The Research Council of Norway

Evaluation of Mathematics, ICT and Technology 2023-2024

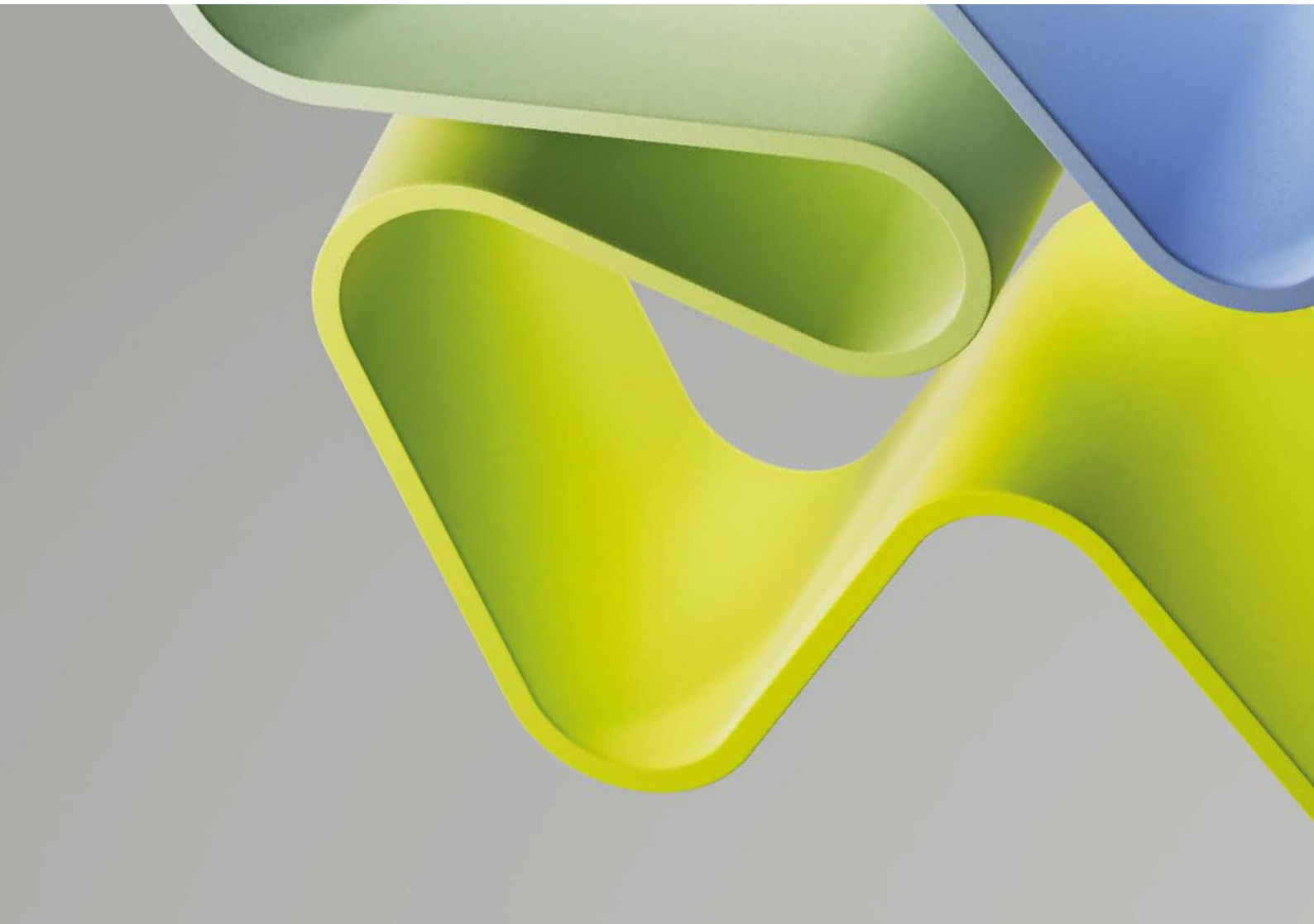
Evaluation Report for Administrative Unit

Administrative Unit: Faculty of Computer Science, Engineering and Economics

Institution: **Østfold University College (ØUC)**

Evaluation Committee Higher Education Institutions 3

December 2024



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Statement from Evaluation Committee Higher Education Institutions 3

The members of this Evaluation Committee have evaluated the following administrative units at the higher education institutions/research institutes within Mathematics, ICT and Technology 2023-2024 and has submitted a report for each administrative units:

- Department of Industrial Technology, UiT The Arctic University of Norway
- Department of Electric Energy (IEL), Norwegian University of Science and Technology (NTNU)
- Department of Marine Technology (IMT), Norwegian University of Science and Technology (NTNU)
- Department of Mechanical and Industrial Engineering (MTP), Norwegian University of Science and Technology (NTNU)
- Faculty of Engineering and Natural Sciences (FIN) / Faculty of Technology, Environmental and Social Sciences (FTMS), from 1.1.2026, Western Norway University of Applied Sciences (HVL)
- Department of Mechanical, Electronic and Chemical Engineering, Oslo Metropolitan University (OsloMet)
- Faculty of Computer Science, Engineering and Economics (IIØ), Østfold University College (ØUC)
- Department of Electrical Engineering (IET), UiT The Arctic University of Norway
- Department of Technology and Safety (ITS), UiT The Arctic University of Norway
- Department of Electrical Engineering (IT) and Cybernetics (EIK), University of South-Eastern Norway (USN)
- USN School of Business, University of South-Eastern Norway (USN)
- Department of Microsystems (IMS), University of South-Eastern Norway (USN)

The conclusions and recommendations in this report are based on information from the administrative units (self-assessment), digital meetings with representatives from the administrative units, bibliometric analysis and personnel statistics from the Nordic Institute for Studies of Innovation, Research, and Education (NIFU) and Statistics Norway (SSB), and selected data from the National survey for academic staff in Norwegian higher education and the National student survey (NOKUT). The digital interviews took place in the autumn 2024.

The members of the Evaluation Committee are in collective agreement with the assessments, conclusions and recommendations presented in this report. None of the committee members has declared any conflict of interest.

