lavernia, University of California Davis, USA (did not attend the meeting in 2014)
- Professor Arthur J. Ragauskas, Georgia Institute of Technology, USA
- Professor Rasmita Raval, University of Liverpool, United Kingdom
- Dr. Jens Rostrup-Nielsen, Haldor Topsoe, Denmark

Introduction

The Scientific Advisory Board (SAB) visited the School of Chemical Technology for the second time, from Monday till Wednesday March 10-12, 2014. The meeting was well prepared, with flawlessly organized logistics, excellent documentation and secretarial support. Owing to this, the meeting was efficient, informative and pleasant. We appreciated the open atmosphere in which the discussions were held. We thank the Dean, Professor Janne Laine, Ms. Eija Zitting, and Dr Greger Lindén for the excellent arrangements and support.

This report has a main section with the most important recommendations, while more detailed comments as well as minutes of the meetings are given in appendices. We present our report to the president and the dean and leave it to their discretion with whom they wish to share the information, and if they wish to edit the report for that purpose.

The seminar with four newly appointed staff followed by a session with posters presented by doctoral students was a highlight of our visit, and a good way to enhance a feeling of corporate spirit among the school community.

For the next visit the SAB recommends

- to have separate sessions with BSc, MSc and PhD students and postdocs, and newly appointed tenure track professors,
- that each department prepares a SWOT analysis, and
- that there is a one-page key info per professor, in the style of the ERC template, providing a summarizing CV with specialism, teaching load, grant history, recent publications, and major management responsibilities.

Aalto University

The SAB is somewhat concerned that too many new professors are, and have been, hired at the same time (big catch – poor fish?); and also wonders how to ensure that all share the new vision and mission of Aalto. The SAB recommends a five-year plan for staffing, investments in equipment, anticipating retirement and replacements to ensure a smooth transition. The leading principle in the plan should be the number of staff needed for teaching and perspectives for research excellence. In order to enhance the spread of the vision

and mission of Aalto and to ensure uniformity and efficiency in administration, Aalto's leadership courses for present and prospective deans and heads of department are of the highest importance.

Multidisciplinarity will fail or be at best superficial without special actions and incentives, and also needs to be a clearly stated requirement for tenure in multidisciplinary fields. Aalto should continue its efforts and support in this. The synergy with the School of Arts, Design and Architecture has so far been incidentally successful, but offers unique possibilities for Aalto to be a leader in a self-created league of design-oriented universities. Aalto should capitalize on the reputation of Helsinki as a design capital of the world.

A few additional recommendations to the university and the president would be to install a special fund for large investments in equipment; to expand the adjunct professor program (and employ more part-time faculty from industry); and to make a program for PhD students to spend a semester abroad. The mentoring plan for young staff in the tenure track system should also be reinforced. Generally, the SAB also heard complaints about the magnitude of the central overhead and the insufficient transparency of how this overhead is spent; clearly there is a need for clarification.

School of Chemical Technology

At the school level, there seems to be a significant imbalance between teaching, research, infrastructure, staffing and funding; apparently, the funding situation is tighter than foreseen. The SAB then recommends the school to abandon the 'formation plans' and make a plan based on minimum staff for teaching requirements and reconsidered research priorities to be delivered by this staff. The school should also make a plan for a unique and upgraded infrastructure and staffing strategy (e.g. concerning the vacancies for "metal processing" that are there mostly for historical reasons).

The school could consider making the organization flatter, and to remove the management layer (of heads) of departments. The remaining structure would be a school, led by a dean and one or two vice-deans (e.g. education; management & administration) and a few program coordinators, which could offer a more flexible organizational and research structure.

The SAB would describe the current departments in a nutshell as follows. The Department of Biotechnology and Chemical Technology and the Department of Forest Products Technology are both on track; the Department of Materials Science and Engineering has much improved since last time; whereas the Department of Chemistry still lacks a comprehensive vision and mission. The involvement of this department in collaboration with other units is weak and not acceptable; both the SAB and an earlier review panel have noted this before. The SAB recommends the department to draw up a plan of action, which should be implemented within one year, followed by an in-depth review by a special external review committee of experts, before new staff is hired.

A general concern for the whole school is that the heavy focus on bio-related areas could be a danger if it occurs at the cost of 'traditional' but indispensable disciplines (e.g., reactor engineering, etc.).

Evaluation of the School of Chemical Technology

Since the SAB's last visit in 2012 there is clear improvement in publication productivity and to some extent graduate studies. Also, select faculty is exhibiting international-level research and impact.

Some weaknesses are still to be remedied. To some extent, the research visions of the departments are weak and too broad and need be refocused. The departments' research missions need to be described with quantifiable parameters. There is also a lack of clearly focused strategic plans, which is truly concerning

given the planned faculty hiring. There seems to be little evidence of synergism of individual faculty research efforts.

The school and the departments should definitely make up a plan to address equipment renewal and strategic capital equipment purchases.

The school and the departments have taken some of the recommendations of the previous SAB review into account but a truly effective response is lacking. The issues and challenges raised in 2012 still exist and should be dealt with. The current management team is new and seems uncertain of all the challenges and what to do.

Education; PhD funding and training

Teaching is the first priority of any university. The SAB notes that the training of undergraduates has been tackled effectively. A strong recommendation of the SAB is for the school to turn its attention to the training of PhD students.

In view of the bio-related focus, the SAB recommends biology and cell wall biology as areas to be included in a general course in the PhD program. In addition, when it comes to the PhD training, there appear to be several PhD students enrolled on one-year funding contracts, with the students responsible for raising their own funding for each year of continuation. The research topics appear to be determined by individual students with their funders, and are not restricted to the major themes of fundamental research that the school is developing[1]. There also appears to be no formal induction or training of PhD students, and there is little formal administrative support within the department/school that addresses the need of the PhD student community. There is no representation of PhD (or postdoc) communities at department/school level. The current structures may leave PhD students isolated in individual research groups and do not create a multidisciplinary environment in which they meet regularly with their peers to discuss science.

The SAB strongly recommends that best practices from doctoral training networks in the EU are adopted to raise the training and connectivity of the PhD researchers. The following elements of PhD training need to be considered explicitly:

- Research projects: Relevance to school/department themes; all results to be publishable in the thesis; must create an original contribution to the research area.
- Specialist scientific skills required to deliver a high-grade research project (attending summer schools, international conferences, international lab visits; receiving in-house specialist lecture courses from research leaders).
- Transferable skills: Training in project management, team working, time management, literature searching, writing research papers, presentation skills, ethical and societal issues that drive research policies in academia/industry, and issues of technology transfer, IPR, innovation and commercial exploitation.
- Building a research community: weekly school/department seminars from external and internal research experts followed by 'mixer' discussions; journal clubs; end-of-year symposium/poster day where all students present their research.

[1] According to the school, the students are dependent on *the professors' effort to raise money* (not on their own efforts), and the research topics are determined *by the professors together* with individual students and their funders. (Note added by wish of the school.)

Departments

Department of Biotechnology and Chemical Technology

The strengths of the department include a broad but encompassing mission focused on process technology, biotechnology as well as biomaterials science that leverages VTT's capabilities. As examples of some recent success at the department, an infrastructure alliance together with VTT for excellence in sustainable biomass refining called Bioeconomy was included in the national research infrastructure strategy and roadmap of 2014. This promises future funding and contribution to a key national research focus that is relevant to global biorefining efforts. The focus on innovative microbial oil technology also indicates that translational research is being done in the department. In general, the department has responded positively to the review and recommendations of the SAB in 2012. The actions taken include hosting an upcoming conference on biotechnology and increasing both publication impact and quantity over the past two years.

There are, however, also some reasons for concern. There seems to be little contribution of the department to Aalto's vision and mission on design and business. There also seems to be a lack of cooperation between the areas of chemical technology and biotechnology; the faculty on both sides should be encouraged to produce joint publications, to have joint projects and also share students. The department must also identify the critical needs when it comes to equipment as well as tenure track hires. To avoid unexpected financial crises in the future, there should be a management plan to handle changes in funding.

Department of Chemistry

As a highlight and indicator of the quality of research done at the department, Professor Maarit Karppinen has recently received an ERC Advanced Grant in the area of molecular-layer-engineered inorganic-organic hybrid materials. Both the quality and the quantity of publications of the department have increased since the last visit of the SAB. On the teaching side, a more streamlined structure has evolved.

Five new tenure track positions (of which two are joint positions with other departments in the school) have been made available; one of them has so far been filled in inorganic chemistry by Professor Shiv Halasyamani. These new positions strengthen the possibilities to collaborate within the school, where all chemistry research currently maps onto an active and functional materials theme. Within this covering theme there is computational chemistry, a new and important capability. The SAB would, however, recommend that there is alignment of computational research with existing experimental work at Aalto University to deliver high impact science for the whole university. The new streamlined BSc and MSc course structure should enable the professors to deliver all lecture courses, with lab classes delivered by a greatly reduced number of teachers. This should allow the departmental staffing structure to be reorganized away from teaching-only contracts towards research.

There are still areas of concern. There is no clear vision and strategic plan to identify the flagship areas of the department and develop research excellence in them. Although chemistry is a central scientific discipline in the school, the department's interaction and overlap with the rest of the school is limited and falls short of realizing its potential as a truly underpinning science. A structured brainstorm at the departmental and school level is required to address this. Concerning the remaining open four tenure track positions still to be filled, there is such a high level of investment involved that it should only go ahead once a clear vision is articulated (see points above). Head-hunting of high-calibre candidates is recommended.

Talented research staff on fixed-term contract should also be mentored and nurtured toward tenure-track positions.

We repeat that the Department of Chemistry should very urgently make a plan of action, which should be implemented within one year, followed by an in-depth review by a special external review committee of experts. Hiring of additional staff should await the outcome of this review.

Department of Materials Science and Engineering

The department has a clear vision and strategy, with areas of focus that align well with the school and the university priority themes. The department has altogether developed significantly since the last visit of the SAB. External research funding increased from 2011 to 2013, with major research project funding brought in through industrial partnerships, but also with a significant increase of funding from the Academy of Finland. There has been a 45% increase in ISI publications in two years. There is clear evidence of interaction with other departments in the school. The number of foreign PhD students has increased from 24% (2011) to 43% (2013), and new BSc and MSc programs have been developed. All research in the department falls under two themes: metal and minerals processing and functional materials. The former theme maps onto EU's strategic area of resource scarcity.

The SAB saw some areas of concern. A significant number of professors will retire between 2014 and 2017. Furthermore, when someone retires, the professor position is returned to the university. Therefore, a clear succession plan needs to be put in place by the school and the department to enable recruitment of 'new blood' into key areas to occur in a smooth way. Head-hunting of high-calibre candidates is recommended. The infrastructure that will enable research to be conducted at the highest level in the field of functional materials needs to identified and a strategy put in place to acquire these key facilities. The SAB would have wished also to visit the laboratories of the department, but cannot now comment on them.

Department of Forest Products Technology

Overall the management team presented a high performance departmental research and educational team that is well focused on the forest biorefinery concept leveraged with wood science and bio-based materials. For example, the hiring of Professor Orlando Rojas is a testimony to the dynamic promising future of the department. The number of publications and their impact has significantly improved during the last few years along with grantmanship, and the department contributes to the research mission and vision of Aalto. The department tour also illustrated new promising cellulose spinning facilities and the department is a role model for other departments.

The main concern is that the department still needs to find a good partner school in green chemistry. Further, the department would need to find a faculty member with expertise in lignin to take the department to the next level.

Response to the SAB's recommendations in 2012

The SAB report of February 9, 2012 contained a number of recommendations. During the visit in March 2014, the SAB received responses to the recommendations at different levels of the organization.

The president agreed that the so-called 65/25/10 scheme for research contracts with industry would be helpful to ensure the balance between an applied and a basic approach to solving problems, but there had not been time to implement it. The same was true for the strong need for a fund to finance large investments for truly unique equipment, enabling a step-up in scientific performance.

The dean and the department heads responded positively to many of the recommendations. The Department of Biotechnology and Chemical Technology has arranged for joint preparation for “green chemistry” and has improved the number of publications in “visible journals”. The Department of Materials Science and Engineering has started more joint activities with other departments and demonstrated more focus in research. The Department of Forest Products Technology has aimed at more funding from academic sources such as the Academy of Finland and ERC and has established more collaboration with the University of Helsinki. The Department of Chemistry is still working on formulating a strategy.

The School of Chemical Technology still needs to respond to two key recommendations:

1. to do more to spread the vision of the Aalto University at all levels, and
2. to reorganize underperforming units and consider the strategic merger of units.

6. SAB Report of the School of Electrical Engineering

Scientific Advisory Board

- Professor Göran Andersson, ETH Zürich, Switzerland
- Professor Daniel Baker, University of Colorado, Boulder, CO, USA
- Professor Toshio Fukuda, Nagoya University, Japan (Chair)
- Professor Lennart Ljung, Linköping University, Sweden
- Professor Lars Samuelson, Lund University, Sweden

Professor Daniel Baker was not able to attend the meeting in January 2014, but he visited separately on 24-26 February 2014.

Assessment of strategic plans

The SAB members are impressed by the speed and effectiveness of the implementation of the plans that were outlined at its previous visit. The recruitment of 23 (so far) tenure track professors in vital areas is an important prerequisite for future success. About half of the new professors appointed have had some sort of prior affiliation with Aalto University, but the rest of the appointees are completely new to the system. Opening up the arena to international applicants has been crucial. The definition of the steps in the tenure track professor career as well as the other positions such as lecturers and staff scientists form a solid basis for well-structured personnel policies. This makes expectations both for the school and for the employees transparent.

The educational system has been restructured in a thoughtful and productive way: The SAB believes that the 3+2+4 (Bachelor, Masters, PhD) system is a correct one. The undergraduate education is effectively school-wide and classes are taught in an integrated way across departments. Classes taught at the master's and PhD levels are much more specific to individual departments and they seem to be working well. The influx of new, external students after stage 1 may be an excellent recruitment opportunity. The SAB supports defining a somewhat leaner and more efficient PhD program and this will no doubt be attractive.

The definition of "focus areas" as four grand challenges is well regarded by the SAB. All areas are of great importance and ELEC has an excellent and versatile competence to assure essential contributions. The SAB had questions about how the leadership of the four focus areas could be efficiently combined with the leadership within the five departments. Also, the SAB believes that "Health and wellbeing" would benefit from having a strong "champion" with medical background for scientific leadership.

A possibly effective way to think of the focus areas as they relate to the academic departments is in something of an "institute" model. While the departments have responsibility for teaching and disciplinary pursuits, the focus areas are crosscutting and will be inherently interdisciplinary. Thus, the four focus areas will attract researchers from many different departments and even from different schools. In this way, they form the sorts of institutes that can and will excel at innovation and nimble change in response to external opportunities. This approach has worked well at other academic institutions. Care should be exercised in choosing focus leaders and in assuring that those joining the "institutes" have physical proximity and share broad research objectives and goals.

