KANSALLINEN KOULUTUKSEN ARVIOINTIKESKUS
NATIONELLA CENTRET FÖR UTBILDNINGSUTVÄRDERING
FINNISH EDUCATION EVALUATION CENTRE

AUDIT OF AALTO UNIVERSITY

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Publikationsår **2023**, NCU:s publikation **13:2023**
Språk **Engelska**
ISBN **ISBN 978-952-206-764-7 pdf**

2.2 Research, development and innovation activities as well as artistic activities with impact

- Högskolans självvärdering

Aalto offers a strong foundation for scientifically and socially impactful research, education, artistic activities and innovations. This is accomplished by securing a long-term funding base, by creating career systems that support academic and professional excellence, by maintaining world-class infrastructures and by providing an internationally networked ecosystem. The research and innovation activities at Aalto's schools are directly aimed at solving global challenges and building a sustainable future.

We support multidisciplinarity and new collaborations across fields via the Aalto Networking Platform, whose mission is to facilitate matchmaking and networking of multidisciplinary activities leading to larger research initiatives and solutions to grand challenges.

Measuring quality and impact

Success in research and impact creation is monitored through KPIs relating to the quality of publications (measured by the number and proportion of Top 10% publications and Publication Forum scores), acquired competitive research funding, the number of artistic outputs, corporate collaboration volume, the share of open access publications, income from technology transfer and the number of employed graduates. We also measure the carbon dioxide emissions of our operations. In addition to numerical measures, we follow qualitative measures such as employer opinions.

Aalto University continuously assesses its societal impact and the quality of its research and artistic activities. The Research, Art and Impact Assessment (RAI) evaluation by international peers is conducted every 7-9 years. Its aim is to assess Aalto's international standing and to identify areas with world-class potential. The development of each school is monitored by a Scientific Advisory Board or Scientific and Artistic Advisory Board (S(A)AB) made up of international experts in fields relevant to the future development of the schools. In biennial meetings, the S(A)ABs provide recommendations for further development. The recommendations given by the RAI and S(A)AB are incorporated in the annual planning cycle, and the academic units are asked to report on how they respond to the recommendations. For example, merging of departments has taken place following recommendations by one or more external panels and internal discussions.

In reviewing and evaluating its research and impact, Aalto takes into account international guidelines (DORA, Leiden Manifesto) and national guidelines (i.e., the recommendation for responsible researcher evaluation guides the implementation, ethical conduct and transparency of researcher evaluations).

Aalto's track record in creating impact through research, innovation and artistic activities is very good, but university-level KPIs and target setting need to be developed further in order to better reflect changing circumstances and to guide personnel to consider how to increase the societal impact of their research. Collaboration between student activities and research, innovation and artistic activities also requires development. Furthermore, because research infrastructures are a prerequisite for research excellence and also provide a meeting place for researchers and companies, their development needs special emphasis.

A challenge is to ensure that art and creative practices receive sufficient attention and management after the responsibility for artistic activities was transferred from a separate Artistic Activities Steering Group (led by the VP for Art and Creative Practices) to the Research Steering Group (ReSG, led by the VP for Research). We have recently established an Artistic Activity Task Force under ReSG which will report on artistic activities and support awareness of art. The question of how to measure excellence in art objectively also sometimes arises since there are no established indicators available.

Open access for greater impact

Open science increases the societal impact of research, accelerates innovation, ensures the quality and transparency of science, and makes the results available for use in solving global problems. The Vice President for Research leads services that support open science activities.

The university has taken several measures to promote open science since 2017. In recent years, the UNESCO Open Science recommendation and our active participation in the National Open Science Coordination (TSV) have offered us objectives to work towards. Aalto University's Open

Science and Research policy, established in 2020, encourages researchers to make their publications open access and requires researchers to parallel publish all peer-reviewed scientific articles and conference papers. The number of openly accessible research publications is an internal KPI (82% in 2021). It is also one element determining the Ministry's basic funding for the university. In 2022, two more components will be added to our open science and research policy: open infrastructures and open learning materials.

Data and code are increasingly important as research outputs. Our major funders require open access to data unless ethical or legal reasons prevent it. Our Research Data Management network of 12 researchers and service personnel works to increase our researchers' awareness of FAIR (Findable, Accessible, Interoperable, Reusable) data.

Aalto University's research information system, ACRIS, provides a good platform for collecting and maintaining reliable publication and research data.

Ensuring research ethics and the responsible conduct of research

Aalto University follows the Finnish Advisory Board on Research Integrity (TENK) guidelines for ethical principles of research and the guidelines for the responsible conduct of research. The Aalto University Research Ethics Committee is responsible for the preliminary ethical evaluation of the university's non-medical research projects with human participants. Statements on research projects that fall under the Medical Research Act are provided by the ethical committees of the Hospital District of Helsinki and Uusimaa. A network of research ethics advisors supports the researchers. In addition, the Aalto Code of Conduct sets the foundation of our community culture and provides ethical principles and legal compliance policies to create a better working environment. In everyday life, the code helps us make ethically sound choices and gives practical examples of actions that are in line with our values. Legal compliance has also been strengthened via a support system for export control.