The Evaluation Committee has consisted of the following members:

Professor Lina Sarro,
Delft University of Technology (Chair)

Professor Stefania Bruschi,
University of Padova

Professor Khaled Ahmed,
University of Strathclyde

Professor Andreas Müller,
Johannes Kepler University Linz

Professor Maria Teresa Correia de Barros,
University of Lisbon

Professor Kostas J. Spyrou,
National Technical University of Athens

Description of the Administrative Unit

The Faculty is split across the Halden and Fredrikstad campuses. It has separate departments for computer science, engineering, and economics and innovation. Only two research groups were submitted to EVALMIT (see below). However, the group structure in the Faculty is rather loose, so people can affiliate themselves to the group or groups of their choosing.

Historically, the colleges that have merged to become ØIC have been teaching institutions, so the institution is still in the process of building research capacity. About half the academic faculty have allocated time for research, reflecting the historic teaching focus. The Faculty has 14 professors (4 women), and 47 associate professors (12) focused on teaching and a further 34 (8) lecturers. There is 1 (male) full-time researcher, 17 (7) PhD candidates and 8 (male) associate professors with research rights. [position codes to be checked] In 2022 the faculty financed a total number of 34 full time equivalents for research, including PhD candidates.

The research groups of the administrative unit

IIØ has submitted two research groups to EVALMIT.

- Department of Computer Science and Communication
- Green Energy Hub (GEH)

The unit's work and strategies

The College's strategic priorities are as follows. Those prioritised by the unit are asterisked.

- Strategic relations*
- Strengthening research
- Strategic development of educational portfolio*
- Strengthen students' engagement and impact
- Strategic competence and career development*
- Development of the campuses

More specific priorities of the unit are building research capacity and the PhD programme "The Digital Society". Activity plans focus on building regional cooperation for research, integrating research into education, and strengthening research support services.

The unit's work in its sector

ØUC undertakes all three university missions. For historical reasons it has an emphasis on education and life-long learning. It is working to make its courses more flexible for this purpose, and it is building more research capacity.

The future of the unit

Current strategy underpins the maintenance of the strong teaching role, while building research capacity.

Overall Assessment

The research strategy of the administrative aims to foster a productive research environment, yet it falls short in promoting high-quality outputs and innovation. Although the focus on strengthening research by 2025 is understandable due to capacity constraints, the delay implies that research is not currently a primary focus. This could impede the development of a robust research culture and limit immediate progress towards achieving high-impact outputs. Further, the reliance on building networks and experience before fully committing to research activities may prevent the unit's ability to reach its full potential.

In terms of aligning with institutional strategies and scientific priorities, the research strategy seems somewhat disconnected. While there are positive elements, such as the establishment of a PhD programme and a focus on digital society, the strategy lacks a cohesive plan that integrates these goals with broader institutional objectives. The strategic goals are reactive rather than forward-thinking, suggesting the unit would benefit from a more aggressive approach to contributing to scientific priorities and driving innovation. As a result, the strategy's overall impact on institutional growth and innovation appears limited.

The organisation of the research activities in the administrative unit lacks coherence, despite the existence of few research groups across departments. While the unit encourages cross-field communication and interdisciplinary work, the informal structure of these research groups may result in a lack of clear focus and direction. This organisational setup might not fully support the development of a unified research culture, which is essential for producing high-quality research. Additionally, the approach to recruitment, career opportunities, and internationalisation appears underdeveloped, potentially limiting the unit's ability to attract and retain top talent.

Support for early-career researchers is limited, particularly in terms of providing mobility opportunities and transparent processes for research leave or sabbaticals. The unit would benefit from establishing clearer career paths and more robust support systems for young researchers, including PhD candidates and post-docs. While the role of the vice dean for research is advisory, the unit lacks a comprehensive strategy that focuses on building international collaborations and expanding research mobility, which are critical for fostering growth and elevating the research profile.

Regarding research funding, the unit has received a modest level of support, but the current funding does not fully reflect high-quality or high-impact research. Only 25% of the total budget is allocated to research, which may be insufficient for elevating the unit’s research capabilities. The low success rate in grant applications, despite the submission of 25 proposals annually, indicates that more support is needed to enhance proposal quality. Improved support mechanisms, such as grant-writing workshops and administrative assistance, would help the unit secure more significant funding and increase the overall success rate.

The research infrastructure available to the unit is moderately utilised, with access to national facilities like Sigma2 for high-performance computing and DataverseNO for data storage. However, the extent to which these resources are integrated into daily research activities is unclear, suggesting that they may not be fully leveraged. The unit lacks involvement in national or international infrastructure projects, which could improve its standing and visibility within the research community. A more active role in these initiatives could significantly enhance the quality of the unit’s research and support collaborations with other leading institutions.

The Terms of Reference for the administrative unit is attached to the report.

Recommendations

1. The administrative unit should prioritise research earlier in the strategy period instead of delaying focus until 2025. Gradually integrating research activities alongside other priorities will help establish a stronger research culture.
2. Strengthening research infrastructure and providing support through training in grant writing and project management is essential to empower researchers and increase productivity.
3. Aligning the research strategy with institutional goals is vital. The unit should ensure that its strategy is closely connected with the university's broader goals, especially in interdisciplinary areas like the digital society.
4. Expanding collaborations and partnerships with regional and national institutions, as well as establishing formal agreements with industry partners, will drive innovation and offer real-world applications for research.
5. The integration of research and education should be encouraged to strengthen the research environment and enhance the student learning experience. Faculty should incorporate their research into teaching and provide students with opportunities to engage in research.
6. A system for monitoring and evaluating research progress should be implemented to ensure alignment with strategic goals and to allow for timely adjustments.
7. The unit's research group structure requires formalisation with clear roles, objectives, and leadership. Regular meetings and progress tracking will ensure cohesive research efforts.
8. Additionally, a comprehensive research strategy should outline clear goals for recruitment, career development, and internationalisation. This will help attract top talent and encourage mobility within the institution and internationally.
9. There should be greater support for early-career researchers through structured mentoring and training programmes. These could include assigning mentors, providing research skills workshops, and giving young researchers leadership opportunities in projects.
10. Developing a dedicated team to assist researchers with grant applications and tailoring support to improve the success rate of high-quality proposals is equally important.
11. The unit should work on aligning its research strengths with relevant national and international funding opportunities and establish mechanisms for regularly reviewing and updating its research strategy. This should include a strategic plan for increasing external funding, strengthening access to national and international research infrastructures, and promoting open science practices through training, collaboration, and policy implementation. These steps will help elevate the unit's research quality and visibility.