One of the key questions is about how decision-making is done in such an organizational system. It is the SAB's view that broad strategic direction is established at the university and school levels. Professorial candidates are hired in such a way that they inherently fit into this strategic "mold" and naturally buy into

the strategic goals of the university. Once hired, new professors are then strongly encouraged to exercise their own judgment and academic freedom to pursue specific tactical objectives. Hence, decisions in day-to-day matters are made by individuals, but these are broadly consistent with top-level strategic plans and desires.

Some more specific comments on the proposed research within the research groups are:

Autonomous Systems (EEA): We are pleased to see the continued progress in Automation and Autonomy, with results relevant to Finnish industry. We wish that this close cooperation between EEA and related companies in the forestry industry would continue. To maintain this edge, it may be necessary to employ more professors in Automatic Control to support the applied work with theory and methodology.

Signal Processing (SPA): The work in the signal processing group forms one of flagship activities in ELEC. The research has excellent international contacts, deals with central recent issues and attracts wide attention in the international community.

Power Systems and Conversion (EEA): We note that the long tradition in energy conversion and power electronics at Aalto is successfully continuing. The activities in this field have been essential for Finnish industry. It is also encouraging to see that the power grid of the future is included in the research portfolio. The refurbishment of the high-voltage laboratory could be an opportunity for ELEC to have a pivotal influence on the future Finnish and Nordic grid developments. It is important the persons responsible for the future high voltage research are involved at an early stage in the selection of equipment for the lab. Further, since the interaction between the distribution and transmission systems will get stronger in the future, we suggest that the research groups in "Transmission Systems" and "Power Systems and High Voltage Engineering" be merged.

The Micronova Nanofabrication Center (Nanofab) is a state-of-the-art facility for micro- and nanoeletronics, for quantum devices, MEMS and microfluidics, micro- and nanosensors as well as for photonic and optoelectronic devices. The Nanofab facility is part of the Otaniemi Research Infrastructure for Micro- and Nanotechnologies, and is operated jointly by ELEC and VTT together with Nanomicroscopy Center and Cryohall, operated by the School of Science. Nanofab also offers a wide variety of electrical, optical, mechanical and structural characterization and analysis tools. All in all, the scientific and technical progress realized with Nanofab as a basic resource is impressive, ranging from fundamental quantum physics or quantum metrology to life-science applications, to graphene research and photonics research. A strong effort enabling much of this is that of advanced epitaxial growth and thin-film deposition, including MOVPE-growth of GaN as well as regular III-V semiconductors.

The research activities in space sciences at Aalto University are rapidly developing and forming into a coherent strategic direction. There are groups working in space physics, astrophysics, planetary science, and in the applied area of space weather. There is considerable energy and enthusiasm amongst the researchers and they are working on forefront topics. It is worth noting that several topics being pursued in the space arena at Aalto have strong counterparts at the University of Helsinki and also at the Finnish Meteorological Institute (FMI). Thus, attention should be paid to how to make these diverse efforts complementary (rather than strictly competitive) with one another. It is important that facilities such as the Metsähovi Radio Observatory and other programs (as in the School of Science) be effectively coordinated and brought into alignment with the strategic goals in ELEC. The efforts of ELEC staff to pursue "CubeSat" programs are particularly commendable.

SWOC analysis

Strengths

It is clear that the school leadership has been able to carry through a highly dynamic and forceful development within the evolving structure.

Among the most impressive achievements in this process is the way the school has created new top-level positions, especially professorships, of high quality.

The structure of the academic career paths seems very good and versatile and will be a great structure for the new hires to look forward to.

The crucial aspect of healthy diversity, and deliberate avoidance of inbreeding, seems well addressed by the strengthening of internationalization initiatives, which will include the newly installed sabbatical system for school researchers.

We feel that the school has been able to obtain a quite good coverage of the most crucial subject areas, which will be critical for its success going forward.

It appears that the close proximity to the VTT establishment is taken care of, and made use of, in an efficient way. The SAB can see that smoothly functioning connections with VTT have been established.

Weaknesses

As related to strategic versus tactical decision-making, the school leadership should think carefully about how the most effective distribution of power backing up different kinds of decisions is accomplished. If handled well, this can become a great strength of the research enterprise within ELEC.

As noted above, the SAB feels that the power and priorities of key research efforts should not be handled by the departments but should be limited to the professors and to the cross-disciplinary research efforts given priorities from the school and university levels. This will obviously include structuring of the research efforts in ways described above. Again, if handled well, this can become a significant strength rather than be perceived as a weakness.

Opportunities

It should ideally be through the bottom-up establishment of joint research efforts that the future of the research efforts is generated. The focus area “institute” approach outlined above offers such an opportunity.

In order to create the desired kind of clear leadership of the focused research themes it is of prime importance that the leaders (“Area Champions”) of these themes be very carefully selected, such that they will both benefit from strong internal support and loyalty, but also with a research standing that will enable excellent international collaborations.

It is clear to the SAB that in recent times the in-flux of international students, and their recruitment, has been highly enhanced. This will be a very good development for the school.

The Finnish education system is known as one of the better within Europe, meaning that the school will have access to very high-quality students on master’s and on PhD levels.

A modern society, like the Finnish society, puts high priorities on people's well-being and on health-initiatives. This will create new opportunities for the school, if it wants to contribute here.

Another highly prioritized area is that of supporting the energy needs of the society through high-level research and development. This will be a perfect opportunity for the school to take full benefit.

The recently established EU-initiative towards HORIZON 2020 will incorporate many ideal opportunities of the school to participate in different international cooperation schemes.

With the presently seen problems within "traditional" Finnish high-tech industry, it will become easier for start-up companies to get access to highly trained specialists.

Challenges

At the last SAB visit, we think that we saw more direct industrial connections. We think that it should be given priority such that these kinds of direct industrial links are maintained and developed.

The excellence of the tenure-track initiative, and very successful establishment which has put this into place, must be carefully monitored and brought to a solid follow-up and inclusion in the university structure.

Several cases of successful joint participation with other schools were presented, a trend that we see as a continued critical challenge.

The large-scale cross-disciplinary initiatives must be established in a very clear fashion such that they serve as a "map" for where the school will be going.

It is, in general, seen as a key challenge for the school to enable and carry out the multidisciplinary initiatives that we believe will give the most powerful development of the school and the university as a whole.

Especially for one of the cross-disciplinary initiatives, the one dealing with health-related research, we see a clear need to recruit an external "medical champion" as its leader, in order to ensure that the most relevant targets are identified for the research effort.

Recommendations

Research excellence

The members of the SAB are very enthusiastic with regard to the development of the new strategic research areas, as described by the image on page 8 in the "Strategic roadmap: Towards 2020"-document. We are convinced that it is via the bottom-up generation of such thematic, cross-disciplinary, efforts that research excellence as well as coordinated programs will emerge. This will have the potential to lift the productivity and research impact of the school's efforts.

It is, however, of crucial importance, that the chosen focus areas be carefully selected based on the sincere ambitions from the involved parties and, maybe even more importantly, that each such focus area will identify a natural research leader to guide and steer the efforts. Such a "scientific champion" is clearly very different from finding an administrative coordinator, which we believe will not suffice. We are quite concerned about the "hot" and timely topic of Health and wellbeing for which we strongly feel that it will be necessary to recruit, or invite to the school, a very strong person with a medical competence profile, in

order to make sure that the target formulation for this research is going to be on a sufficiently high scientific level and that the efforts will correspond to true needs of the society.

Pioneering education

The work to clearly define the three stages in education leading to a PhD is much appreciated by the SAB, as mentioned in the Section on Assessment of strategic plans.

We believe that the three basic programmes in the MSc education (Automation, ICT, and Radio/Nano) are well chosen, but wonder why Nano is linked only to Radio. One would expect that the mix Nano+ICT would also be a very attractive combination.

The definition of the PhD part as 40 course units and a research work with clear goals (3-4 journal papers) may seem a bit formal, but will no doubt help the supervisor and student with transparent expectations and plans.

We wonder somewhat about the rules for allocation of the Aalto/school funded PhD students: It may seem natural that the students compete for this in terms of their own merits, irrespectively of the distribution over the professors.

Cutting edge technology

Regarding EEA it can be said that it is a somewhat diverse entity resulting from a bold merger of earlier labs. The merger has a great potential for the future, bringing together related and complementary, but actually quite different disciplines. It is most important that cutting edge activities prominent in the earlier organization maintain the edge.

1. Power systems and power conversion
   For research in future power systems and power conversion, the new department EEA would offer an excellent environment. The general trend in electric power systems is to enhance the traditional power engineering with solutions based on power electronics and controls, sometimes referred to as the “Smart Grid”. Since EEA encompasses all these competences, it has perfect prerequisites to have a pivotal impact. If the new high voltage lab will be equipped with this in mind, research with high relevance for Finland and internationally will emerge. There are very few labs in the world that have the possibilities to do research both concerning hardware, e.g. high voltage, power conversion and electronics, and power system design. Broad projects utilizing these strengths would have a significant potential, with regard to both basic research and practical implementation.

2. Control, robotics and autonomous systems
   An important example where the old organization had cutting edge activities that must be taken care of is focus area 3: Control, robotics and autonomous systems, where Aalto has (or had) a very strong international standing. The starting research on robot vision is a most important complement for future work on autonomous systems. A clear direction with a particular application in mind is desirable, as is more contact with similar research in artificial intelligence. Micro- and nano-robotics is a promising area for "embedded systems". That clearly requires a strong cooperation and collaboration with the Department of Micro and Nanosciences.

3. Well-being and smart living environment
   It is a new area and challenging area set by the reform and is a multidisciplinary area with the other schools, such as design, mechanical engineering and others. It requires the clear definition on this new area from the viewpoint of electrical engineering and automation at this moment what the focused topics are. It may be the life support system by the electronic and robotic technology for the aged senior people or handicapped/socially challenging people. This totally depends on the choice of the leader of this focused area.

4. The development of nanofabrication in general, and materials fabrication in particular, will enable strong development in the Energy and environment focus area, for instance via development of LED- and solar panel technologies. Similarly, these technology advances has potential to contribute to the Health and wellbeing focus area in terms of sensors, MEMS and related devices.

Societal impact

It should be remembered that the largest societal impact a technical university has is through its graduates, from MSc and PhD levels, that are employed in the industry, government, and other organizations. Therefore, educational programs that make the alumni attractive for a life-long professional career are pivotal for the societal impact.

Collaborative projects with industry are a very effective means of a seamless transfer of knowledge in both directions between academia and industrial partners. Such projects can be on different levels, e.g. MSc and PhD thesis levels, but also shorter more focused projects. We have the impression that projects of this type, which used to be an important component in the Helsinki University of Technology research activities, are not that prominent any more. It is our belief that projects of this type have a large impact both in the short and long time scale. Further, such projects offer a natural meeting platform with industry people, which is beneficial for the university researchers.

Start-up companies, whose business ideas build on research results from ELEC, will also have a societal impact. The measures taken to strengthen innovation and the entrepreneurial skills of the students and researchers are steps in the right direction. Support from ELEC and Aalto during different stages in the company establishment is important. Cooperation with other schools within Aalto and with other universities and research organizations should be considered in order to create companies that are viable and sustainable.

The presented indicators measuring societal impact are relevant. However, one must remember that these are indicators, and an overall judgment together with continuous discussions with different stakeholders, e.g. alumni, industrial representatives and researchers from other schools and universities, are indispensable to get the right feedback concerning the performance.

Presence and visibility in media is also of value.

Strategic enablers

The successful initiation of recruitment of a large number of new and ambitious professors is a great and necessary effort that the SAB thinks of very highly. We think that the next crucial step in the development of an even higher research impact will be the transformation of the research environment from being one with a large number of independent research groups, of traditional as well as novel character, into coordinated efforts of a cross-disciplinary nature. For this process it may be important that ELEC brings

forward, or invites, scientific leaders of high internal and external/international credibility to take a strong lead by specifying the targets of such research focus areas and by identifying the routes via which these targets may be reached. Initiatives from the university leadership level in terms of funding new endeavours, thus stimulating such bottom-up cooperation, are of great value.

Closing remarks

General remarks; reflections on development after prior evaluations.

From the SAB member visits to Aalto University in January-February 2014, it is concluded that many aspects of the ELEC School are proceeding well. The undergraduate education program throughout the school seems stable and is hitting its stride. Graduate education, both at the master's level and the PhD Level, is the strong purview of the several ELEC departments. Once again, it seems that graduate programs are being handled well throughout the school.

The ELEC research programs generally are showing vigour and innovation. Such initiatives as the "Health Factory" concept show tremendous potential and should be touted by working with local Finnish journalists. This will get the message out, will reflect well on Aalto (and ELEC), and will stimulate stronger corporate/business partnerships. It will also increase public awareness and appreciation of the school and the university. Similarly, the CubeSat work going on has tremendous potential to engage students and to excite the public about research in ELEC.

In our SAB remarks above in this report, we have spoken about the frontier focus areas. Treating these focus areas as interdisciplinary research institutes holds great promise for the future. The SAB could envision that with strong, effective leadership, each of the four focus areas could become world-class centres of excellence. These could help tie together many of the departments and research groups into coherent and highly collaborative entities. It might be suggested that frontier research be portrayed by having monthly public lectures about forefront ELEC work.

Finally, the SAB reiterates its enthusiasm for the hiring and assimilation of a new crop of 23 professors throughout the school. While about half of these "new" faculty had prior relationships (of some sort) with Aalto, the other half were completely new hires. Nonetheless, all seem to be working out well and are fitting into their departmental homes while also playing broader university roles.

7. SAB Report of the School of Engineering

Scientific Advisory Board

- Professor Torgeir Moan, Norwegian University of Science and Technology, Chair (Marine Structures)
- Professor Luca Bertolini, University of Amsterdam (Urban and Regional Planning)
- Professor Nick van de Giesen, Delft University of Technology (Water Resources Management)
- Professor Philip de Goey, Eindhoven University of Technology (Mechanical Engineering, Combustion Technology)
- Professor Rafael Sacks, Technion – Israel Institute of Technology (Information Technology (IT) in Construction)
- Professor Huseyin Sehitoglu, University of Illinois at Urbana – Champaign (Mechanical Science and Engineering, Fracture Control)

The Scientific Advisory Board visited the school during 26-28 March 2014, with the agenda shown in the appendix. As background material, the SAB received copies of descriptions of the school and its departments. The material primarily included a "Background Report for the Scientific Advisory Board Visit to the Aalto University School of Engineering", brief CVs of the professors and presenters, copies of presentation material, the Roadmap 2020 of the School with its Implementation Plan of the Aalto University Strategy, the strategy of Aalto University (2011); some general instructions on the tasks of the SAB, and the meeting agenda.