Strengths	**Enhancement areas**
Research and impact KPI targets are ambitious and are evaluated and established annually.	Support for developing sensitivity to see art in science, engineering and business.
An innovation management system helps manage and analyse innovation pipeline activities.	More systematic collaboration between different stakeholders within the Aalto community.
Research and artistic agendas are discussed and aligned with strategic public and private partners.	Developing a systematic approach to translate fundamental research into innovations with a wider impact.

Systematic and regular consultation with industrial advisory board in several schools.

Multidisciplinarity and new collaborations across fields are supported via the Aalto Networking Platform.

Motivating researchers to practice open science.

2.2 Research, development, and innovation activities and artistic activities with impact

- Auditeringsgruppens bedömning

Cross-cutting research exists between schools but needs better visibility

Aalto’s long-term strategy is to excel and make breakthroughs in and across science, art, technology and business. Aalto aims to create the conditions needed for innovation, economic growth, employment, and well-being. Aalto’s research focuses on seven key areas combining four core competences in the fields of ICT, materials, arts, design and business, together with three grand challenges related to energy, living environment and health.

Aalto’s networking platform promotes cross-disciplinary actions in its seven key research areas between different departments and schools and even supports collaboration outside the university. In the SER, Aalto stated that all cross-cutting approaches are discussed within all steering groups as part of the University Review process. Here the cross-cutting managers have a particular role in reaching out to departments and schools, bringing people together to enhance interdisciplinary dialogue and competence building. There is also a focus on improving staff competence related to Aalto’s cross-cutting areas of sustainability, creativity and entrepreneurship. However, based on the audit interviews, cross-cutting research between schools still needs better visibility. Therefore, the audit team recommends that Aalto continue working towards a visible cross-disciplinary approach.

Aalto has a Research Steering Group with representatives from each school, including the School of Arts, Design and Archtitecture. Some joint faculty positions exist, for example, between the Schools of Arts and Electrical Engineering. Seed funding initiatives can also promote cross-disciplinary collaborations and fruitful collaborations between different scientific fields. In the audit interview, the university’s leadership team recognised that systemic problems required systemic solutions.

One of the three cross-cutting approaches by the university is radical creativity. It seeks to encourage creative and transdisciplinary research approaches. Some good examples are found in Space 21 – a cluster of rough, free project spaces. The university intends to utilise vacant/diverse spaces for studio types of workshops for bottom-up experimental needs and inclusive events for students and personnel. Another initiative involves seed funding for radically creative risk-taking and bold transdisciplinary collaborations. At the time of the audit visit in January 2023, Aalto was planning to launch educational offerings to develop a creative mindset among university community members. This includes online courses as well as summer bootcamps. Hence, the cross-disciplinary concept of radical creativity is well-stimulated by various means.

Research impact is monitored through quantitative KPIs, but defined targets should be clearly defined and communicated

KPIs for monitoring research impact include 1) Peer-reviewed publications, quality and quantity (number and proportion of the top 10% publications and publication forum scores) and the share of open access publications. It is evident that whilst the total number of publications has risen over the last decade, the percentage in the top 10% has remained relatively static. This is despite a doubling of the number of faculty with ERC funding. 2) Acquired competitive research funding; this has remained relatively static, even though the number of professors has risen by 50%. 3) Corporate collaboration volume, which appears to have declined since 2015. 4) Income from technology transfer. This has increased substantially and particularly in more recent years, by 70-fold. 5) The number of employed graduates.

Other non-official KPIs captured locally at the school level include invention disclosures, patents, licences and spinouts. Metrics on these performance measures are shared but are not benchmarked against predetermined targets. Aalto is recommended to give more attention to the impacts emerging from these KPIs. Alone, they are merely outputs or academic metrics. In order to augment KPIs on academic outputs, which are well captured, it might be valuable to consider additional measures to capture the impact of these achievements from societal, economic and sustainability perspectives. Reactive solutions should be devised to capture the societal impacts of these outputs.

The audit team recommends that Aalto consider setting transparent targets and benchmarking to relevant institutions in assessing the impacts of its R&D and innovation activities. Furthermore, to mainstream EDI goals within the university’s R&D activities, it would be valuable to break down KPI metrics by gender and other considerations, such as minority groups. In the future, this will enable greater insight into the impact of Aalto’s EDI initiatives on the university’s success.

In addition to these numerical measures, Aalto follows qualitative measures such as employer opinions to capture the impact of its research. One of the most significant impacts recognised by Aalto is its students. They are proud to be educating game-changers. There is a continual

dialogue with stakeholders about how graduates' competencies are aligned with their needs. This is very much appreciated by the audit team, as it contributes to ensuring that graduate competences stay relevant and up to date.