1. Strategy, Resources, and Organisation of Research

The Administrative unit's strategy aligns with Østfold University College (ØUC)'s broader goals, focusing on six key areas: strategic relations, research enhancement, educational development, student engagement, career development, and campus growth. Initially, the unit prioritises strategic relations, educational portfolio development, and career development, with a planned focus on research starting in 2025 due to limited management capacity and the nascent state of research activities. The unit aims to establish key partnerships, enhance researchers' skills, and build a technology transfer office to promote innovation. Previous efforts centred on launching a PhD programme in "Digitalisation and

Society," and ongoing activities include regional research collaborations and integrating research into education. The ultimate goal is for ØUC and the Administrative unit to gain national recognition for their expertise in digitalisation.

1.1 Research Strategy

The research strategy involves some effort towards developing the research environment, but it falls short in effectively promoting high quality and productivity in research. The delayed focus on strengthening research until 2025, while understandable due to capacity constraints, suggests that research is not currently a top priority, which could hinder the development of a robust research culture. Additionally, the reliance on building networks and experience before fully committing to research activities may limit immediate progress in achieving high-quality outputs and innovation.

Regarding the alignment with institutional strategies and scientific priorities, the strategy appears somewhat disconnected. While the establishment of a PhD programme and the focus on digital society are positive steps, the strategy lacks a clear, cohesive plan for integrating these goals with broader institutional objectives. The strategic goals seem to be more reactive than proactive, and the strategy could benefit from a more aggressive approach to meeting scientific priorities and contributing to innovation. Overall, the research strategy's impact on the institution's growth and innovation potential seems limited and underwhelming.

Recommendations to the administrative unit.

- Prioritise research early in the strategy period. Rather than delaying focus on research until 2025, the unit should gradually integrate research activities from the outset. Allocating resources and attention to research in parallel with other priorities can help build momentum and establish a stronger research culture earlier.
- Strengthen research infrastructure and support. The unit should develop a robust support system for researchers, including access to research funding, training in grant writing, and administrative support for project management. This will empower researchers to pursue high-quality projects and increase overall research productivity.
- Align research strategy with institutional goals. The unit should ensure that the research strategy is closely aligned with ØUC's broader institutional strategies and scientific priorities. This could involve more explicit integration of research goals with the university’s strategic areas, particularly in interdisciplinary fields like the digital society.
- Enhance collaboration and partnerships. The unit should work on expanding partnerships with regional and national institutions to include more active research collaborations. Establish formal agreements with industry partners to create joint research initiatives that can drive innovation and provide real-world applications for research findings.
- Encourage integration of research and education. The unit should foster a culture where research and education are intertwined. Encourage faculty to incorporate their research into their teaching and provide opportunities for students to engage in research projects. This will not only enhance the learning experience but also strengthen the research environment.
- Monitor and evaluate research progress. The unit should implement a system for regularly monitoring and evaluating research activities against strategic goals. This will allow for timely adjustments to the strategy and ensure that research objectives are being met effectively.

1.2 Organisation of Research

The Faculty of Computer Science, Engineering, and Economics at Østfold University College has about 100 employees, half of whom are in positions that can involve research. It consists of three departments: Computer Science and Communication, Engineering, and Economics, Innovation, and Society, spread across two campuses. Each department hosts various research groups in specialised areas like interaction design, machine learning, advanced materials, and green energy. Researchers are assigned to a primary research group but can collaborate across different groups, promoting interdisciplinary cooperation. The faculty is led by a dean and two vice deans, with the vice dean for research coordinating and enhancing research activities. The faculty emphasises interdisciplinary collaboration and research-driven education, integrating current research into curricula to provide students with practical experience. Outreach activities, coordinated with local industry and the public sector, address real-world challenges while enriching the student learning experience. The faculty also prioritises continuous professional development and cultivates strategic partnerships to boost research capabilities and create opportunities for collaborative projects. Research administration, handled at the college level, supports external funding, ethics, GDPR, and technology transfer, ensuring a comprehensive approach to research management.

The administrative unit's organisation and composition for conducting research activities appear somewhat fragmented and lack coherence. While there are multiple research groups across various departments, the integration and coordination among these groups seem to be loosely managed. The fact that research groups are less formal and encourage cross-field communication is a positive aspect, but it may also lead to a lack of focus and clear direction in research activities. The current structure might not fully support the development of a strong and unified research culture, which is essential for achieving high-quality research outputs.

In terms of strategy, the unit's approach to research activities, recruitment, career opportunities, and internationalisation appears to be underdeveloped. There is limited information on how the unit strategically plans for the recruitment and development of researchers, especially in terms of providing clear career paths and mobility opportunities. The role of the vice dean for research is primarily advisory, which may limit the effectiveness of strategic initiatives aimed at enhancing research capabilities and fostering international collaborations. Without a more cohesive and comprehensive strategy, the unit may struggle to attract and retain top talent and fully to leverage international research opportunities.

The organisation of research within the administrative unit does not appear adequate to facilitate the education and training of master’s students, PhD candidates, and young researchers. Although the unit promotes interdisciplinary collaboration, there is little evidence of a structured and supportive environment for facilitating this practice. The link between the research organisation and the institution's broader strategic objectives is also unclear. The current setup may not adequately contribute to the institution's goals, particularly in terms of integrating research into education and ensuring that research efforts align with the college's overall mission and priorities.

<u>Recommendations</u> to the administrative unit.

- Strengthen research group structure and coordination. The unit should establish a more formalised structure for research groups with clear objectives, roles, and responsibilities. This includes regular meetings, progress tracking, and stronger leadership within each group to ensure focused and cohesive research efforts.

- Develop a comprehensive research strategy. The unit should create a unified research strategy that outlines clear goals for recruitment, career development, and internationalisation. This strategy should include specific plans for attracting top talent, providing career advancement opportunities, and encouraging mobility both within the institution and internationally.
- Enhance support for early- career researchers. The unit should implement structured mentoring and training programmes for PhD candidates, post-docs, and young researchers. This could include assigning mentors, providing research skills workshops, and offering opportunities for early-career researchers to lead projects or collaborate on high-profile research.