It must be stressed, that the documentation of the school and the presentations only give an overview of the school, and that the SAB had little chance "to go behind the scene" and get to know the departments thoroughly. We suggest that in later SAB visits the different departments can meet separately with relevant SAB members to maximize our exposure and understanding, thereby facilitating our advisory role.

In this review the past efforts and future plans related to establishing and implementing a focused research strategy, educational (BSc and MSc) program, doctoral program as well as recruitment of faculty is dealt with for the school and for the individual departments.

- Summary and key recommendations
- Strategic plans and goals
- Terms of reference
- Quality and recruitment
- Doctoral program
- Reflections – especially relating to organizational and locational issues

We hope that our praise and critique reflect our respect for the significant organizational efforts undertaken by Aalto University, its School of Engineering and departments, as well as especially its faculty and staff.

Summary and key recommendations

The realization of the vision of the Aalto University is a bold and ambitious undertaking that requires devotion and significant efforts on all levels of the university. Two years is a limited time for making fundamental changes in a university organization and activities. Yet the School of Engineering and its

departments have already shown significant results in research and teaching activities and plans. Our observation is that the school and its departments are dedicated to the undertaking of the move towards a research university of international stature by focusing the research and emphasizing fundamental research and high-level scientific publications, developing and implementing the Aalto tenure track system, improving the quality and efficiency of the doctoral program, streamlining the BSc and MSc programs to enhance quality and reduce teaching efforts and, as well as internationalizing the school and its faculty and students – to the benefit of the society. The examples presented by postdoctoral fellows and young faculty members on Arctic Technology, Mechanics and Materials, Multidisciplinary Energy Technologies, Sustainable Built Environment as well as Systems Design and Production were very interesting and bear promises for the future excellence.

However, other universities and research institutions also continue to improve their performance in all respects. By the true nature of university activities: generating new knowledge, educating personnel for the society, the tasks are never completed. The realization of a top international university requires continuous change by dedicated efforts by its faculty and administration.

Our key recommendations are as follows:

1. Long term planning – The school needs to identify new research efforts to develop that may be aligned with the existing faculty's expertise and that may also involve new hires in emerging areas and external financial support. These new intellectual areas may build upon existing strengths, could cut across departments and must have significant societal impact. A potential example that we have identified is a focus on 'smart human settlements' at the interface of planning, real estate, transport, geoinformatics, water and energy. Another example could be a research focus on 'manufacturing' to develop new processes, devices and systems incorporating relevant knowledge from applied mechanics (fluid mechanics, solid mechanics), heat and mass transfer and materials science and processing disciplines. This would mean a process of strategic planning with an ad hoc faculty committee to examine the future areas that will have the highest payoff for the school in the next 10 years. The dean of the School of Engineering can appoint such a committee. Upon implementation, this type of plan can move the departments to the next level. In addition to this, each department needs to improve its vision on the relevant future scientific and societal challenges within each area and research topic, to be used as a basis for future recruitment.

2. Enhanced collaborations – Earlier, the SAB concluded that there was a lack of collaboration between the different professors, even within departments. Although this situation seems to be improved significantly, most collaborations are still fresh and need to be established and strengthened further. It is advised to introduce additional incentives and measures (like a granting system for joint PhD/postdoc projects) to enhance real long-term collaborations between the professors within the departments, so that the research efforts can be further strengthened. Another possibility could be the appointment of professors with an explicit mandate of ‘bridging a gap’ or ‘realizing a synergy potential’ between two or more groups or departments. Perhaps in exceptional cases this could also involve a joint appointment in different departments.

3. Highlighting the strengths – One of Aalto Engineering School's strengths is the world-class facilities ranging from ice lab to structural, mechanical testing, energy research, machine design facilities, water treatment and related areas. Another strength is the collegial and supportive environment. A

third is the combination of a diversity of strong, well established disciplines with ample opportunities for problem-led, innovative multidisciplinary projects. Many applicants and academics outside Finland are not familiar with the strengths of Aalto School of Engineering. To be able to attract top faculty candidates to the departments in the next few years, the school should highlight these strengths on their website and possibly also through a brochure.

4. Faculty development – Efforts need to be made (through a committee appointed by the dean) to nominate faculty, especially young faculty, for national/international awards. Such awards play a role in external evaluations for promotion. These awards range from excellence in education to contributions in research or academic work that impacts society in an unprecedented way. Overall, these recognitions will also enhance the reputation of Aalto, demonstrate the existence of meritorious faculty at Aalto, and confirm that Aalto is a good place to conduct research and teaching. Ultimately, it will elevate the rankings of Aalto reported by various surveys.

5. Active recruitment – Although the recruitment of new faculty seems to be successful in terms of the number of new professors, recruitment of highly qualified international experts seems to be difficult. The school is advised to develop a more active recruitment system, in which (international) hot-shots are coached, followed and attracted on a personal basis. The school should also consider developing interesting starting packages for new professors to attract such promising and established researchers (including arrangements for spouses, a number of PhD students, lab space and money).

6. Mentoring junior faculty – As Aalto transitions to a tenure track system, clear guidelines need to be prepared regarding the mentoring of junior faculty. We recommend that the school prepares a document to provide valuable and rewarding advice to junior faculty, with a focus on international tenure-track professors as they are generally unknown with the (funding) system and industry relevant for Aalto. The mentors will be the senior faculty, who should get time and support to adequately perform this task. This document could outline the expectations of performance during the tenure-track period and also provide insight into effective and timely use of start-up support, and crucial advice on balancing teaching, research and service. As a result of this process and experiences of the junior faculty and their feedback, the mentoring process could be revised and optimized in the future.

School

Strategic plans and goals

The school's Roadmap 2020 was based on the strategy of Aalto University, and approved by the president of Aalto University in the spring of 2013, and serves as basis for its research and education strategy. The main message of the roadmap was to focus on the following five research fields: Arctic Technology, Mechanics and Materials, Multidisciplinary Energy Technologies, Sustainable Built Environment as well as Systems Design and Production. Our observations are that these fields are followed by the departments – as far as practicable in faculty recruitment and research activities. The educational programs also reflect focusing: by reducing the number of BSc and MSc programs from 17 to 3 and 31 to 9, respectively. About 35 % of the credits in the 3 BSc tracks are common.

While significant efforts up to now have been required to restructure existing activities it is important that the school engages in initiating possible research areas in the 2030 perspective – based on the competitive advantages within the school, Aalto University and Finland. An excellent university should not only capitalize on its existing strengths but be also forward looking, and identify areas with an expected high future scientific and societal relevance in which it has a unique potential to contribute. Some possible examples are discussed below. Once these have been identified, consequent decisions, in for example recruiting, should be made to help realize the potential.

School terms of reference

The school and its departments have followed up the suggestions made by the SAB review in 2012 very cautiously, almost literally – regarding research focus areas, doctoral program, organization of research groups as well as the Aalto tenure track system, as discussed under different headings in this evaluation report. At the same time we would like to stress that some of these efforts need constant attention – especially recruitment for several years to come.

Quality, relevance and recruitment

The establishment of a coherent teaching and research strategy and competence profile, especially of professors, is a main challenge in reaching the goals of Aalto University. This requires continuous focus, also because it involves recruitment of faculty in a tenure track ideally with assistant professors. This significant renewal of faculty in the coming years also suggests using senior faculty members in a mentoring role before they retire. This is not only concerned with transfer of scientific knowledge, but also knowledge about how the university, research councils and other stakeholders operate and how research support can be solicited.

The number of publications has been increasing. There is a general focus on international journal publications to reflect the striving towards research excellence. Competitive grants, e.g. to FiDiPro positions is another measure in this respect. The doctoral program standards and productivity have improved. Further comments are provided for the different departments below.

The school and its departments are following up the introduction of the tenure track approach for faculty recruitment in a devoted and systematic manner. The SAB would like to emphasize the importance of transparency in the process of identifying tenure track positions and tenure track criteria –and especially the steps to take at the time of the hire. Academic recruitment is commonly very individualized, but in view of the need for cooperation/multidisciplinarity in addressing complex future problems, the recruitment process should reflect the need to have persons with desirable personal character traits (e.g. willing to actively seek exchanges and develop collaborations with colleagues and practitioners, and willing to take part in public debates). Since recruitments might take time, it is considered important that the dean – in consultation with the university management – has got a mandate to act rapidly to offer a position to outstanding candidates, who may otherwise accept a position at a competing institution. Active head-hunting is necessary, especially in the recruitment of female professors. It might be necessary to offer more extensive packages (than the typical starting package with a postdoc or a PhD fellowship for 4 years) in some areas where the recruitment competition is significant.

In the process of going through the plans for the different departments it appeared that they proposed faculty positions corresponding to about 90 professors while the target for the school seems to be 75. This discrepancy needs to be assessed and the plans harmonized.

Cooperation in research is essential as the problems addressed have increasing complexity. There needs to be a balance between internal (in the Aalto University) and international cooperation. Incentives for those who contribute to cross-disciplinary research should be made available. Appointments with an explicit mandate to 'bridge an interdisciplinary gap' or 'realize a multidisciplinary potential' could be considered. Strategic alliances with other universities, faculties/schools, departments, research groups is an important part of the strategy – partly with institutions that share similar values, but partly also with others whose values are to some extent complementary. While the traditional academic network is based on person-to-person relations, institutionalization (i.e. by involving individuals, groups, departments) has several advantages and needs to be pursued. An important issue is to use strong groups in this networking.

To release more time for research, reduction of the teaching load, by reducing the number of courses, is important. This could imply that courses with a limited number of students are cancelled – however, possibly by incorporating material from cancelled courses in other courses. A limit, for instance of 40 students for BSc and 20 for MSc courses, could be considered. On the other hand Aalto University may have societal responsibilities to educate BSc and MSc students with a certain competence profile even if the number of graduates in certain areas is limited. National distribution of responsibilities for different programs and strategic alliances in terms of joint European or Nordic programs with other universities could be utilized to facilitate an efficient educational program. Alliances that can also promote research cooperation would be particularly useful.

Besides achieving recognition for the teaching and research actually accomplished, it is also clear that awards increases visibility, peers' opinions about the institution etc. Hence it might be worth proposing researchers/PhD candidates for awards or encouraging them to apply for awards – beyond competitive research grants.

The school and its departments have a large societal impact by graduating students that are in highest demand in the society, by an extensive dialogue with the industry, Tekes etc. This is clearly important for soliciting research funding also.

Even if small research groups occasionally achieve excellent results it is generally important that they have a minimum size to be robust and attractive for researchers to join. To improve performance of small groups in an organization they might be strengthened, reorganized – by merging them with another group, or discontinued. We discuss some of these possibilities in the department sections.

The research personnel should ideally include professors – in a tenure track, postdocs, researchers and PhD candidates. Postdocs primarily serve as a step towards academic positions but also serve as to follow up PhD studies and hence can be important in completing PhD works – and contribute scientific publications. The postdoc periods should not be too long, ideally not more than 2 years – because a too long period in 'academic training' might make a career either in industry or in academia difficult. A tenure track may be more suitable for pursuing an academic career.

Doctoral education

A short time has passed since our first SAB review and many of the PhD candidates in the school started before the reform of the program started. In view of these facts we are pleased to observe significant progress on the restructuring of the doctoral program from the traditional continental European system based on a thesis emerging as 'an independent lifetime achievement' versus a supervised thesis combined with course requirements achieved at the start of a research career. However, there is still a way to go.

The focus is more on the full-time students, shortening of the study time, and new opportunities for full-time funding. Reduction of the study time, say, to less than 5 years, is important for the reputation of the university and also for being able to recruit international students. There are also signs that the rate of PhD graduates is increasing, but it is still a main concern. The quality of the doctoral research depends on the quality of candidates and the supervisors' attitude, dedication and efforts. Since the "new" doctoral degrees represent a change compared to the old doctoral degree, constant focus on quality is important. In this respect the supervisors' workshop for exchange of best practices is important, and should encompass all supervisors, if necessary by making it mandatory. Also important is to keep offering facilities and services at school levels (e.g. training and assistance in English scientific writing, general research skills, and skills in specific research methods).

The quality assurance in the final stages of the study through the use of pre-examiners, beyond the use of opponents, is noted with interest. Possible proactive quality assurance at the entrance or midterm of the study could also be considered (for instance an independent 'mid-term' assessment of the research progress or interim output at school level). This is especially of relevance if preparation of publications is not an integral part of the study, and it may contribute to shortening the duration of PhD studies by ensuring focus on the right areas early on.

Similarly, cooperation that involves doctoral candidates in Aalto University and other universities nationally or internationally, within certain research areas, regarding specialized PhD courses or research, can be of mutual benefit.

On the school level there has been an increase in the annual number of doctoral degrees awarded over the last years and a clear plan of further increase in the years to come. This plan is also reflected in the plans of the departments.

Organizational issues

Organizational structures are a relevant topic when restructuring Aalto University. Some considerations are offered below. However, it is important to make a choice of the organizational structure – among possibly equally good alternatives – and then decide how to operate within that structure. Linked to the organizational issues are the names of departments, which also have an important communicative, 'branding' function to both insiders and outsiders. We recommend to consider renaming the departments of Civil and Environmental Engineering, Civil and Structural Engineering as well as Real Estate, Planning and Geoinformatics. Some suggestions regarding the latter department are given below.

Infrastructure

A particular challenge relating to our suggestions was concerned with the large infrastructure of ice- and wave tank as well as wind tunnels operated by the Applied Mechanics Department. Since these laboratories

involved laying off several employees we see the heavy burden in choosing the strategy related to these facilities. The decisions and actions made must exact respect at all levels within the university as well as in relevant organizations outside the university.

Departments

Department of Applied Mechanics

Strategic plans and goals

The focus areas of the department are: Advanced Structures, Arctic Marine and Ice Technology and Flow Modelling. These areas relate to the school's focus areas. The first and third area is within the Mechanics and Materials area while the second department area is within Arctic Technology. The department aims at strengthening the fundamental engineering research, in mechanics and arctic engineering. The activities in solid mechanics already have a high quality – also by involving two FiDiPro's.

The fundamental research in the department is linked to applications within marine technology, aeronautical engineering and (other) mechanical systems and support of various MSc programs. The most significant application is the former. MSc programs in arctic marine engineering are also under development – in a joint Nordic setting in a similar way as a marine technology program the department is involved in.

The potential for offering an international MSc and PhD program and research at a high level is particularly large in the arctic marine and ice technology due to the competence profile, LRF Centre and unique infrastructure. The strategic decisions and actions regarding the laboratories seem to be well taken as commented on below.