There is evidence that Aalto's research, development and innovation activities and artistic activities contribute to reforming society. During the audit visit, the team learned from several examples where Aalto is collaborating with industrial partners towards the shared goal of societal reform. For instance, SAAB has an extensive research programme with Aalto involving ten PhD students. In collaboration with VTT, individuals move between the two organisations. There is also sharing of equipment with ABB Finland.

The in-house ACRIS system is the most critical tool for tracking research and artistic activities. Three specialists are designated to benchmark Aalto to other universities in terms of different indicators and bibliometrics. Based on the audit interviews, it would be advantageous if support personnel could also input results into the system.

Defined targets for the impact of artistic activities are not distinguished from research other than the number of artistic outputs. The SER does not detail how this is quantitatively and qualitatively assessed. Aalto should invest some more thought into defining targets for these activities.

Combining art and creativity – what societal impacts has this realised?

Aalto assesses its societal impact and the quality of its research and artistic activities through a Research, Art and Impact Assessment (RAI) conducted by international peers every 7-9 years. The remit of this committee is to assess Aalto's international standing and to identify areas with world-class potential. The last one was carried out in 2018. The evaluators were very complimentary, particularly concerning the enthusiastic and collaborative work atmosphere, the university's infrastructure, the tenure track career system and the student-driven entrepreneurial ecosystem.

The 2018 RAI made numerous recommendations. An example was the recommendation to provide seed funding to support the generation of pilot work to allow larger grant acquisitions. There needs to be due consideration given to how (seed) funding can best be used to develop artistic activities. Similarly, another initiative to stem from the 2018 RAI is the joint professorship initiative. Notably, the RAI did recommend developing a Vice President of Art and Creative Practices role to lead the strategic development of multidisciplinarity, sector/government engagement and leadership in the creative industries.

Aalto chose not to go down this route but instead to establish an Artistic Activity Task Force under the Research Steering Group, which reports on artistic activities and supports art awareness. In Aalto's Living strategy from 2021 onwards, art is now embedded in research, and radical creativity was chosen as one of the cross-cutting approaches. Aalto sees that the cultural

and creative sectors should be integral, not separate, parts of the economy and society, as then the entire creative human potential and imagination is in use.

Through the SER, Aalto self-identified the challenges in ensuring that art and creative practices receive sufficient attention and management after the strategic and organisational change mentioned above. Within Aalto, a working group has been established to try and improve the visibility of artistic activities. Based on the interviews, the visibility of the School of Arts, Design and Architecture is also achieved through its high-level national and international networks. Furthermore, within new buildings on the Aalto campus, 5% of the budget is ring-fenced for art and regular exhibitions to enhance visibility.

The audit team finds it essential to consider the cross-cutting approach to radical creativity in all of Aalto's activities and steering groups. The audit interviews brought up that due to cross-cutting approaches between art and science, a project between chemistry and art led to the creation of new textiles. This is an excellent example of innovation potential embedded in cross-cutting approaches and promoted by Aalto's procedures. The audit team recommends that Aalto ensure and promote the visibility of artistic activities creatively.

A Scientific and Artistic Advisory Boards (S(A)AB) review regularly the research, artistic and teaching activities and plans of the schools with focus on research activities. In biennial meetings, the S(A)ABs provide recommendations for further development. The recommendations given by the RAI and S(A)AB are incorporated into the annual planning cycle, and the academic units report on how they respond to the recommendations.

Aalto considers international guidelines such as DORA, Leiden Manifesto and national guidelines for instance regarding the recommendation for responsible researcher evaluation guides the implementation, ethical conduct and transparency of researcher evaluations.

A clear strategy for advancing open science through open-access publications, FAIR data archiving

The university has taken several measures to promote open science since 2017. Aalto's Open Science and Research policy, established in 2020, encourages researchers to make their publications open access and requires researchers to parallel publish all peer-reviewed scientific articles and conference papers. The number of openly accessible research publications is an internal KPI (82% in 2021). It is also one element that determines the Ministry's basic funding for the university. In recent years, the UNESCO Open Science recommendation and Aalto's active participation in the National Open Science Coordination (TSV) have provided objectives to work towards. The vice president for research is responsible for leading services that support open science activities.

As of 2022, two more components were added to the Open Science and Research Policy: open

infrastructures and learning materials. Data and code are increasingly crucial as research outputs. Funders require open access to data (save ethical/legal restrictions). The interviews indicated that Aalto's Research Data Management network and service personnel work hard to increase researchers' awareness of FAIR data. Aalto University's research information system, ACRIS, provides a good platform for collecting and maintaining reliable publication and research data and ensuring long-term, sustainable data management and warehousing. An online code of conduct course is obligatory for everyone at Aalto. During the staff workshop, several individuals expressed its positive impact on their research ethics.

Whilst there is a clear strategy for supporting open science practice in the university, it would be advantageous to have incentives and support for students and researchers to implement open science, such as covering publication costs. The audit team also recommends regular staff training, particularly doctoral students, to ensure ethical and transparent research.