1.3 Research Funding

The faculty's total average income for teaching and research is 91.5 MNOK. Of this basic grant, some 15 MNOK is spent on research. In addition, the unit receives some 8.2 MNOK in external research funding, with 3.4 MNOK from the Research Council of Norway, 1.9 MNOK from the EU, 0.8 MNOK from diverse private and public funding, and 2.2 MNOK from international sources (mostly the EU). This means that in the evaluation period the unit has had some 23.2 MNOK available to fund research, making up roughly 23.2 MNOK (23%) of the total budget. The faculty actively seeks external funding, submitting around 25 proposals annually, with about five being funded. From 2018 to 2022, the faculty managed 42 different projects funded by various national and international sources.

The research funding received by the administrative unit seems to indicate a moderate level of research quality, but this is insufficient to support excellence or high-impact research. With only 23% of the total budget allocated to research, the unit may be underinvesting in areas that could significantly boost research quality and output. The average income from the Research Council of Norway and the EU is modest, which suggests that while the research produced is of an acceptable standard, it may not be consistently competitive at the highest levels, particularly in attracting substantial national or international grants.

Support from the administrative unit for applying for external funding appears to be limited or not fully effective. While researchers are actively pursuing external funding and submitting an average of 25 proposals annually, the relatively low success rate of approximately 20% indicates that more could be done to enhance proposal quality and align them with funding priorities. The unit might benefit from providing more targeted support, such as grant writing workshops, mentorship programmes, or dedicated administrative assistance, to improve the success rate of funding applications.

Over the last five years (2018-2022), the research groups have had some success in obtaining national and international grants, managing 42 projects in total. However, the unit was not very successful in attracting external large research funding according to their track record especially the number of full-time staff members is 61. It is also noted by the committee that the number of PhD students (17) is very low compared to the staff members. The ratio is 0.27, which is very low compared to the national or international levels.

The unit has a diverse portfolio including EU Horizon 2020 and RCN projects, but it seems that they follow a scattered approach rather than a focused strategy to secure major, high-impact grants. The results show that while the unit is capable of attracting funding, it is not excelling in this area, and there is room for improvement in securing more significant and prestigious grants that could better reflect the unit's research capabilities and elevate its standing in the academic community.

Recommendations to the administrative unit.

- Strengthen support for grant applications. The unit should develop a dedicated grant support team or office within the administrative unit to assist researchers with the grant application process. This team should provide tailored training on writing high-quality proposals, offer one-on-one consultations, grant application review, evaluate internally before submission and maintain up-to-date knowledge of funding opportunities.
- Enhance alignment between research quality and funding opportunities. The unit should conduct a thorough assessment of the unit's research strengths and align them with the most relevant national and international funding sources.
- Establish mechanisms for regularly reviewing and updating the research strategy to ensure it matches current funding priorities and trends.
- Encouraging researchers to collaborate on interdisciplinary projects could also attract more diverse funding opportunities.
- Develop a strategic plan to increase external funding. This plan should include setting clear funding targets, fostering partnerships with industry and other research institutions, and actively participating in national and international funding networks.

1.4 Research Infrastructures

The administrative unit does not participate in any national, ESFRI or other international infrastructure, despite having access to some national research infrastructures. Sigma2 AS provides national e-infrastructure services for high-performance computing and large-scale data storage, in collaboration with major Norwegian universities under the NRIS partnership. The Oslo Region European Office in Brussels supports 17 members from Norway's capital region by enhancing their participation and visibility in European processes. Microdata.no, offered by Statistics Norway, grants authorised researchers access to confidential microdata, while DataverseNO, managed by the Norwegian Centre for Research Data, serves as a secure repository for sharing and publishing research data. Additionally, the material technology group at the engineering department has access to advanced equipment, including a scanning electron microscope, at OsloMet and the Technical University of Cartagena.

The research infrastructure available to the administrative unit appears to be moderately utilised, but there is room for improvement in both participation and hosting capacities. While the unit has access to important national infrastructures like Sigma2 for high-performance computing and DataverseNO for data storage, the extent of their use and integration into everyday research activities is not clearly emphasised. This suggests that while the infrastructure is available, it may not be leveraged to its full potential, limiting the significance and impact on the unit's research outcomes. Additionally, the collaboration with institutions like OsloMet and the Technical University of Cartagena for specialised equipment, such as the scanning electron microscope, indicates some level of access to advanced tools, but the frequency and effectiveness of this use in driving research excellence are unclear.

In terms of fulfilling the FAIR (Findable, Accessible, Interoperable, and Reusable) principles, the unit seems to have basic structures in place through platforms like Microdata.no and DataverseNO, which support data management and sharing. However, the degree to which these principles are systematically applied across all research activities is uncertain. There is little evidence to suggest that the unit is actively hosting or coordinating significant national or international research infrastructures, which could enhance its role and visibility in the broader research community. This indicates a missed opportunity for the unit to take a

leadership role in key infrastructure projects, which could further contribute to its research quality and collaboration efforts.

Recommendations to the administrative unit.

- Strengthen access and participation in national and international Infrastructures. The administrative unit should actively facilitate greater access to and participation in national (such as the Norwegian roadmap for research infrastructures) and international (such as ESFRI) research infrastructures. This can be achieved by establishing dedicated support teams that assist researchers in navigating access procedures, applying for usage time, and integrating these infrastructures into their research projects.
- Enhance capacity for hosting and coordinating research infrastructures. The unit should plan to host or coordinate major research infrastructures, which can be carried out by investing in building the necessary capacity and expertise to effectively manage these roles.
- Ensure adherence to FAIR principles in data management: The administrative unit should implement and regularly update policies and practices that ensure full adherence to the FAIR principles for all research data generated within the unit. This includes establishing partnerships with national and international data repositories and infrastructure providers to ensure that data is managed according to global standards, thereby enhancing the visibility and impact of the unit's research.

1.5 National and international collaboration

Østfold University College (ØUC) has prioritised regional, national, and international cooperation in research and innovation, which is especially critical with the launch of its "Digitalisation and Society" PhD programme. ØUC has established robust local and national collaborations with academic institutions, industry partners, and government bodies, such as through the "Key Partner arrangement" and active roles in business clusters like NCE Smart Energy Markets and the Cluster for Applied AI. Internationally, ØUC has strengthened ties, particularly in the Nordic region, and is working to expand its network globally through initiatives like internal research grants, conference support, Erasmus+ participation, student exchange agreements, and membership in the Oslo Region European Office.