The main challenge is the fluid mechanics area. Flow modelling has been defined as a very broad area. Introductory courses can be taught by fluid mechanics specialists (say aerodynamics specialists or marine hydrodynamics specialists) with different research focus. But a certain critical mass would be needed to excel in research and the research area must be narrowed down. In this connection it is noted that fluid mechanics for free surface hydrodynamics is an import discipline in marine arctic activities (also proposed as a new position) but especially for the marine technology program. It is important to have a permanent faculty member in this discipline – possibly complemented by an adjunct professor from another university or research institute. Temporary solutions by visiting faculty might also be considered. Clearly the success in hiring faculty depends on the access to experimental facilities.

The aeronautical educational and research activities are not much visible in the material and presentations we have had access to. The future of these activities need to be considered in order to meet the society's need for students and sustainable research activity on one hand and to get the research focus that is the ambition of Aalto University.

Quality and relevance

The department has demonstrated a clear drive towards more basic research and an increased quality by publishing journal papers, especially in the solid mechanics activities. The department continues to contribute to various Aalto and Nordic MSc programs. The restructuring of laboratories, establishing of an international centre for arctic technology, obtaining two FiDiPro positions, form a basis for successful future activities. Besides the societal impact of graduates, the faculty members contribute to the society at

large and the research society though an active engagement in international regulatory bodies, professional and scientific societies, journal boards, conferences etc. Several faculty members have excellent international networks.

Doctoral education

The Department is making commendable attempts to increase the number of doctoral students and reduce the time to graduation. By having visiting professors, the students have access to a wider exposure.

It appears the department has attracted a large centre-type funding in areas related to arctic technology. This will lead to support of a larger number of PhD students and postdocs.

Infrastructure

A particular challenge addressed in the previous SAB exercise was concerned with the large infrastructure of the ice- and wave tank as well as wind tunnels operated by the Applied Mechanics Department. Since these laboratories involved laying off several employees we see the heavy burden in choosing the strategy relating to these facilities. The decisions and actions made must exact respect at all levels within the university as well as relevant organizations outside the university.

Reflections on other issues

The Applied Mechanics Department is organized partly according to applications (Aeronautical Engineering and Marine Technology) and partly according to disciplines (Fluid mechanics and Mechanics of materials). It is timely to reconsider whether this organization is optimal.

Department of Civil and Environmental Engineering

Strategic plans and goals

The stated strategy is to strive towards an eco-efficient society and sustainable use of water and mineral resources. The angles of “attack” are: transport, water, waste, and "soil, rock and highways". This strategy notwithstanding, the department is not really thematically unified. Such unity is not an absolute necessity as departments are in first instance administrative units but it is always good when extra value can be created on the basis of physical and/or organizational proximity.

Transport engineering and waste management are relatively small. One should critically assess the role and place of these two groups: Are they best placed in this department? Is it necessary to have these disciplines at Aalto? Is it possible to recruit at high international level? Is a lively research program thinkable with ample output in terms of peer reviewed international articles?

Within the water related parts of the department, there is clear coherence. The urban focus is a clear rallying point within the department. The urban focus is also a clear bridging point to other groups in the school and university (Sustainable built environment).

The information on the geo-groups was rather limited.

Quality and relevance

There is some tension between research quality and societal relevance. Helsinki University of Technology used to provide engineers in all fields that were needed by Finnish industry and society. However, larger

groups have better chances of developing scientific quality and having a full mix of assistant, associate, and full professors. Larger groups can also more readily build an international profile and recruit accordingly. This holds especially for this department.

The quality and relevance of the water research is very high and the group has a high international profile. It would be possible for this group to recruit high-level international candidates. If consolidation is an option, one might consider expanding this group, possibly at the cost of the smaller groups.

It is more difficult to assess the precise research quality of the geo-parts in the department.

Doctoral education

The rationalization of PhD students (shift to full-time positions) has advanced well but will need to be finalized. The 32 doctoral students and doctoral degrees granted in 2013 suggest an average study duration of eight years, which is (very) long. Once the program is well established, a duration of four years would be a good target.

Department of Civil and Structural Engineering

Strategic plans and goals

The department outlined three strategic areas for research in their 2012 statement:

- Building Information Modelling and Operations Management in Construction
- Computational Structural Engineering and Building Materials
- Building Physics, Building Services and Microbiology

These remain highly relevant areas for focus.

Over the past two years it is clear that the department has taken bold, active steps to fulfil the goal of focusing in these areas and the SAB commend the leadership of the department for this. The steps include development of four specific research initiatives, such as the Well-Tech and BIM for Lean initiatives; recruitment of faculty, postdoc and PhD students for the BIM focus area, in which no prior expertise was held; and reduction of non-tenured teaching staff.

The collaboration with the Department of Architecture is another important step forward.

Quality and relevance

The department remains essential and relevant for its educational role in building engineering (structures, construction management, materials, etc.). The new focus areas of BIM and Building Physics & Microbiology are highly relevant for education, but even more so for research.

Recruitment may be the number one challenge for this department, because its plan calls for recruiting a total of eleven new tenure track professors by 2020. There are only eight professors at present, three of which will retire by 2020. Despite the high number of applicants for some of the positions, it is proving difficult to fill other positions. Four positions are currently open.

The success or failure in recruiting may determine the long-term viability of one or more of the focus areas. This is somewhat less for the BIM area given the university-wide collaboration in this area, with professors from industrial engineering and from computer science, which gives the group a critical mass. The

structures group may be resilient too given its initial size. The building physics focus will need special attention to ensure its mid- and long-term viability.

The steady increase in the number of postdocs is encouraging.

Doctoral education

The number of PhD graduates remains a major concern. Although the number of graduates has increased to three in 2013, the planned targets for 2014 and 2015, based on existing students, are still low. As for the school as a whole, reducing the duration of PhD studies is essential to improving this state of affairs. Attracting international students may be easier if the duration is more in line with what is common in other European and in US universities, i.e. between three and five years.

Reflections on organizational issues

The department appears to be well organized, in the sense that the professors' fields' of interest and research are well aligned with the focus areas. The name of the department could be reconsidered for two reasons: to better reflect the research focus areas, to provide a branding which positively influences the way in which people think of their role as collaborators within the department rather than individual researchers, and to avoid inevitable confusion with the department of Civil and Environmental Engineering. Possible names could focus on the 'Building Engineering' aspect, as the 'Building' keyword is common to all three focus areas. This would also be quite clear to both students and research clients.

Department of Energy Technology

Strategic plans and goals

The main goal of the department to contribute to the world grand challenge on energy by concentrating on energy efficiency is well chosen, as this is the area with the highest contribution to the overall expected reduction in world energy consumption. The two strategic research focus areas of the Department, Energy Efficiency & Systems (EES) and Thermodynamics & Combustion (TC), fit very well into this and are in the very heart of Multidisciplinary Energy Technologies, one of the five key focal points of the School of Engineering. The department successfully followed to recommendation of the SAB in 2012 to take the lead in this area.

Focus and recruitment

The research topics within the EES & TC groups are rather scattered and could be more focused. For instance, the three professors in the TC area currently address eight quite different but important topics. As an example, the groups may consider concentrating more effort on more generic-mentioned topics like combustion modelling and combustion experiments. These more generic methods could then be used and expanded as a tool to tackle the numerous applications, also mentioned as separate topics. If a similar strategy would be used for personnel recruitment, this will also create more cohesion and collaboration between the professors in the future. It is recommended to investigate if a similar procedure can be used in the EES area.

Quality and relevance

In line with remarks of the committee on the level of the school, the department is advised to create a clear vision on promising future directions of the energy related research, not only in terms of relevance of the

research needed in Finland, but also in terms of scientific challenges and knowledge (e.g. new and advanced experimental and modelling tools for future use). Future research topics and recruitment actions can then be aligned with such new scientifically challenging and relevant future directions. The output in terms of publications in refereed journals has been increased significantly. The new publication strategy and the external collaborations are very well appreciated and may contribute to a further increase in output quantity and quality.

Doctoral education

The initiatives of the department to coordinate the national program on Energy Efficiency & Systems and the PhD network on Energy Technology with many students are very good achievements. As in other departments, the number of graduates increases strongly.

Reflections on organizational issues

After the reorganisation of five groups into two, it is very well appreciated by the committee that a specially arranged working group is trying to coordinate the sharing of lab space and personnel, so that further coherence and collaborations are enhanced. The committee advises to investigate possible further collaborations of the EES group with the Department of Real Estate, Planning & Geoinformatics.

Department of Engineering Design and Production

Strategic plans and goals

The SAB feels strongly that the Department has undergone significant elevation since 2012. The quality of education in the department is excellent, it has strong ties to industry and government, and is in a position for leadership in shaping engineering design, manufacturing and advanced materials practice.

The department outlined three strategic areas for research in their 2014 – 2020 statement:

- Engineering Design (Systems Design and Production)
- Engineering Production (Systems Design and Production)
- Engineering Materials (Mechanics of Materials)

These remain highly relevant areas of societal impact and core areas in mechanical engineering. The department has made significant strides in entering the field of advanced manufacturing by developing additive manufacturing capabilities. The collaboration with the Department of Art also complements nicely these activities. Other investments in research with scanning microscopy, friction stir welding and digital image correlation capabilities are also worthwhile. The synergy between the materials and manufacturing groups is expected to develop in the coming years. Further investments in the facilities to allow production of metallic materials (via 3D electron beam melting for example) will further complement the ADD lab, and allow interactions with the materials group and applied mechanics department. Many new developments are occurring at the interface of these disciplines, and the department is positioning itself to exploit this synergy.

Based on our assessment of the intrinsic value of the existing fields within the department and their viability as teaching and research foci, we believe that, in addition to these existing strengths, the department should go through a strategic planning exercise to consider new areas as well.

Recruitment

The Department has made strong hires recently (Bossuyt and Vilaça). These recent hires are grounded in fundamental areas of engineering, and will leverage the existing strengths (facilities and other senior faculty) in the department. The department should be also commended in attracting international candidates for the faculty searches. The planned hire list on design of multidisciplinary machines, design of manufacturing machines and in computer-aided engineering will also be realized in the future. The new hire in engineering materials is also planned and is very timely.

Quality and relevance

The department has traditionally strengths in machine design and materials, and now building new experience in manufacturing, including digital manufacturing. Hence, there will be new emphasis on mechatronics, fluid power, i.e. control-related fields. The manufacturing emphasis with layered deposition methods can have significant impact on Finnish industry.

The research measure based on standard metrics can be improved, perhaps, these do not represent the significant improvements made by faculty in the department. Manufacturing traditionally does not yield to high index values. Nevertheless, the faculty will need to continue to publish in high impact journals to stay within the norms of the department and Aalto University. The increase in number of publications by faculty in the last three years is admirable.

Doctoral education

The department is making commendable attempts to increase the number of doctoral students and reduce the time to graduation. The use of postdocs for long periods remains a concern that is also being addressed in the Engineering School. By having visiting professors, the students have access to a wider exposure.

It appears the department has attracted large centre-type funding over the last few years in diverse areas related to design, dynamics and materials. This will lead to support of a larger number of PhD students and postdocs.

Reflections on organizational issues

The department covers a large number of fields and has an ambitious plan for recruiting. The areas range from machine design to materials processing, control of machinery, vehicle engineering, and engineering materials behaviour. All of these fields are an integral part of a mechanical engineering department. Still, some collaboration with the School of Electrical Engineering in controls and mechatronics areas would be worthwhile because it is difficult to cover this area with one or two faculty. The development of the Digi-platform initiative will provide further visibility to this department.

Regarding the materials emphasis , this is an area where sufficient funding, reputation and infrastructure exists, and new faculty possibilities should be explored to complement the existing faculty who can also collaborate with the Solid Mechanics group in the Applied Mechanics Department.

Infrastructure

The department has excellent facilities both for instruction and research. The instructional facilities that have been strengthened recently include the design studio, mechatronics laboratory, and the ADD

laboratory. The research facilities include extensive materials testing and materials characterization capabilities which are the state-of-the -art, including the friction stir welding and the new SEM/EBSD capabilities.

Department of Real Estate, Planning and Geoinformatics

Strategic plans and goals

Further enhancing the already emerging strategic directions there seems to be a unique potential for a world-class contribution of the department to what has come to be known as the 'smart cities' debate. This debate focuses on societal challenges at the interface of urbanization processes and sustainability dilemmas, and it seeks to tap the potential of information and communication technologies to improve understanding of issues, increase performance of localities, and foster communication and collaboration among stakeholders. Much international research funding, for instance in the framework of the H2020 program of the EU, is directed to this area, but there is also great demand for research from local governments, industry and civic society. The department is already very strong in the key areas of real estate, planning and geoinformatics (with both 'hard' and 'soft' GIS). An explicit focus on 'smart cities' or perhaps more broadly 'smart settlements' (to reflect the existing broader expertise) could give a boost for the realization of the synergy potential between these key areas and enhance inside cohesion and outside visibility of the department. It could also help realize the potential of linkages, not yet fully achieved, with research in the Energy Technology and Civil and Environmental Engineering Departments, which already often has a locality focus. The same applies to the collaboration with Architecture and others outside of the school. The Aalto-wide theme 'Human Centered Living Environment' and initiatives as the Living+ platform, Aalto Built Environment Lab and the Urban Mill are emerging natural fora for these exchanges and collaborations. Last but not least, Helsinki and Finland can provide a pioneering and internationally unique 'living lab' for this type of research, due to the comparatively very high penetration of information and communication technologies (the Internet) in everyday life.

The report of the department in part already points in this direction and potentially relevant activities are named, but we feel it could be even more focused, and be clearer about which concrete actions (e.g. collaborative teaching and research projects, recruitment policy) derive from the strategy, how they complement each other, how their implementation is proceeding, and how different groups and researchers of the department contribute to them.

Quality and recruitment, doctoral education

The key advice of our 2012 report was to realize the potential of linkages within the department and across the school and university to achieve the 'focus and mass' to address key societal challenges, and most notably the challenge of the sustainable development of human settlements.

The department has gone a long way to follow this advice: many statements and initiatives mentioned in the report and presentation point exactly in this direction. We are very pleased by this progress and in the 'reflections on organizational issues' below we hope to give some comments and suggestions that can help the department move further along this exciting and promising journey. We are aware that due to the limited information that we have there might be even more happening than we realize. So, we apologize in advance for things we say that might be due to our not knowing, rather than facts. Finally, let us also mention that, even if we will not discuss it further, we are really impressed by the great progress the department has shown on the dimensions of scientific quality and impact of research, as for instance

demonstrated by publications, PhD, and external recognitions. Importantly, increasing the quality and output of the PhD program seems under way, with a welcome shift of focus towards full time PhDs. Consolidation and further improvement could be based on our suggestions under the paragraph on 'doctoral education' at school level above.

Reflections on organizational issues

A few matters for reflection seem to be worth mentioning here.

The first has already been noted before, and in our earlier report: there are great synergy potentials between research in the department and research in the Departments of Civil and Environmental Engineering and Energy Technology. Much of the research there has already an urban, or locality dimension, and is highly relevant in addressing issues at the interface of urbanization and sustainability. Initiatives are mentioned in the report but there is still no clear evidence of the project-based collaborations that we advocated.

The second, more specific issue we mentioned in the first report is the great potential for synergy between Transportation Engineering and Land Use Planning. There is already commendable work being done on a forthcoming joint master program. However, less seems to be happening on the research side. We wonder if the integration process could be accelerated by moving the Transportation Engineering group to this department. We realize this is something to ponder carefully, but Transportation Engineering is now quite a small and isolated group in the Civil and Environmental Engineering Department – which raises questions about its long term viability – and has on the other side a key contribution to give to address the issues of urbanization and sustainability central to this department. Furthermore, the growing focus of the group on intelligent transportation systems would add further momentum to the exploration of applications of information and communication technologies with a 'smart settlements' framework.

A third issue is concerned with the name of the department. We were invited to comment on the new name of the department. We think the name needs to reflect the broader strategic framework sketched in the 'strategic plans and goals' paragraph above. We appreciate that there has been a great effort to bring together previously separate disciplines and people in the department. The new name reflects and sanctions this process, and acknowledges the three main groups in a clearly recognizable way. However, we wonder whether the next step could be that of a name stressing the added value of bringing these three groups together, rather than their separate identity, and at the same time provide more of a sense of strategic direction, both for those within the department and those outside (e.g. potential users of the generated knowledge, or perspective employees). Those participating in the department seem to have in common two things. The first is a focus on human settlements (and perhaps especially cities?) and the challenges that they raise to those living in and governing them. The second is a focus on technologies, broadly defined, that might help addressing these challenges. The mission as stated in the report underlines this: 'From spatial knowledge to planning and development'. It is not our role to indicate a name, but we might suggest looking for one that reflects more this common ground and strategic direction. Examples of names that would do this (for illustration and without saying that they are the right ones) might be 'smart human settlements', 'metropolitan processes and technologies', 'urban engineering' or some other combinations or variations of these.

Finally, and following on the discussion above, we suggest that the department could consider adding a university with a strong 'smart city' focus, like MIT, to the list of reference universities.

Infrastructure

We share the aim of the department to be co-located, be on a location close to the other departments of the school, and be housed in facilities which foster human interaction and collaborative activities, as this would greatly help realizing the synergy potential we see.

8. SAB Report of the School of Science

Scientific Advisory Board

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Report summary

Overview

The visit by the SAB took place approximately two years after the founding of the SAB and its first visit in 2012. In this report we summarize our observations while on the ground in Otaniemi in March 2014 and project these as a set of recommendations. The recommendations track the report which the SAB made two years earlier in providing our view of the trajectory of the School of Science as a whole as well as of the individual departments, respectively.

The SAB recognizes that the bold “Aalto experiment” remains at incubation stages in terms of the ultimate goals and vision of creating an innovative and powerful whole from the sum of its three cornerstone charter institutions (Helsinki University of Technology, Helsinki School of Economics and the University of Art and Design Helsinki, respectively). Our recent visit is a snapshot through the lens of the School of Science of the progress within Aalto University while it strives for the eventual academic and geographical integration of its constituent parts as an internationally first rate unified institution as defined by the Governing Board of Aalto and being led by President T. Teeri.

In broad terms the committee found a good number of positive indicators in the School of Science (SCI) which seem to reflect increased acceptance, participation in active planning, and positive action for the Aalto concept being carried forward across and by core constituencies – whether in our discussions with junior faculty, graduate students, or anecdotal encountering of an Aalto T-shirt at a local corner store. We also appreciate how the SCI has responded to the number of the suggestions and guidance made in our report two years ago, even if questions and challenges remain (see below). Among the many positive elements we note the (i) robust leadership in Dean Risto Nieminen and his staff for crafting a strategic vision (under development), (ii) high-quality scientific output from most of the SCI departments, (iii) launching of the new tenure-track system, even if with some “speed bumps”, and (iv) movement, if still somewhat tentative, within the SCI in responding to the spirit and structure commensurate with the Aalto vision. The faculty of the SCI should be broadly commended for their actions as the SAB recognizes the challenges to adapt and adjust to both the ongoing and future changes which the Aalto concept encodes implicitly and explicitly.

In addition to very good (standard) metrics of scientific quality, the degree of success by the SCI faculty in winning or co-winning European competitive grants is laudable, to complement domestic funding. The four new ERC grants plus existing (Advanced and Starting) ERC grants and the participation in the Human Brain

and Graphene Flagship projects all reflect well on the SCI faculty and the strength of this particular school within the Aalto University. In terms of broader and public visibility, examples such as work by L. Nummenmaa and colleagues on brain-and-body mapping (record downloads in PNAS) and by T. Lokki and colleagues on sensory assessment of concert hall acoustics (Physics Today feature article) make important contributions to the Aalto brand recognition.

Among the highlights of the SAB visit we note our meetings with junior faculty, and graduate students and postdocs, respectively. The committee met with a group of five junior faculty who gave useful insights into their own SCI/Aalto experience related, for example, to the mechanics and implementation of the tenure-track system both during their recruitment and academic experience after hire. We held an approximately one hour meeting with some 30+ students and postdocs, most of whom seem to have not only captured the Aalto University idea but were quite engaging in expressing their enthusiasm for opportunities embedded in this concept and appreciating the Aalto potential for their individual higher education.

Comments of the strategic vision of the SCI

During this visit, the SAB got the benefit of Dean Nieminen's overview presentation but did not have time for substantive discussions with the dean or his staff about the overall school strategy and future directions. The materials provided to the SAB do suggest, however, that careful thought is paid to flesh out maximum synergy within SCI through key focus areas (listed as: Computational and mathematical physics; Condensed matter and material physics; Energy sciences, Computer sciences; Neuroscience and neurotechnology; Creating and transforming technology-based businesses). This mixture of focus areas appears to promote existing areas of research excellence while leveraging these for new scientific intersections – a very reasonable if measured approach. The new Energy Science Initiative (ESCI) and the Aalto Ventures Program (AVP) are very good examples of newly established synergy, especially in their initial emphasis on a progressive educational accent (e.g. master's level programs). Initiatives such as the "Smart Society" and "Biodesign Finland" are intriguing concepts and the SAB looks forward to seeing progress on these programs as well as other focus areas in our next visit.

The new Aalto Brain Centre is a prime example of a potentially powerful initiative which can combine internationally recognized excellence in human neuroscience and brain imaging technologies pioneered in Finland. If implemented with vision and resources, it can be a leader in worldwide brain science research and education. Any implementation is likely to benefit significantly of a rational organization which fuses the outstanding expertise at O.V.Lounasmaa Laboratory (OVLL) and the BECS department (see below and in separate comments of these two presently individual entities).

Among other positives, the committee noted the continued internationalization of the SCI, with several notable new hires to the faculty. Coupled with the finite net gain in total SCI faculty (to approximately present total of 100), it is good to see the robust hiring at the junior level that has taken place in the past two years.

Specific critique and suggestions

With the many positives noted above, and in the spirit of the committee's responsibility, we also identified important issues which need attention, carrying over from our 2012 report. In this Executive Summary we comment on these issues with the hope that they be proactively addressed and emphatically worked on by the school leadership, faculty, and support staff - within the larger context of the strategic vision for the school. A major issue concerns (A) particular departmental and related organizational structures, while other issues relate to (B) mechanics of the tenure track system, and (C) integration of campus

infrastructure relevant to the SCI (while understanding that this is a complex longer-term, university-wide matter). In addition, the SAB notes that for a university striving for international prominence, it is important that it has a strong mathematics department which can compete with other leading universities. In the following we also recognize that external factors such as financial resources will impact not only on the rate of Aalto University's transition to a private foundation but play a role in the implementation of new initiatives.

A. On current departmental/institute structure: Points of convergence

The SAB commented quite explicitly in its 2012 report on specific cases where the current departmental and institute structure appears rather non-optimal in terms of synergy and resources in the new Aalto context, if not outright confusing and distracting. We recognize that there may be solid historical reasons that have led to these structures. Yet future aspirations should not be held hostage to those in the past. Two particular instances at issue are the clear need to (A1) consolidate computer science, engineering and computing to a coordinated if not an outright unified single departmental organization and (A2) the immersion of the OVLL in relation to the Department of Applied Physics and BECS. We summarize our recommendations next while noting that while perhaps some movement on these issues has taken place within the past two years, this has been rather minimal on the aggregate as far as the SAB could observe. We urge the leadership and the SCI faculty to accelerate their proactive stance in this matter.

A1. Consolidation of computer science, computer engineering and other computing activities

Strikingly, the word Computer or Computing appears in no less than three department titles (four, if one also counts in the HIIT), namely Department of Computer Science and Engineering, Department of Information and Computer Science, Department of Biomedical Engineering and Computational Science. Furthermore, the Department of Media Technology is anchored in the application of modern computing methodologies and applied technologies. While there are historical reasons for this convoluted multi-departmental structure, at a superficial level and to an outsider this array of independent, yet thematically interconnected departments begs for justification and clarification. More important, dividing the computer and computational sciences as they presently stands raises a serious question as to how such splintered activity will serve SCI and Aalto in the future. Thus as the SAB expressed in our 2012 report "…for harnessing the intellectual, research, and educational power of these three departments, the present organization appears to be far from obviously optimal". During our recent visit while we noticed a growing awareness of the problem there was little concrete evidence of forward thinking and/or movement in altering the present status quo which, in our opinion, is neither rational nor sustainable in the long term. The SAB recognizes that several of the departments in question have undergone structural and organizational changes in recent years and that major structural rearrangements must be planned carefully and in measured steps. Nevertheless, the SAB believes that computer engineering/science and computational elements within the SCI should actively begin plans to consider and implement stronger strategic alliances amongst each other – by envisioning a sum of its parts as one single departmental-like entity.

We recognize that computing today is ubiquitous and diffused across all areas of modern science. Which is perhaps yet another reason for a single umbrella within the SCI in the form of "computer science and engineering" (or equivalent phrases), i.e. a well-defined core discipline which is the basis of one department or other comparable coherent organizational unit prevalent in so many universities globally. Within the SCI, such a single department or equivalent entity would be a large one so that careful advance

planning is needed, including gauging commensurate administrative responsibilities (such as associate department head(s), etc.). But a set of convergent aims should be made clear, sooner rather than later.

(N.B. The SAB cannot here comment on the possible relationship to the School of Electrical Engineering which may or may not be of relevance in such future planning. That said we believe that however the faculties are divided there will be tensions created by the apparent separation of related groups. It is therefore important that the spirit of cross-faculty collaboration is cultivated and administratively encouraged by appropriate mechanisms such as pump-priming funding. Such funding could, for example, be targeted at young tenure track researchers giving them additional funding to initiate such inter-disciplinary projects).

A2. Role of OVLL in relation to the Applied Physics Department and BECS

The OVLL has long been a crown jewel in Otaniemi, famous as perhaps the internationally premier research entity in Finland, and certainly so in low-temperature physics. Today, its research mission cleaves largely into two separate and well identifiable areas, namely low-temperature physics and quantum devices on one hand, and brain sciences and imaging on the other. Some recent strong new hires in each area have taken place and superb science is being conducted by top faculty. In turn, these two areas link closely to core themes in the Applied Physics Department and the biomedical engineering component of BECS, respectively.

On the teaching side, we note that the OVLL faculty is now participating in Aalto's main mission as an educational institution. How this is being implemented and defined was not clear during our visit, however. On the research side, active collaborations between scientists between OVLL and those in Otaniemi and elsewhere appear to be quite robust. Yet there seems to have been very little active conversation and/or agreement, even in principle, about the full integration of OVLL into the departmental structure of SCI. Our committee wishes to go on record with the following recommendation: (a) that the low-temperature and quantum device research/education in OVLL be integrated within the Department of Applied Physics (DAP), and (b) that the brain science and brain imaging in OVLL be integrated within a Department of Biomedical Engineering (BECS), regardless of whether the latter retains its full spectrum of present computing related elements. It appears that both DAP and BECS are not unwelcoming to such integration, respectively. The SAB expresses an opinion that such full integration of OVLL into the mainstream fabric of SCI and Aalto University can be an effective way to maintain the legacy of the laboratory while looking forward at decades to come. Also, whereas maintaining an independent institute-type concept seems somewhat anachronistic and at odds within the Aalto context, the concept of centres as places of research intersection (such as the Aalto Brain Centre) can provide a useful complement to the standard departmental structure in any academic institution.

B. Commentary on the new tenure track system

The newly introduced `tenure track system' appears to be on its way and while still in a transition period the university as a whole and the SCI in particular should be complemented for making this major progressive step. From the 2011-2014 statistics provided to the SAB, a sizable fraction (on the order of 50%) of faculty appointments have been made at an assistant professor level during this transition period. Coupled with the very welcome arrival of new SCI faculty from outside Finland, these developments represent very good steps in the right direction.

The mechanics in the process of hiring new faculty appear to need improvement. In our 2012 report SAB noted that "the lead time for recruiting new faculty under the new system is sluggish and needlessly lengthy. Candidates should know within a month or two after an application deadline whether they have made the cut", with more rapid interviewing and final selection processes. A lengthy process can lead to loss of the top candidates (or they will simply stop applying if the perception about slow bureaucracy spreads). The SAB recommends a review of the current procedures in order to reduce the current lead time". From the comments by the faculty during our March 2014 visit it is unclear to the SAB how much progress has been made within the SCI, and especially at the Aalto University overall administrative level. In our discussion with the recently hired junior faculty the SAB got an impression that there is much room for improvement e.g. in communication between faculty candidates and responsible SCI personnel (search committees) to keep candidates abreast of the status of searches, and in general increase the transparency of the process.

C. Comment on infrastructure needs

The research at the SCI is privileged to have access to many superb and technologically state-of-the-art facilities including and especially for micro- and nanotechnologies (run by VTT) as well as the physical proximity to start-up companies via the Technology Park concept. On the other hand, several of the departments are dispersed across multiple buildings and sites, thereby hampering scientific interactions and collaborations even within a given department. Joint meeting and discussion space seems also to be lacking especially to facilitate continuous fertilization of cross-disciplinary activities. The SAB recognizes that building and infrastructure matters present major challenges at multiple levels across Aalto University, including the planned transition e.g. of the School of Arts, Design and Architecture to Otaniemi. Nonetheless, the SAB supports the SCI in its aspirations for improvements towards a more coherent, co-location-based entity.

D. Comment on relationship of the SCI and Aalto University

As one final broad comment we note that even though it is beyond the mandate of the SCI SAB, we believe that bringing down the barriers between schools, and strongly encouraging collaboration both in research and teaching, should be one of the major areas of focus for the next few years. As noted above, there is very welcome and increased awareness of this within the SCI. The collaboration between SCI, ARTS and business is the essence of the Aalto project and should be further encouraged by multiple means and resources. However, other more proximate cases of synergy and continuum, such as between ENG and SCI (e.g., in what concerns computing) is further encouraged. Specific existing barriers, institutional or otherwise, should continue to be identified and actively removed with scientific collaboration fostered with specific additional incentives.