The national and international collaboration profile of the administrative unit appears to meet some of its aspirations, but it falls short of fully realising its vision. While the unit has established several key partnerships, particularly within the Nordic region and through local business clusters, these collaborations seem more focused on maintaining existing networks rather than expanding and diversifying them. The emphasis on regional partnerships suggests a strong local presence, but the unit's ambition to extend its global reach appears underdeveloped. More proactive efforts to build new international collaborations beyond the Nordic countries would be necessary to align with the unit's broader aspirations.

In terms of added value to research quality, the current collaborations offer a solid foundation, but their impact seems limited. The involvement in initiatives like NCE Smart Energy Markets and the Cluster for Applied AI contributes positively to research activities, but there is little evidence to suggest that these collaborations have significantly elevated the overall research quality within the unit. The focus appears to be on applied research with a regional emphasis, which, while valuable, may not fully support the development of cutting-edge, high-impact research that can compete on a global scale. The unit would benefit from seeking collaborations that push the boundaries of innovation and contribute more directly to enhancing research excellence.

The administrative unit has made efforts to facilitate cross-sectoral and interdisciplinary collaboration, particularly through its engagement with industry partners and participation in clusters like NORA. However, these efforts seem somewhat limited in scope and impact. The collaborations with non-academic and public partners are a positive step, but there is room for improvement in fostering deeper interdisciplinary work and broader cross-sectoral initiatives. Encouraging more dynamic and innovative collaborations that bring together diverse disciplines and sectors could enhance the unit's research profile and better integrate different perspectives into its research activities.

Recommendations to the administrative unit.

- Expand and diversify international collaborations. The unit should actively pursue partnerships beyond the Nordic region to increase its global reach and impact.
- Strengthen high-impact collaborative research. The unit should focus on building partnerships that contribute significantly to advancing research quality. The unit should first prioritise collaborations with institutions and organisations known for cutting-edge research and innovation.
- Facilitate cross-sectoral and interdisciplinary collaboration. The unit should enhance efforts to bring together researchers from different disciplines and sectors by creating formal structures or programmes that encourage interdisciplinary work.

1.6 Research staff

The faculty has a notable gender imbalance, with women comprising only 25% of the staff, though this is less pronounced among PhD candidates, where women make up 41%. The majority of the faculty's researchers are Associate Professors, with a significant portion of the staff holding permanent positions, reflecting a stable workforce. The faculty has implemented a plan to support early-career researchers, pairing them with experienced mentors and encouraging participation in interdisciplinary research groups. These initiatives, along with formal training programmes and support for attending conferences, aim to foster professional development and strengthen research competence. The faculty also has a structured approach to research time allocation, requiring researchers to submit annual plans for their activities, which are reviewed and adjusted based on strategic goals and resource needs. Researchers who meet their goals can allocate a significant portion of their time to research, with opportunities to increase this through external funding. In 2022, the faculty financed 34 full-time research equivalents, including PhD candidates. Research mobility is a key investment area for ØUC, with grants like the Research Stays Abroad supporting faculty members in building international networks. Between 2016 and 2022, 18 faculty researchers benefited from these grants, enhancing their global collaboration opportunities. Additionally, the Erasmus+ programme facilitated international research experiences for 10 faculty members between 2020 and 2022.

The administrative unit has made considerable efforts to establish a robust recruitment policy and succession plan, though there is room for improvement, particularly in addressing gender balance and ensuring a diverse age distribution among the staff. While the current workforce includes a significant proportion of permanent positions, which provides stability, the gender disparity, particularly at the senior level, suggests that more targeted recruitment efforts are needed to attract and retain female researchers. Additionally, the unit's approach to balancing the proportion of professors and associate professors appears effective in maintaining a strong academic environment, but further attention to career development opportunities for early-career researchers could help in cultivating future leaders within the faculty.

Regarding the distribution of research time, the unit has implemented a structured process that requires annual planning and approval, which helps align individual research activities with the faculty's strategic goals. The criteria for allocating research time, including targeting journal publications, securing external funding, and supporting strategic priorities, seem appropriate for maintaining a focus on high-quality research output. However, the system could benefit from more transparent and flexible options for research leave or sabbaticals, especially to support mobility and international collaboration, which are essential for the unit's growth and global engagement. Ensuring equitable access to these opportunities across all career stages would further strengthen the research environment.

Recommendations to the administrative unit

- Enhance gender balance and diversity. The unit should implement targeted recruitment strategies aimed at increasing the representation of women and other underrepresented groups within the faculty, especially in senior positions. This could include establishing mentorship programmes, offering leadership training for female researchers, and actively promoting the unit's commitment to diversity during the hiring process.
- Strengthen career development and succession planning. The unit should develop a more comprehensive succession plan that includes clear pathways for career advancement, particularly for early-career researchers.
- Improve research time allocation and sabbatical opportunities. The unit should develop criteria for research time allocation more transparent and flexible, ensuring that all staff members, regardless of their career stage, have equitable access to research leave, sabbaticals, and mobility opportunities.

1.7 Open Science

The administrative unit at Østfold University College (ØUC) has made notable strides in promoting open science through a series of well-structured policies, initiatives, and activities. Since 2020, the unit has strategically focused on creating an environment conducive to open science, with efforts centred around open access to both publications and research data. The establishment of a dedicated open science team within the library, along with the introduction of a publication fund, highlights the unit's commitment to facilitating and encouraging open access among researchers. Additionally, the development of an institutional repository for research data and the implementation of a Rights Retention Strategy for green open access publishing demonstrate a proactive approach to embedding open science practices within the institution.

The unit's contributions to open science have had a significant impact, particularly in increasing the number of open access publications and fostering a culture of data sharing. The rise in open access publication rates from 33% in 2018 to over 80% in 2021 and 2022 reflects the success of these initiatives. Moreover, the collaboration between IIØ researchers and the open science team to integrate data sharing into new research projects is a critical step towards ensuring that research outputs are accessible and reusable, adhering to the FAIR principles. These efforts not only enhance the visibility and impact of the research conducted at ØUC but also align with broader national and international trends towards transparency and accessibility in scientific research.