Impressions, evaluation and assessment of the School of Science by individual departments and units

In the following, the SAB provides a summary of its observations, impressions, and recommendations concerning individual departments and other academic units, following the two day visit to the School of Science (SCI) in March 2014.

Department of Biomedical Engineering and Computational Science

The research within BECS has continued to produce internationally recognized, high-quality science. Several new hires have been made or are underway (for a total 5), including two junior faculty in core areas of

biomedical engineering. In the BECS strategic plan summary, two thematically very broad areas are identified ("mechanism of human body" and "novel health care") which are consistent with any progressive biomedical or biomedical engineering department in a leading university. The department seems to have key assets (both within BECS and e.g. with OVLL) to not only continue its quality research but to build on this on a robust upward trajectory. Consistent also with some of the recommendations of the SAB 2012 report are active efforts to bridge research in partnership with hospitals and through such educational vehicles as BioDesign Finland. Likewise, the ongoing strengthening neuroscience and neurotechnology is in tune with our earlier report.

Three research initiatives are explicitly identified as building blocks for the 5-year strategic research goals. Their corresponding research areas seem compatible with the talent and vision in the department – even if their scope and focus varies significantly. The first of these, advancing non-invasive brain imaging and stimulation (by MEG-MRI, TMS-EEG, NIRS) is well-defined, rooted on technical excellence in BECS, and builds on pioneering work in BECS (and OVLL) over the past two decades. The second area, age-related blindness has a somewhat narrower focus yet represents an obvious opportunity for a sector of human health care where important needs will only increase. Here, too, BECS has built a kernel of reputation which should enable this initiative to do well in an internationally competitive position. The third initiative, aiming to develop an (apparently) modelling-based view of "complex dynamics of human social" interaction" is an extremely broad subject. Here the "computational" (complex systems) strength of the department is placed to the fore. It would be helpful for the SAB to better understand where this broad initiative is really heading and what are the science and application drivers (presumably data driven and acquired e.g. from the Aalto Brain Centre and/or hospital partners).

The strategic plan also cites the opportunity for participating in more cost effective health care technology. How this is approached within the holistic Aalto context of cross-disciplinary research appears to quite diffuse at this point (even if BioDesign Finland is one good starting point). Further on the educational side it is good to see the plans for a Life Science Technology (LSIE) joint study program and perhaps a concrete curriculum might be available for the SAB's next visit. One unanswered question about LSIE curriculum relates to teaching of "biology for engineers and physicists": where and by whom will such teaching originate with – or will it? Elsewhere in this report the SAB has pointed to two very important organizational issues that require early resolution whereby a vibrant Department of Biomedical Engineering (or Bioengineering or like label) within the SCI can maximize its intellectual and scientific potential. These are the (i) question of bringing the brain science faculty into the department and (ii) possible integration of at least some elements of the computational activity with other computing departments within the SCI. In the 2012 SAB report we noted that "Accordingly, and from the point of view of strategic planning within SCI, it seems evident to the SAB that the BECS as a department will sooner than later be at crossroads related to its future. Time for planning and planting is now. While there are obvious points of symbiosis between the BME and Laboratory of Computational Engineering units, the department would do well to investigate what its true technical centre of gravity is: Is BECS a true Bioengineering or Biomedical Engineering department or not? As one example (see also comments for the Low Temperature Laboratory, OVLL), the bioengineering components which relate to brain imaging, brain science (from OVLL), and computation of complex systems could be viewed as providing the core scientific strength of a future bioengineering-type department. In such a model, some of the computational activities which are not necessarily bioengineering or health technology related might consider migration and integration with one of the other computing- or computer science-centric departments."

As of 2014, it appears that some encouraging movement has taken place with respect to the brain science bridging between BECS and OVLL , even if this seems to be happening in rather small and highly measured steps. One means to accelerate the (highly recommended) fusion is the hiring of new faculty who will take the initiative and leadership of the "neuroengineering" component within a reorganized department. As for the role of the "CS" (in BECS) in relation to the other computing entities within the SCI, it is unclear to the SAB as to what strategic planning, if any, might be under way.

(N.B. Please also note commentaries in the report summary in relation to BECS).

Department of Mathematics and Systems Analysis

The SAB report of 2012 extensively addressed challenges and made recommendations for the department. The SAB positively notes that the number of foreign postdocs has dramatically increased from the year 2012 to 2013 from 7 out of 11 to 19 out of 26. For the year 2014 it is too early to judge the numbers which have been 7 foreigners compared to 10 Finnish postdocs.

On the graduate student level the increase seems not that large. Currently less than 20% are non-Finnish. (6 out of 35) The SAB was told that the new master's program in applied and engineering mathematics, jointly with KTH, Chalmers, DTU and NTU, did not attract really students from outside Finland.

The new hirings of the faculty since our last visit have improved the age structure marginally. One does see a widening of fields but last year one out of three was not a Finn. Unfortunately one faculty died last year and one retired. Hence the net growth is dramatic. Currently two hirings are in the process and it is hoped that at least one would be non-Finnish. There has been a change in the leadership of the department to a younger generation just two months before the SAB meeting.

The recommendation of the RAE in 2009 has been reinforced by the SAB report 2012 and can be summarized as follows:

1. essential growth needed
2. the profile should be wider
3. increase the number of foreigners within doctoral students, postdocs and faculty

The SAB again supports these goals and the arguments have been already formulated in the 2012 report. These remain valid and shall not be repeated except for the following points:

- There is a heavy teaching load. Currently part of this teaching is done by senior academic staff. However, it is very important that faculty with active research also do the teaching. Hence one should increase the faculty dramatically. This could be done by reducing the number of senior academic staff. This would make the department more attractive for new foreign faculty, postdocs and PhD students.
- The SAB reiterates strongly that the name of the department is changed to Mathematics to reflect the aim to broaden the profile and make it more attractive for students and faculty.
- It is important for a large university that it has a strong mathematics department with a wide profile since mathematics is used nowadays in many different research fields.

Funding of the department: The leadership of the department reported that in 2014 about 40% of the income derives from service teaching to other Aalto schools, and that there are plans to change the system. It is feared that this will result in an overall reduction of the funding of the department. The SAB

recommends independent of which system is used that the funding of the department is increased such that it can realize the needed essential growth. In addition the introduced system has to guarantee that the funding is not fluctuating too much. A department cannot hire high-quality faculty if the career path is unstable due to the financial scheme.

Department of Media Technology

The Department of Media Technology has four main areas of research: Virtual Acoustics, Visual Media, Games Graphics and Interaction and WWW and Semantics. The department does innovative and exciting research in all of these domains, at the highest international level. This is illustrated for example by the ERC-funded work in acoustics, and the top-notch publications in several domains (e.g., ACM SIGGRAPH for graphics, JASA in acoustics, but also PNAS or Physics Today, ACM CHI for interaction and semantics). Some groups are well-established leaders worldwide (e.g., the virtual acoustics group). Overall, the research directions pursued are highly innovative, creative and very promising. The demonstrations presented to the SAB were all very impressive and of excellent quality. The SAB also had the opportunity to meet one junior faculty and a PhD student during the visit, in addition to the specific visit of the department itself; the overall feedback was very good, and indicative of the positive outlook of the faculty and students.

The department has recently hired several young faculty who contribute greatly to the dynamic and creative atmosphere the SAB observed during the visit. These include a recently hired young HCI faculty member; the addition of this expertise will be a very positive addition for many aspects of the department's activities. Several of the younger faculty are on very promising research and teaching trajectories, as demonstrated by the quality of their work in both aspects of their academic roles.

More general recommendations:

- As was pointed out in the 2012 SAB report, groups with similar scientific and research interests as those in this department are traditionally found in computer science departments elsewhere. In the context of such a unified department, interactions with other computer science specialties will be beneficial for all of the research groups, and will also enrich the more traditional "core" computer science disciplines. The SAB thus supports the request of the department head to be part of a unified Computer Science entity within Aalto, as discussed elsewhere in this report.
- One potential issue for the department is that of indicators for publications. Major publications venues in several of the domains of the department (acoustics, graphics, HCI) are not listed as level 2 or 3 publications in the Finnish Publication Forum classification. It is important that faculty are not discouraged from publishing in their peer journals or conferences because of this indicator system.
- As suggested by the department head, a future hire in the domain of computer vision/image processing (possibly with a link to interactive techniques) will nicely complement the existing scientific expertise in the department. It will also be of general benefit to the entire computer science community at SCI.
- We encourage the department to pursue its efforts for securing adequate funding; in addition to the planned ERC applications, other opportunities exist for funding in creative technologies (future H2020 calls etc.) and gaming/gamification.
- We encourage the department to strengthen the link with ARTS. Existing faculty cross-appointments are an excellent means of achieving this, and we encourage such developments in the future. The move of ARTS to the same campus as SCI should also facilitate interactions in the

medium term. Other initiatives which will foster the collaboration with ARTS are strongly encouraged, especially for teaching. The domain of computer games is an example where collaborations should be relatively easy to establish.

In conclusion, the Department of Media Technology has excellent potential in research and teaching. Acoustics, graphics, web technologies and visual media all have a direct artistic component, and the business applications of these areas (games, social networks etc.) are sectors with some of the most impressive growth in recent years. Consequently, the scientific and research focus of the groups in the department make them natural candidates to contribute to the essence and the success of the Aalto project. (N.B. Please also note commentary in the report summary on Consolidation of computer science, computer engineering and other computing activities).

Department of Applied Physics

The Department of Applied Physics at Aalto is very well-known throughout the world for its pioneering work in a number of areas, and especially in nanoscale quantum electronic devices and condensed matter physics. It currently has a headcount of 219, with 18 professors and approximately 100 PhD students. Five new appointments have been made to the academic staff, with three coming from abroad, a good indicator of the growing internationalism of the department. The move to a closer engagement of the DAP with the OVLL stressed in the previous SAB report has started but much remains to be done: we note that OVLL professors are now affiliated with the DAP with respect to management, research and to some extent teaching. The SAB recommend this process be actively accelerated.

The DAP now has a more compelling vision for the future compared with the previous visit of the SAB, and we noted its aspiration to engage in more research on micro- and nanodevices and to develop ideas for a Quantum Technology Centre, building on their substantial clean-room facilities and investment in this area.

The DAP is widely dispersed, occupying five separate locations with as far as we can see no prospect of co-location on the horizon.

The funding landscape for the department is diversifying in a welcome manner, with 30% of their funding derived from the Academy of Finland, and notable success in ERC applications.

The DAP has been active in reforming its teaching provision, with a renewed first year program and a well-developed doctoral program.

The DAP actively collaborates with Electrical Engineering in research and in teaching a common optics major, and has activities in the teaching of energy studies. The SAB believe more collaboration in the spirit of the Aalto vision is needed.

The gender balance of the department is still an issue, with a decline in the pool of students at the high school level; an action plan on gender is urgently needed.

(N.B. Please also note commentary on in the report summary on “Role of OVLL in relation to the Applied Physics Department and BECS”)

Department of Computer Science and Engineering

The Department of Computer Science and Engineering (CSE) is devoted to the design and engineering of software-based systems, in the scope of leading-edge application areas and in cooperation with industry. With the great developments in social, mobile, data-intensive and cloud computing, the field of software

technology is thriving. In the 2102 SAB report it was observed that the department faced non-trivial challenges in determining its future strategy and focus, to target itself in the development of the field and for guiding its efforts in hiring new faculty. It is a pleasure to see that the department has made significant progress in addressing these challenges compared to 2012.

The department has modernized its mission statement and refocused its research strategy to the following five `thematic areas': distributed pervasive data-intensive systems, distributed pervasive applications (including mobile computing – industrial internet), empirical software engineering, systems security, and learning technology. The department has successfully hired several new tenure-track faculty, with a clear fit to the chosen research directions. Also other indicators have developed very positively, for example as regards publications in high-ranking outlets and cooperation with leading institutes abroad and industrial partners. The department is an important part of the Helsinki-node of the EIT ICT Labs KIC.

In the view of the SAB, the renewed focus has revitalized the department and brought it in an excellent position for a strong development in the coming years. It is also important for guiding the forthcoming recruitment processes. Further challenges remain, notably in the area of funding. Although good progress was made since the 2012 SAB report, the funding landscape is increasingly competitive. The department is clearly aware that the acquisition of research funds at the Finnish (Academy of Finland) and European levels (ERC, ESF, Horizon 2020) requires a dedicated approach. It may be advised to have an internal mechanism for advising and assisting junior faculty who are applying for these grants.

Finally, we like to point at some general recommendations:

- The SAB recognizes that the five thematic areas are a crucial step forward in the research strategy of the department. Nevertheless, the chosen areas seem to emphasize systems issues (pervasive systems, security) rather more than software engineering as such. We encourage the CSE Department to consider how to master the balance between the system perspective and software engineering. The SAB would like to emphasize the need to focus on making some thematic areas stronger and not risk spreading too thinly. The question may be relevant when further professorships become available, or when anticipating the expected retirements three years from now.
- It is important for the department to realize that several of its thematic areas are broad fields and that there can be considerable advantage in concerting the efforts in selected areas with faculty in neighbouring departments or schools. The SAB recommends that this aspect is taken into account in the further explicitation of the department's strategy, both in research and in the development of new master programs.
- As noted in the 2012 SAB report, the department continues to carry a considerable load of basic software and systems education for all other degree programs at Aalto. Applied computing science is liked and needed by many students, a phenomenon which affects all departments in computing as the computational sciences unfold. The school as well as the department have to resolve the dilemma of the extra teaching load this gives, without sacrificing research capacity. (The SAB is aware that this aspect tends to be handled in internal funding models, but did not explore this issue during this visit.)
- Systems and software engineering is a research field which traditionally presents much of its research advances mostly in peer-reviewed top-level conferences, as is customary in many other areas of applied research. If the school moves to adopt a classification standard for publications,

the quality standard of the research field itself should not be sacrificed for an unwarranted ideal of uniformity. At the same time, the department is advised to note the increased importance of ranked and indexed publication outlets. (N.B. Please also note commentary in the report summary on “Consolidation of computer science, computer engineering and other computing activities”).

Department of Information and Computer Science

The Department of Information and Computer Science (ICS) is a leading department devoted to fundamental computer science, supported by novel applications. The department currently focuses on the following four areas:

1. Algorithms, logic and complexity
2. Big data: data analysis, distributed computing
3. Machine learning and computational inference
4. Smart society and sciences.

These areas give an interesting and modern mix for a high-quality department and are in line with the areas at the previous review despite arising from a redefining of the focus areas undertaken in 2013. The department is part of three CoE's and has an excellent publication record both in terms of quality of venues and quantity of papers.