Regarding research data management, the administrative unit has taken significant steps to formalise policies related to data ownership, confidentiality, and management. The guidelines provided by ØUC stress the importance of data management plans, proper classification and storage of data, and compliance with security procedures. The forthcoming

official policy, expected to be adopted in 2024, will solidify the current practices and provide clear directives on the ownership of research data, particularly in cases where researchers move to other institutions. This policy is crucial for safeguarding intellectual property while also promoting the open availability of research data, ensuring that the institution's contributions to the scientific community are both secure and widely accessible. However, the policy was not active during the period of assessment.

Recommendations on how to promote open science

- Enhance training and support for open science practices. Providing training and resources to researchers on open science principles and practices is crucial for fostering a culture of openness. The administrative unit should offer workshops, seminars, and online resources regularly on topics such as data management, open access publishing, and reproducibility of research.
- Promote collaboration and engage with open science initiatives. To advance open science, the administrative unit should actively participate in and support collaborative research networks and open science initiatives. This includes engaging with national and international open science platforms, contributing to open data repositories, and participating in collaborative research projects that embrace open science principles.
- Policy implementation and monitoring. As the unit/university finalises its policy on research data ownership and open science, it should establish clear procedures for monitoring compliance and impact. Regular audits and reports on open science activities within the institution can help track progress and identify areas where additional support or adjustment is needed.

2. Research production, quality and integrity

2.1 Research quality and integrity

The research and education at the faculty are organised into three departments, each focusing on specific areas. The Department of Computer Science and Communication covers a broad range of topics in informatics and communication, with an emphasis on applications and interdisciplinary projects that contribute to both national and regional development. The Department of Engineering focuses on energy technology, materials science, and a variety of other fields, including biomedical technology and innovation studies. The Department of Economics, Innovation, and Society, which is not part of the EvalMit evaluation, conducts research in business economics, marketing, and organisational studies, among other areas, contributing to both academic and societal discussions.

Over the five-year period from 2018 to 2022, an average of 55 researchers each published 1.7 peer-reviewed journal papers annually, with variations between departments and individual researchers. The faculty is also the host of the new PhD programme, Digitalisation and Society, and adheres to strict research ethics standards as outlined in institutional guidelines and the Research Ethics Act. The ØUC has a Research Ethics Council and a Research Integrity Committee to ensure compliance with these standards, supported by initiatives to raise awareness of research ethics across the institution.

Research group Department of Computer Science and Communication overall assessment

An important factor in our evaluation is the history of the university and group. Østfold University College was established in 1994 and has traditionally had emphasis on educational activities rather than research according to the self-assessment. The research

groups evaluated have only existed since a restructuring in 2018. The Expert Panel scored group with this history in mind and the Expert Panel would expect to see further improvements on building strong research staff and culture in future assessments.

In terms of research activity and research funding, the group have grown significantly in both over the years of the assessment. These are great trends to see. In terms of the quality of the publications this could improve in order to reach a strong profile internationally. In terms of the projects presented they demonstrate a wide array of very strong, very practical and diverse. While there is no doubt that these are of great societal relevance, it was a little difficult to ascertain the extent of impact. As mentioned in the executive summary all benchmarks are going in a positive direction and if this continues the group will compare strongly against international peers.

Research group Green Energy Hub (GEH) overall assessment

The group has specific professors and disciplines that are very strong in acquiring external funding. The same people are also active in collaborating with international partners and publishing their results. In those disciplines, the related research and publication quality can be considered to be at a high level (considering the resources available). However, there are other professors and disciplines present in the research group that do not report such activities and apparently are not as much involved in research activities. This makes the overall assessment of the group as an entity challenging. Indeed, the main weakness of the group is that it that it lacks a clear leader and strategy, and the subgroups are scattered rather than working together. Consequently, self-evaluation report was written in the general level, e.g., objectives and benchmarks for the research were given only at the host institutional level, making the group assessment challenging.

In terms of internal resources, the group can be considered to have a good infrastructure, internal funding and strong administrative support from the host organisation. While the research group works with local industry, their involvement in the actual research remained somewhat unclear as there is no funding or authors from industrial partners reported.

Note that the evaluation period ended in 2022 while the group reported several activities for 2023. These achievements/activities were left out of this assessment report.

3. Diversity and equality

Østfold University College is committed to addressing various forms of discrimination, including gender, ethnicity, disability, religion, beliefs, age, and sexual orientation, in line with the Equality and Anti-Discrimination Act and the Universities and University Colleges Act. The college has established policies and assigned leaders to promote gender equality and diversity actively. A "Si ifra" function on the ØUC website allows for feedback on issues like harassment and discrimination. The Working Environment Committee (AMU) oversees gender equality and diversity efforts, with plans to strengthen these initiatives by forming a dedicated network, enhancing awareness, and recruiting a new position focused on advancing gender and diversity goals.

The administrative unit demonstrates a commitment to diversity and equality through several proactive measures aimed at protecting against discrimination and ensuring equal treatment for its employees. The faculty has implemented various policies to promote an inclusive environment, including mechanisms for reporting and addressing discrimination, as well as initiatives to ensure fair treatment across all levels of employment. There are established

guidelines and support systems designed to foster an equitable workplace, and efforts are made to include diverse perspectives and backgrounds in the hiring process.

However, challenges remain, particularly in achieving gender balance and addressing disparities across different staff categories. While there are efforts to increase awareness and training on diversity issues, the representation of women, especially in senior research positions, remains uneven. The administrative unit could benefit from more targeted actions and strategies to address these imbalances and ensure that all employees have equal access to career advancement opportunities, regardless of gender or background. Enhanced monitoring and evaluation of diversity initiatives would also help in assessing the effectiveness of current measures and identifying areas for improvement.

4. Relevance to institutional and sectoral purposes

Østfold University College (ØUC) aims to offer high-quality higher education and research while addressing societal challenges, particularly in technology and health sectors. The institution emphasises lifelong learning and flexible study options, as evidenced by recent updates to its engineering programmes which now incorporate sustainability and interdisciplinary approaches. However, there has been a decline in study point production in recent years, though graduation rates have slightly improved. ØUC is actively working with the Norwegian Institute for Studies in Innovation, Research, and Education (NIFU) to address dropout rates and enhance programme effectiveness.

In terms of innovation and commercialisation, ØUC has historically had limited activity but has made strides since 2020. The establishment of a dedicated Technology Transfer Office (TTO) function aims to support research commercialisation and IPR management. The TTO, led by the Vice Dean for Research, is working on building regional networks and offering guidance on commercial projects. Additionally, ØUC’s research groups are integrated into teaching at both undergraduate and graduate levels, including a newly launched PhD programme in Digitalisation and Society. This integration helps align research with educational programmes and supports the development of students through involvement in research activities and assistant positions.

The administrative unit's activities demonstrate a commendable alignment with sector-specific objectives and innovation goals. The focus on integrating sustainability and interdisciplinary approaches into the engineering programmes highlights a strong commitment to addressing current and future technological and societal challenges. However, while there is a notable effort in fostering innovation through collaboration with Smart Innovation Norway and the establishment of a Technology Transfer Office (TTO), past activities in innovation and commercialisation have been limited. The recent developments, including the appointment of a dedicated TTO function and the formation of regional networks, suggest a positive shift towards enhancing commercialisation efforts and supporting sector-specific innovation.

In terms of training and mentoring, the administrative unit offers robust career development opportunities for young researchers. The establishment of the PhD programme "Digitalisation and Society" reflects an investment in advanced education and research training, contributing to the professional growth of emerging researchers. Additionally, the integration of research activities with teaching responsibilities, including involvement in both undergraduate and graduate programmes, provides valuable practical experience. The unit's practice of hiring master's students as research assistants further supports their career development and involvement in relevant research activities. While these efforts are

commendable, continuous improvement in aligning training and mentoring with emerging sectorial needs and expanding career opportunities would enhance the overall effectiveness of these initiatives.

5. Relevance to society

In March 2018, Østfold University College (ØUC) prioritised 'The Digital Society' as a key research focus, recognising the transformative impact of digitalisation on societal processes and public debates. This strategic choice aligns with the Norwegian Government's long-term research plans and the United Nations Sustainable Development Goals, emphasising the role of technology in promoting sustainable development and addressing social inequalities. The IIØ Faculty leads this interdisciplinary theme, leveraging a broad network of regional, national, and international collaborations to advance digitalisation research. This approach supports Norway's goal of becoming a knowledge-based society and enhances ØUC's contribution to national and global sustainability efforts through programmes in Applied Computer Science and Green Energy Technology, which address SDG 9 and SDG 7 respectively.

The unit’s efforts to align with the Norwegian Long-term plan for research and higher education appear somewhat inconsistent. While there is an acknowledgement of digitalisation as a priority area, the actual impact of the research activities on broader societal challenges and the strategic goals set by the national plan seems limited. The focus on technology and digitalisation is clear, but there is a lack of evidence showing how these efforts translate into tangible societal benefits or address the broader scope of the national research objectives.

Similarly, the unit's contributions to the UN Sustainable Development Goals (SDGs) are not well-documented or effectively showcased. Although there are programmes targeting SDGs like affordable and clean energy and industrial innovation, the overall impact and integration of these goals into the research strategy seem insufficient. The reported activities do not adequately demonstrate how the research outputs are being utilised to drive significant progress towards these global targets, or how they engage with societal needs beyond academic contributions.

Furthermore, the unit’s societal relevance appears to be undermined by a lack of substantial engagement with real-world issues. The partnerships with local industries and public institutions are noted, but there is limited evidence of substantial, impactful collaborations or projects that address pressing societal challenges. The focus on digitalisation and technology, while important, seems to lack a comprehensive strategy for translating research into societal benefits or effectively addressing the complex, multifaceted issues outlined in the Long-term plan and the SDGs.

5.1 Impact cases

Comments on impact case 1: Gjellestad ship

According to the impact case document, the impact case is based on bringing research on the Gjellestad ship. In 2018, Østfold County Council discovered the Gjellestad ship using ground-penetrating radar, sparking considerable interest despite the lack of visible remains. Digital cultural heritage archives often contain static, underutilised assets that struggle to engage users, particularly when artifacts are inaccessible. The trend towards creating virtual experiences to make these sites more accessible faces challenges, including scientific conjecture and reluctance from institutions to address data gaps. To bring this discovery to

life, Østfold University College, Østfold County Council, the Institute for Energy Technology, and Nordic Media Lab formed an R&D collaboration in early 2019 to create a digital model. By fall 2019, they developed this model to support scientific research and public engagement, culminating in the launch of Gjellestadstory.no in early 2020. The integration of 3D models, simulations, and various digital interfaces enhances both scholarly research and public engagement. The "Gjellestad Story" project illustrates these issues and demonstrates the potential of dynamic visualisations to enhance user engagement by evolving with ongoing discoveries, providing an immersive historical journey that has attracted significant global attention and interest. The impact case surrounding the Gjellestad ship's digital visualisation demonstrates limited relevance and strength in addressing broader societal and academic needs. While the project successfully creates a virtual representation of the site, its impact is constrained by the static nature of the current visualisation and the challenges in integrating new data dynamically. Although it has garnered some attention, the overall importance of the case is diminished by its lack of innovation in engaging users and its failure to address the broader issues of accessibility and data completeness within the digital cultural heritage field. Research outputs are also limited.

Comments on impact case 2: Greener and more sustainable buildings

According to the submitted impact case document, the impact case is based on carrying on research on green building solutions, particularly through the use of phase change materials (PCMs), geopolymers, and life cycle assessment (LCA). Phase change materials can enhance energy efficiency in buildings, while geopolymers offer a more environmentally friendly alternative to traditional concrete. The study also includes the development of educational methods that integrate LCA and building information modelling (BIM) to teach students how to improve building sustainability. The initial project, “Micro-encapsulated phase change materials in concrete,” led to valuable insights into the use of PCMs and geopolymers in enhancing energy efficiency and reducing environmental impact. Further research involved collaboration with the European Space Agency on optimising geopolymer recipes for lunar 3D printing, revealing that urea can reduce water requirements for geopolymers on the moon. This research enhanced the understanding of geopolymer applications and led to the development of methods to use lunar resources effectively. The expertise gained was then applied in the Greenbizz project, which supported 60 businesses in creating green business models using LCA. This project also included the training of two PhD students and improved skills in assessing the sustainability of various business practices. The study’s findings have resulted in 23 publications and practical applications, including improved concrete recipes that combine PCMs and geopolymers to enhance thermal comfort and energy efficiency. The impact case demonstrates relevance and importance in advancing sustainable building practices through innovative use of phase change materials, geopolymers, and life cycle assessment. The strengths lie in its comprehensive approach to improving energy efficiency and reducing environmental impact, both in terrestrial and extraterrestrial contexts. By integrating practical research with educational initiatives and industry collaborations, the case not only contributes to cutting-edge knowledge but also fosters real-world applications and skill development in green building technologies. This holistic impact, from enhancing concrete properties to training future industry professionals, underscores the case's pivotal role in driving the transition towards more sustainable construction practices.