In line with most departments, there has been a significant growth (seven new professors with a net increase of six faculty). The hiring process has been carried forward with great care by the current head of department and exceptional candidates recruited allaying any fears about the continued quality of the staff following retirements over this and the next period. The department has fully embraced the spirit of the tenure track system despite the lack of definition of many aspects of its procedures and expectations.

The recruitment to MSc programs has been good as has that for undergraduate programs, though there was reported some not very welcome competition from closely aligned programs run out of Electrical Engineering. We were able to interview a member of this department and have recommended that greater cross-school collaboration is built into the Aalto structure to ensure that appropriate sharing of courses is enabled and unnecessary duplication avoided. We also discuss elsewhere the proposal to create a larger computer science department within the School of Science with ICS at its core. We believe that the department has been run exceptionally well over the last period and commend the vision and management style of the current head. Indeed a staged merging might make the process less painful: initially one could envisage ICS and the Department of Media Technology creating a Computer Science department perhaps before the end of this year. This could be seen as a test case enabling the identification of any particular process issues or challenges in advance of a developing plan for subsequent integration with the Department of Computer Science and Engineering. We do not recommend altering the school structure. This is because however it was structured, a multidisciplinary university will want to allow research and collaborations to cross the boundaries created. As suggested above processes need to be put in place to support these cross-school links. In the case of the computer scientists employed in other departments or schools such as the researchers in Human Computer Interaction in Electrical Engineering, we suggest that joint appointments might be a possible approach. This would give the professors access to their ‘home discipline’ while keeping them fully engaged with their chosen application domain. A similar approach might be applicable to professors involved in the probabilistic modelling effort within the current Biomedical Engineering and Computational Science (BECS) Department. We noted that when discussing these issues with junior faculty, they felt much less constrained by the structures in terms of building

collaborations. This was very encouraging and should be strongly supported. We have proposed elsewhere that funding be allocated to encourage such cross-departmental and cross-school collaborations. This could be targeted at tenure track professors and require joint applications across these divides. The funds would be in addition to any start-up funding allocated as part of the tenure track recruitments.

(N.B. Please also note commentary in the report summary on "Consolidation of computer science, computer engineering and other computing activities").

Department of Industrial Engineering and Management

The Department of Industrial Engineering & Management (DIEM) was created out of a merger of the former IEM department at Helsinki University of Technology and the SimLab & BIT Research Centre. As such, DIEM is now one of the largest departments of Aalto's School of Science (SCI). The departmental report prepared for the SAB 2014 provides a detailed overview of how DIEM has followed up on the recommendations made in the 2012 SAB report.

Overall, DIEM is doing very well. It has a clear focus on creating and transforming technology-based business, which makes for a key contribution to and role in accomplishing the mission of Aalto University (e.g., via the Aalto Ventures Program). The research performance of DIEM's faculty has increased since 2012, evident from the substantially larger share of faculty actively publishing in top-tier journals. This enhanced research excellence has also become more future proof, due to the successful recruitment of several new (young) faculty members. In the 2012 SAB review, we recommended that DIEM develop a more convincing rationale for its position in the School of Science, particularly in relation to Aalto's School of Business. DIEM has clearly progressed in developing a more convincing rationale. DIEM has also enhanced its collaboration with the School of Business (BIZ) via the Aalto Ventures Program as well as by means of several shared appointments. However, the further implementation of DIEM's profile around creating and transforming technology-based business appears to suffer from the time consuming processes arising from the integration of BIT and SimLab in the department. Later in this section, we will return to this integration issue.

Most of the other recommendations we made in the SAB 2012 review were followed upon by DIEM. In particular, the information provided regarding international collaboration and international benchmarking was informative. In the remainder of this section, we will respond to two questions the department is seeking advice on.

One question raised to the SAB pertains to the integration of BIT and SimLab in the department. This ongoing integration process appears not to be progressing as initially expected, also because of the legacy issues involved (i.e., BIT/SimLab has more than 40 people in DIEM). As the next step in this integration process, we recommend that the SimLab and BIT groups be distributed across (and thus placed under the leadership of) the Strategy, Operations and People group leaders within DIEM. This will serve to clearly signal to all members of DIEM that BIT and SimLab no longer exist as separate groups and have become part of the core structure of DIEM.

Another major question is "how to sharpen the profile of DIEM and eliminate the occasionally occurring misunderstandings about the relevance and location of the department in the school?". We recommend sharpening DIEM's profile in two ways. First, as the next step in their collaborative contribution to Aalto University's mission, SCI and BIZ need to develop clear and complementary profiles in terms of the chairs/professorships in each school. The SAB is well aware that this will not be an easy exercise,

particularly because the areas of expertise of BIZ and SCI-DIEM are overlapping. Ideally, this coordination effort with BIZ should result in a clear definition of the ideal target situation (e.g., in 2018) in terms of which professorships will be located in BIZ, which professorships will be embedded in SCI, and which professorships will be shared appointments. The outcome of this coordination effort will also significantly reduce the risk that BIZ and SCI-DIEM compete on the labour market for the same candidates.

A second way to sharpen DIEM's profile is to reconsider the current name of the department (Industrial Engineering & Management) and change it to, for example, "Technology Entrepreneurship". Such a new name would serve to better communicate the contribution and relevance of the department to SCI as well as to differentiate the department in relation to BIZ.

O.V.Lounasmaa Laboratory (OVLL)

The OVLL is a world-class centre for low temperature research ranging from fundamental physics to novel applications especially in brain imaging which it pioneered. With 4 professors and 9 other permanent staff, the laboratory is well-positioned as a research group but does not have the scale to stand as an independent department and for some time proposals to link the OVLL better with the DAP and other parts of Aalto have been investigated. Indeed the last SAB report raised precisely these issues. The SAB recommends that this be resolved, as part of the future vision of the OVLL do fit well with that of the DAP (e.g. the establishment of a Quantum Devices Centre), whereas the Brain Research Unit may well fit better into a reorganized BECS. But this should not be done without careful thought as the "brand-name" of the OVLL has considerable strength and a wonderful history of achievements.

The OVLL research vision is well aligned with EU priorities, especially those of Horizon 2020 and other sources of external funding. OVLL has had a very successful history of technology transfer (e.g. BlueFors).

Members of the OVLL have begun to contribute to the teaching in DAP and in BECS, and the SAB could see a welcome transition to a "double affiliation" model whereby they contribute to teaching in appropriate departments and to research within two effective centres, focusing on the Brain and Quantum Devices.

(N.B. Please also note commentary in the report summary on "Role of OVLL in relation to the Applied Physics Department and BECS")

Helsinki Institute for Information Technology HIIT

HIIT is a joint research institute of Aalto and the University of Helsinki. The SAB review in 2014 concurs with the view expressed in the RAE 2009 and the SAB report from 2012 that the cooperation in HIIT is a good concept for attracting external funding and as such a win-win-partnership for Aalto and UH.

HIIT provides unique opportunities to leverage on the joint strengths of Aalto and UH. The current contract regarding HIIT lasts until the end of 2015. Some worries were expressed regarding the future of HIIT given Aalto's funding model, which is based on professorships. This funding scheme does not fit well with HIIT, since it is built on a selection of joint areas between Aalto and HU and not professorships.

The SAB recommends that Aalto first decides on how to use HIIT strategically in the long term, and then that the funding of HIIT should be thought through separately, and not being based on the regular funding model within Aalto. HIIT should also be an active participant in the discussions about the integration of computer science, computer engineering and other computational activities within one umbrella in the SCI.

9. S(A)AB Meeting Agendas in 2014

School of Arts, Design and Architecture

Sunday 30 March 2014

19:00 – Dean's Dinner

Monday 31 March 2014

09:00 – 11:00 The role of the SAAB visit and the university's expectations
Aalto ARTS vision, mission and progress since 2010
ARTS identity as School of Art and Design in Aalto University
The strategic framework of research
Key objectives and actions 2014-2020

11:30 – 13:00 Lunch

13:00 – 15:20 Research facilities and resourcing in school/ department level
Multidisciplinary research in school/ university
ARTS identity as School of Art and Design in Aalto University
The strategic framework of research
Interaction and collaboration of research, education and artistic activities
Aalto ARTS professors' community

15:00 – 15:30 Coffee break

15:30 – 17:30 Session A: Meeting researchers
Research facilities and resourcing in ARTS
Research focus areas
The strategic framework of research
Most important development actions
Personal research activity and its relation to Aalto's strategy

Session B: Meeting doctoral students
Doctoral education's facilities and resourcing
Support and counselling
How doctoral students are integrated to departments
Personal research and links to schools / university's strategy
Research community
Aalto ARTS Doctoral Programme

17:30 – 20:00 Get together: Multidisciplinary research in Aalto ARTS

Tuesday 1 April 2014

09:00 – 12:00	Aalto University progress since 2010
	Main achievements 2010 – 2013
	Aalto ARTS role in Aalto University's strategy implementation
10:30 – 12:00	Session A: Department of Art
	Departments research focus areas
	Progress since 2010
	Most important development actions
	Department level research and links to university's strategy
	Session B: Department of Architecture
	Departments research focus areas
	Progress since 2010
	Most important development actions
	Department level research and links to university's strategy
12:30 – 13:30	Lunch
13.30 – 15:00	Session A: Department of Design
	Departments research framework and impact
	Progress since 2010
	Most important development actions
	Collaboration between research- and practice-based design projects
	Department level research and links to university's strategy
	Session B: Department of Media
	Departments research framework and impact
	Progress since 2010
	Most important development actions
	Department level research and links to university's strategy
12:30 – 13:30	Coffee break
15:30 – 17:00	Department of Film, TV and Scenography
	Departments research framework and impact
	Progress since 2010
	Most important development actions
	Department level research and links to university's strategy
17:00 – 19:00	Artistic Activity
	SAAB 2013 recommendations and actions taken

	Qualitative criteria for artistic activity
	Artistic research – artists doing research
	Aalto ARTS strengths
	Cases: Helsinki School concept, Aalto ARTS Books, AiR
19:00 –	SAAB members meeting

Wednesday 2 April 2014

09:00 – 11:00	Finalizing the report
11:00 – 13:00	General meeting
	Preliminary results
	Oral report
13:00 – 14:00	Lunch and departure

School of Business

Wednesday 8 January 2014

17:00 – 19:30	SAB members' internal meeting
19:30 –	Dinner

Thursday 9 January 2014

8:30 – 9:30	Meeting with the president of Aalto
9:30 – 11:30	Reflections on the Business School's strategy, vision and developments
11:30 – 12:45	Parallel discussions with senior & junior faculty & PhD students (3 tracks)
	Senior faculty
	Junior faculty
	PhD students
12:45 – 14:00	Working lunch with Board members of the Corporate Advisory Board
14:00 – 15:20	Parallel discussions with Departments/Subjects (3 tracks)
	International Business
	Management Science
	Economics
15:40 – 17:00	Entrepreneurship/Business Law
	Information System Science
	Finance
19:00 –	Dinner at Grill It!

Friday 10 February 2014

9:00 – 10:20	Parallel discussions with Departments/Subjects (3 tracks)
	Management and Philosophy
	Logistics
	Accounting
10:40-12:00	Communication
	CKIR/CEMAT
	Marketing
12:00 – 14:00	Lunch
14:00 – 15:30	Coffee and debriefing to the school team

School of Chemical Technology

Monday 10 March 2014

12:00 – 13:00	Working lunch
13:00 – 14:00	Aalto towards world class 2020
14:30 – 16:45	Aalto CHEM Roadmap 2020; Report of CHEM activities
16:45 – 18:00	Education reforms (BSc, MSc, DSc)
19:00 –	Dinner at Restaurant Loiste

Tuesday 11 March 2014

8:30 – 9:30	Biotechnology and Chemical Technology
9:45 – 10:45	Chemistry
11:00 – 12:15	Tour
12:15 – 13:00	Working lunch
13:00 – 14:00	Materials Science and Engineering
14:15 – 15:15	Forest Products Technology
15:30 – 17:00	Presentations of new tenure track professors
17:00 – 18:00	Presentations of Doctoral students
19:00 – 21:00	Working dinner at hotel

Wednesday 12 March 2014

8:00 – 11:00	Working on the report
11:00 – 11:30	End of the SAB meeting
12:00 – 12:30	Meeting with the Dean of Aalto CHEM
12:30 – 13:30	Meeting with the President of Aalto University

School of Electrical Engineering

Tuesday 21 January 2014

11:30 – 13:00	Lunch and welcome
13:00 – 17:00	Introduction to Aalto University, Aalto infrastructure program and the role of ELEC in Aalto
	Key observations of the previous SAB assessment and the implemented actions
	ELEC activities, research strategy and focus areas, success stories
	Future directions of ELEC
	Research in the departments and the linkages to ELEC focus areas, development since 2012 and plans for the future
	Discussion and questions
19:00 –	Dinner

Wednesday 22 January 2014

9:00 – 10:30	Implementation of the career systems
	Panel discussion: tenure track professors, lecturers, postdocs, doctoral students
10:30 – 12:00	Presentations of ELEC research
	Demonstrations/posters
12:00 – 14:00	Lunch and discussions with the department heads
12:00 – 13:00	Lunch and exhibition viewing
14:00 –	SAB internal discussion and report writing
19:00 –	Dinner

Tuesday 31 January 2012

9:00 – 10:00	Discussion and questions
10:00 – 11:00	SAB report discussions and writing
11:30 – 12:30	Meeting with Aalto President Tuula Teeri
12:30 – 14:30	Lunch and feedback session
14:30 – 15:00	SAB report (follow-up actions for finalization)

School of Engineering

Wednesday 26 March 2014

19.00 Dinner at Restaurant Ranta

Thursday 27 March 2014

9:00 – 9:15	Strategic plans and goals of the School of Engineering
9:15 – 10:00	Strategic plans and goals of the departments
	Applied Mechanics
	Civil and Environmental Engineering
	Civil and Structural Engineering
10:15 – 10:30	Coffee
10:30 – 11:15	Strategic plans and goals of the departments
	Energy Technology
	Engineering Design and Production
	Real Estate, Planning and Geoinformatics
11:15 – 12:00	Question and discussion time with Prof Tuula Teeri
12:00 – 13:00	Lunch
13:30 – 15:00	Highlights and new openings of the focus areas
	Arctic Technology
	Mechanics and Materials
	Multidisciplinary Energy Technologies
	Sustainable Built Environment
	Systems Design and Production
	A short walk to ADD Lab (Aalto University Digital Design Laboratory)
15:00 – 15:30	Coffee at ADD Lab
15:30 – 16:00	A short introduction to Aalto Digital Design Laboratory
16:00 – 16:15	A short walk to the laboratory of Water Engineering
16.15 – 16:45	A short introduction to Aalto Water Engineering Laboratory
16.45 – 17:00	A short walk to building K1
17:30 – 18:15	SAB internal discussion; SAB report discussions and writing
19:30 –	Dinner at Kalastajatorppa

Friday 28 March 2014

9:00 – 9:30	Doctoral Education
9:30 – 12:00	SAB report discussions and writing
12:00 – 13:00	Lunch and End of SAB Meeting
13:00 – 13:30	SAB Chair Professor Moan discussing with Dean Gary Marquis
13:30 – 14:30	A Short Conclusion of SAB 2014

School of Science

Monday 3 March 2014

09:00-9:45	Discussion with the president of Aalto University
9:45-10:45	Aalto School of Science: Strategy and future directions
10:45-11:00	Coffee
11:00-12:30	Departments at SCI: Recent progress and strategic plans
	Department of Applied Physics
	O.V. Lounasmaa Laboratory
	Department of Biomedical Engineering and Computational Science
12:30 – 13:30	Lunch
13:30 – 15:00	Department of Computer Science and Engineering
	Department of Information and Computer Science
	Department of Media Technology
15:00-15:20	Coffee
15:20 – 17:00	Helsinki Institute for Information Technology
	Department of Mathematics and Systems Analysis
	Department of Industrial Engineering and Management
	EIT ICT Labs
17:00-18:30	SAB internal discussion
19:00-	Dinner at Torni

Tuesday 4 March 2014

08:30-09:15	Doctoral Education
09:30-11:00	Meeting with the post docs and doctoral students
11:00-12:30	Site visits at the campus
12:30-13:30	Lunch
13:30-18:00	SAB report discussions and writing
19:00-	Dinner

Wednesday 5 March 2014

8:30 – 10:30	SAB internal meeting
10:45 – 11:30	Preliminary remarks by the SAB and Exit interview
11:30 – 12.30	Lunch

10. Terms of reference and meeting arrangements

General

This report contains instructions for the SAB and SAAB meetings of the Aalto University Schools in 2014. The instructions are given on a general level to support the schools in their preparation of the meetings.