Methods and limitations

Methods

The evaluation is based on documentary evidence and online interviews with the representatives of Administrative Unit.

The documentary inputs to the evaluation were:

- Evaluation Protocol that guided the process
- Terms of Reference
- Administrative Unit’s self-assessment report
- Administrative Unit’s impact cases
- Administrative Unit’s research groups evaluation reports
- Bibliometric data
- Personnel and funding data
- Data from Norwegian student and teacher surveys (only for HEI’s)

After the documentary review, the Committee held a meeting and discussed an initial assessment against the assessment criteria and defined questions for the interview with the Administrative Unit. The Committee shared the interview questions with the Administrative Unit at least two weeks before the interview.

Following the documentary review, the Committee interviewed the Administrative Unit in an hour-long virtual meeting to fact-check the Committee’s understanding and refine perceptions. The Administrative Unit presented answers to the Committee's questions and addressed other follow-up questions.

After the online interview, the Committee attended the final meeting to review the initial assessment in light of the interview and make any final adjustments.

A one-page summary of the Administrative Unit was developed based on the information from the self-assessment, the research group’s evaluation reports, and the interview. The Administrative Unit had the opportunity to fact-check this summary. The Administrative Unit approved the summary without adjustments.

Limitations

The Committee judged that the Administrative Unit self-assessment report was insufficient to assess all evaluation criteria fully. However, the interview with the Administrative Unit filled gaps in the Committee's understanding, and the information was sufficient to complete the evaluation.

List of administrative unit's research groups

Institution	Administrative Unit	Research Groups
Østfold University College (ØUC)	Faculty of Computer Science, Engineering and Economics	Green Energy Hub (GEH)
		Department of Computer Science and Communication (ITK)

Terms of Reference (ToR) for the administrative unit

The board of Fakultet for informasjonsteknologi, ingeniørfag og økonomi (Faculty of Computer Science, Engineering and Economics) mandates the evaluation committee appointed by the Research Council of Norway (RCN) to assess Fakultet for informasjonsteknologi, ingeniørfag og økonomi (Faculty of Computer Science, Engineering and Economics) based on the following Terms of Reference.

Assessment

You are asked to assess the organisation, quality and diversity of research conducted by Fakultet for informasjonsteknologi, ingeniørfag og økonomi as well as its relevance to institutional and sectoral purposes, and to society at large. You should do so by judging the unit's performance based on the following five assessment criteria (a. to e.). Be sure to take current international trends and developments in science and society into account in your analysis.

a) Strategy, resources and organisation

b) Research production, quality and integrity

c) Diversity and equality

d) Relevance to institutional and sectoral purposes

e) Relevance to society

For a description of these criteria, see Chapter 2 of the mathematics, ICT and technology evaluation protocol. Please provide a written assessment for each of the five criteria. Please also provide recommendations for improvement. We ask you to pay special attention to the following 2 aspects in your assessment:

1. To what extent does the RPO contribute to strengthen relevance and quality in Østfold University College's strategic multidisciplinary area "Digitalization and society"?
2. To what extent does the RPO succeed in integrating research and education to contribute to increased relevance and impact to society and industry?

In addition, we would like your report to provide a qualitative assessment of Fakultet for informasjonsteknologi, ingeniørfag og økonomi (Faculty of Computer Science, Engineering and Economics) as a whole in relation to its strategic targets. The committee assesses the strategy that the administrative unit intends to pursue in the years ahead and the extent to which it will be capable of meeting its targets for research and society during this period based on available resources and competence. The committee is also invited to make recommendations concerning these two subjects.

Documentation

The necessary documentation will be made available by the mathematics, ICT and technology secretariat at Technopolis Group.

The documents will include the following:

- a report on research personnel and publications within mathematics, ICT and technology commissioned by RCN
- a self-assessment based on a template provided by the mathematics, ICT and technology secretariat
- A description and strategy of the University collage's strategic area "Digitalization and Society".

Interviews with representatives from the evaluated units

Interviews with the Faculty of Computer Science, Engineering and Economics will be organised by the evaluation secretariat. Such interviews can be organised as a site visit, in another specified location in Norway or as a video conference.

Statement on impartiality and confidence

The assessment should be carried out in accordance with the *Regulations on Impartiality and Confidence in the Research Council of Norway*. A statement on the impartiality of the committee members has been recorded by the RCN as a part of the appointment process. The impartiality and confidence of committee and panel members should be confirmed when evaluation data from Faculty of Computer Science, Engineering and Economics are made available to the committee and the panels, and before any assessments are made based on these data. The RCN should be notified if questions concerning impartiality and confidence are raised by committee members during the evaluation process.

Assessment report

We ask you to report your findings in an assessment report drawn up in accordance with a format specified by the mathematics, ICT and technology secretariat. The committee may suggest adjustments to this format at its first meeting. A draft report should be sent to the Faculty of Computer Science, Engineering and Economics and RCT]. The Faculty of Computer Science, Engineering and Economics should be allowed to check the report for factual inaccuracies; if such inaccuracies are found, they should be reported to the mathematics, ICT and technology secretariat within the deadline given by the secretariat. After the committee has made the amendments judged necessary, a corrected version of the assessment report should be sent to the board of Faculty of Computer Science, Engineering and Economics and the RCN no later than two weeks after all feedback on inaccuracies has been received from Faculty of Computer Science, Engineering and Economics.

Appendices

1. Description of the evaluation of EVALMIT
2. Invitation letter to the administrative unit including address list
3. Evaluation protocol
4. Template of self-assessment for administrative unit (short-version)

The Research Council of Norway

Norges forskningsråd
Besøksadresse: Drammensveien 288
Postboks 564
1327 Lysaker

Telefon: 22 03 70 00

post@forskningsradet.no
www.forskningsradet.no

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