Background

From the beginning, Aalto University set an ambitious goal: to become a world-class university by the year 2020. To lay a solid basis for understanding its current status and receive feedback and guidance for reaching this goal, Aalto has carried out a research exercise assessment (RAE) in 2009 and a teaching and education evaluation (TEE) in 2011. The suggestions and recommendations of these evaluations are now being used in further developing the university towards international excellence and recognition. These evaluations will also be repeated with due intervals

To support the schools in their activities and development, Aalto set up in 2011 Scientific Advisory Boards (SAB) for each school (a Scientific and Artistic Advisory Board, SAAB, for the School of Art, Design and Architecture). The boards consist of international distinguished researchers in the fields of the schools. The task of the SABs are to assess the activities and plans of the schools, visit the schools at regular intervals and present their recommendations and suggestions in a written report. The first meetings were held in the beginning of 2012, when the SABs visited the schools and produced reports on each school. The SABs will visit the schools again in 2014.

Terms of reference

The tasks of the SABs and the SAAB are

- To provide a critical evaluation of the strategic plans and goals of the school and its departments, and a critical evaluation of the implementation and effectiveness of the plans in the light of Aalto's strategy and the previous evaluations.
- To follow up on the academic quality of the research achievements, scientific and societal visibility, research environment and future potential of the schools and the departments.
- To assess and present recommendations regarding arrangements, quality and efficiency of the doctoral education (doctoral courses, supervision, funding and results) taking into account how far the implementation of the doctoral programmes has proceeded.
- To look into any school-specific issues determined by the school and to follow up on the SAB recommendations made in the previous meeting.

The evaluations described above are done in order:

- To support and encourage the departments in their activities, development and transformation process.
- To support the Dean in managing and developing the school and in revising and sharpening the strategic plans of the school.
- To provide the president with feedback for developing the whole University.

The SABs and SAAB will write their findings and recommendations in a SAB report for each school.

Report structure

Each SAB writes a report on their findings and suggestions regarding their school. The final reports will be collected into one SAB report of the Aalto University Schools. A School SAB report could contain the following issues.

1. Scientific Advisory Board Members of the School
2. Summary and key recommendations
3. Achievements and potential
    - A follow up on the academic quality of the research achievements, scientific and societal visibility, research environment and future potential of the schools and the departments.
4. Strategic plans and goals of the schools
    - An evaluation of the strategic plans and goals of the school and its departments, and a critical evaluation of the implementation and effectiveness of the plans in the light of Aalto's strategy and the previous evaluations.
5. Doctoral education
    - An assessment of the arrangements, quality and efficiency of the doctoral education taking into account how far the implementation of the doctoral programmes has proceeded.
6. School terms of reference
    - An assessment according to the additional terms set by the school and a follow-up of the SAB recommendations made in 2012.
7. Recommendations
8. Reflections on each department
9. Additional remarks or conclusion

The SAB should be provided with scheduled time to start writing their report during the meeting so that they would be able to finish the report in a few weeks after the meeting, at the latest. The deadline of the school reports is set on 15 April 2014. Secretarial help will be available, if the SAB so wishes. The SAB will be provided with notes from the meetings in order for them to remember the contents of the discussions.

The reports are utilized by the Aalto University Board in following up the implementation of the strategy of the University. The final reports are published on the intranet of Aalto University and will thereby be available for the all staff and students.

SAB and SAAB members in 2014

The schools (the deans) appoint the members of the SAB of the School. Aalto University wishes that the members will attend at least two SAB meetings in a row.

School of Arts, Design and Architecture SAAB

- Professor Rachel Cooper, Lancaster University, UK, Chair
- Professor Luisa Collina, Polytecnico di Milano, Italy
- Rector Karl Otto Ellefsen, The Oslo School of Architecture and Design, Norway
- Rector Elsebeth Gerner Nielsen, Designskolen Kolding, Denmark
- Professor Peter Krogh, Aarhus School of Architecture, Denmark
- Dr Sally Jane Norman, Newcastle University, UK
- Director Nik Powell, National Film and Television School, UK
- Professor Takeshi Sunaga, Tama University of the Arts, Japan

School of Business SAB

- Professor Michael Myers, University of Auckland, New Zealand, Chair
- Professor Lars Bergman, Stockholm School of Economics, Sweden
- Professor Alnoor Bhimani, London School of Economics, United Kingdom
- Professor Joep Cornelissen, VU University Amsterdam, The Netherlands
- Professor Eileen Fischer, York University, Canada
- Professor Marian V. Jones, University of Glasgow, United Kingdom
- Professor Herbert Moskowitz, Purdue University, USA
- Professor Martin Ruckes, Karlsruhe Institute of Technology, Germany
- Chief Financial Officer Jussi Siitonen, Amer Sports, Finland

School of Chemical Technology SAB

- Professor J.W. (Hans) Niemantsverdriet, Eindhoven University of Technology, The Netherlands, Chair
- Professor Wout Boerjan, Ghent University, Belgium
- Professor Enrique J. Lavernia, University of California Davis, USA
- Professor Arthur J. Ragauskas, Georgia Institute of Technology, USA
- Professor Rasmita Raval, University of Liverpool, United Kingdom
- Dr. Jens Rostrup-Nielsen, Haldor Topsoe, Denmark

School of Electrical Engineering SAB

- Professor Göran Andersson, ETH Zürich, Switzerland
- Professor Daniel Baker, University of Colorado, Boulder, CO, USA
- Professor Toshio Fukuda, Nagoya University, Japan (Chair)
- Professor Lennart Ljung, Linköping University, Sweden
- Professor Lars Samuelson, Lund University, Sweden

School of Engineering SAB

- Professor Torgeir Moan, Norwegian University of Science and Technology, Norway, Chair
- Professor Luca Bertolini, University of Amsterdam, The Netherlands
- Professor Nicolaas van de Giesen, Delft University of Technology, The Netherlands
- Professor Philip de Goey, Eindhoven University of Technology, The Netherlands
- Professor Rafael Sacks, Technion – Israel Institute of Technology, Israel
- Professor Huseyin Sehitoglu, University of Illinois at Urbana-Champaign, USA

School of Science SAB

- Professor Arto Nurmikko, Brown University, USA, Chair
- Dr George Drettakis, REVES/Inria Sophia-Antipolis, France
- Professor Rolf Jeltsch, ETH Zurich, Switzerland
- Professor Sir Peter Knight, Imperial College, UK
- Professor Jan van Leeuwen, Utrecht University, The Netherlands
- Professor Georges Romme, Eindhoven University of Technology, The Netherlands
- Professor John Shawe-Taylor, University College London, UK
- Professor Claes Wohlin, Blekinge Institute of Technology, Sweden

Practical meeting arrangements

Background information

The schools are in charge of providing relevant information about the school and the university before the meetings. Below is a suggested list of information that should be provided to the SABs. The suggestion is that as much as possible of the documentation produced for the resource dialogues between the schools and the president in the autumn of 2013 will be reused for the SAB meetings. The schools will have the possibility to use a common web site for presenting the material to the SAB members. Preferably this web site would be open to all the SAB members and the Deans for comparison of materials. A suggested list of documents (or web links) is the following.

University-level information

- Reports and publications
    - Scientific Advisory Board Reports 2012
    - University Strategy 2012 (http://www.aalto.fi/en/about/strategy/)
    - University Annual Report and Statistics 2012 (http://www.aalto.fi/en/about/reports_and_statistics/)
    - Internal Funding Model 2012 and update
    - The tenure track system and statistics
    - Research Assessment Exercise 2009 (http://www.aalto.fi/en/research/strengths/)
    - Teaching and Education Evaluation 2011 (http://www.aalto.fi/en/about/services/strategic_support/tee/)
- Web sites
    - Aalto University (www.aalto.fi/en/)
    - Schools, departments and other units (http://www.aalto.fi/en/about/organization/)
    - Major Research and Teaching Infrastructures (http://www.aalto.fi/en/research/infrastructure/)

School-level information

The school-level information may include, among others,

- The Strategy Plan and/or the roadmap of the school
- A description of the doctoral education at the school
- Facts and figures of the school: financial information, personnel/professors, publications
- Department descriptions or self-assessment reports of the departments
- Research groups descriptions
- SAB Members' CVs

But school-level information may also include any information that the school considers relevant for the meeting.

Website for information

The schools collect university and school-level information on a password-protected web site for the SAB members. The SAB members have access to the information from all schools. Also the Deans have access to all information. The website would contain the following facts and figures (in addition to the documents listed in the previous section).

- Aalto-level information

    - A list of all new tenure track and tenured recruitments since 2010 (as collected for the survey of the Academy of Finland for their report *The State of Scientific Research in Finland 2014*. This information will be available at the latest by the end of December 2013.)
- School-level information:
    - Financial information: income, expenditure, department-wise ; competitive vs. basic funding
    - Personnel structure according to categories
    - Publication figures according to categories
    - Student degrees awarded (PhD, Lic, M, B)
    - Possible excellence awards
    - RAE, TEE, and other ratings
    - (Other) School/University KPIs
    - Relative school data, e.g. median and lower/upper quartiles for 2010-2013
        - Publications/academic staff
        - Competitive funding/academic staff
        - Master degrees/professors
        - Doctoral degrees/professors
    - Relative data, average for 2010-2013
        - Total funding/publications
        - Competitive funding/total funding
- Department-level information:
    - Personnel, FTEs and targets in the near future, according to position; degrees awarded;
    - Degrees awarded
    - Relative department data, e.g. median and lower/upper quartiles for 2010-2013
        - Publications/academic staff
        - Competitive funding/academic staff
        - Master degrees/professors
        - Doctoral degrees/professors
    - Relative data, average for 2010-2013
        - Total funding/publications
        - Competitive funding/total funding

A more detailed preliminary description and web site is under construction. The draft version will be available by the end of October 2013 and the finished version by the end of November 2013.

Meetings in 2014

To continue their work and to follow up on the schools, the SABs will visit Aalto University again in 2014 (the SAAB of ARTS visited ARTS already in May 2013, but will also return in 2014). As before, the schools will be in charge of organizing the meetings, communicating with the SAB members and also for taking care of any costs related to the meetings.

The suggested time of the meetings is during January-March in 2014. The schools should contact their SAB chairs in advance to ask for any feedback or suggestions on how to set up the meetings. The schools should also consider whether the SABs need to be extended with more members, or if any other changes are needed (e.g. selecting a new chair of the board).

Schedule for the meetings in 2014

SAB or SAAB meeting date	School
31 March – 2 April 2014	ARTS
8 – 10 Jan 2014	BIZ
21 – 23 Jan 2014	ELEC
10-12 March 2014	CHEM
3 – 5 March 2014	SCI
26 – 28 March 2014	ENG

Agendas of the meetings

The schools are in charge of the setting up the agendas in cooperation with SAB chairs. The president should have a chance to meet the Chair towards the end of the meeting (or the entire SAB at the beginning?), and there should also be ample time for the SAB to write (the main part of) the report during their visit at Aalto. Other agenda items may include

- Presentation of Aalto University and its development since 2012.
- Presentation of the school and the departments and their development since 2012 and plans and goals for the future.
- Presentations of focus areas and/or research highlights of the schools
- Follow-up of the SAB recommendations to the school in 2012.
- Private sessions for the SAB only.
- Feedback session by the SAB to the school at the end of the meeting.
- Poster sessions and/or meetings with the students and staff and new international tenure track professors.
- Visiting some part of the school's facilities.
- Coffees, lunches and dinners.

A representative from Academic Affairs will attend the meetings and act as secretary taking notes during the meetings and also provide support for finishing the reports, if the SAB so wishes.

Working schedule for preparing the meetings in 2014

25 Feb 2013	Meeting with the development managers of the schools. To discuss preliminary plans for the next SAB meetings.
14 Mar 2013	AATU, meeting with the deans. To inform about upcoming SAB meetings and to gain feedback from the schools.
End March	Feedback from the president on preliminary plans.
Spring 2013	The schools make preliminary contacts with SAB members, asking for any suggestions for organizing the meetings, and making necessary changes to the composition of the boards.
29 Aug 2013	F&P: Development Day. Further discussion on the meetings in 2014.
13 Sep 2013	Development managers, library and MIS to discuss the SAB meetings.
End September	The president's and deputy president's feedback on the meeting preparations.
Autumn 2013	The schools produce documents for the resource dialogues with the President, and update information also about the schools for the SAB meetings.
End October	The preliminary web site sis up with examples of statistics. Feedback from deans

	and Development managers; meeting with Development managers
13 November	AATU, feedback and proposal; presentation to the management
End November	The web site is finalised but may be updated when relevant data is received.
Dec 2013 - Jan 2014	Statistics of the schools for 2013 are added to the school material.
Jan-Mar 2014	The SAB meetings are held at Aalto.
15 April 2014	The SAB reports have been finalised and returned.
30 April 2014	The SAB reports are released.
5-8 May 2014	The SAB reports may be used in the strategy dialogues with the president.
31 May 2014	A compiled report containing all reports is released.