



Evaluation of Mathematics, ICT and Technology (EVALMIT) 2023-2024

Self-assessment for research groups

Date of dispatch: 19 September 2023

Deadline for submission: 31 January 2024

Institution (name and short name): University of Oslo (UiO)

Administrative unit (name and short name): Department of Informatics (IFI)

Research group (name and short name): Software Engineering (SE)

Date: 25.01.2024

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1. Organisation and strategy

1.1 Research group's organisation

With a staff of more than 400, The UiO Department of Informatics (IFI) is a “powerhouse” for informatics training and research in Northern Europe. It is the largest such unit in Norway and the one with the strongest international rankings. Around a comprehensive core in computer science, IFI interprets informatics in substantial breadth: from microelectronics or signal processing to participatory design or digital innovation. In 2023, IFI hosted five BSc and eight MSc study programmes with close to 2500 students. The department is organised into four thematic sections, each comprising 2–5 research groups. Our group, Software Engineering, is part of the section for Programming.

The software engineering research group was established in 2020 to advance research and teaching in Software Engineering. Before its establishment, it was part of another group called Programming and Software Engineering (PSE).

Initially, the group consisted of only two permanent employees, Dag Sjøberg (professor) and Yngve Lindsjörn (senior lecturer). However, in 2017, Antonio Martini and Viktoria Stray were hired as Associate professors in the group. In 2021, Dr. Martini was promoted to the position of professor. Additionally, in 2022, Gunnar Bergersen was recruited as an associate professor. As of October 2022, the group included two PhD candidates, Marthe Nordengen Berntzen and Kartik Shivashankar. Dag Sjøberg is the head of the section “Programming”, and Viktoria Stray has been the group manager of the group “Software Engineering” for the last few years. We have also recently graduated 3 PhD students supervised at our group, Saulo Toledo, Raluca Florea and Kjetil Holgeid.

The research group's focus encompasses various areas in Software Engineering, such as agile software development, large-scale agile development, technical debt, software developer skills acquisition, software process improvement, teamwork in software engineering, software testing, and research methods in software engineering. The group maintains a strong tradition of collaborating with industry partners and engaging with private and public sector organisations.

Even though we are just four permanent employees (five when counting the section manager), our group has responsibility for extensive courses in the department: IN2000 Software Engineering with project work is a 20 ECTS capstone course, equivalent to a total workload of 67% of one academic Norwegian semester (<https://www.uio.no/studier/emner/matnat/ifi/IN2000/index-eng.html>). This course has more than 300 students, IN3240 Software Testing (<https://www.uio.no/studier/emner/matnat/ifi/IN3240/index-eng.html>), IN5140 Smart processes and agile methods in software engineering <https://www.uio.no/studier/emner/matnat/ifi/IN5140/index-eng.html>. In collaboration with the Design group, we have responsibility for IN1030 Systems, Requirements and Consequences <https://www.uio.no/studier/emner/matnat/ifi/IN1030/index-eng.html>. Finally, we are also responsible for ITLED4350 Modern Systems Development, a Continuing Education course in our department's Executive Master's Program.

We are also active in outreach, believing this is important for our society. Recent media appearances include DN, Aftenposten, TV2, and NRK Radio. Further, we strongly believe in sharing knowledge about teaching software engineering and publishing academic research articles on this topic.

The SE permanent employees included in this evaluation are the following:

- Dag Sjøberg, Professor, PROG section leader
- Antonio Martini, Professor
- Viktoria Stray, Associate professor, SE group leader and IFI board member

- Gunnar Bergersen, Associate professor
- Yngve Lindsjörn, Senior lecturer

Table 1. List of number of personnel by categories (as of November 2022).

	Position by category	No. of researcher per category	Share of women per category (%)	No. of researchers who are part of multiple (other) research groups at the admin unit	No. of temporary positions
No. of Personnel by position (Oct 2022)	Professor	2	0	1	
	Associate Professor	2	50		
	Senior lecturer	1	0		
	PhD candidates	2	50		2
	Adjunct professor	2	33		2
	Adjunct senior lecturer	1	100		1
	Adjunct Lecturer	2	50		2
Notes to Table 1: One of the professors is a Section manager but is included in the SE group in this evaluation since he is still a Software Engineering researcher and formed this research group.					

1.2 Research group's strategy

a) The research group's main goals, objectives and strategies to obtain these

The SE group is committed to upholding and expanding our tradition of excellence in research and teaching. Central to our ambitions is the continued publication of high-quality research papers, with an added focus on articles about research methods, generative AI, and teaching methodologies and innovations in software engineering education. This commitment is not just about quantity but also about the impact and relevance of our work. To ensure this, we will introduce initiatives like peer-review workshops and writing retreats, creating a supportive environment that nurtures academic writing and research.

Expansion of our research group is a top priority, and we target highly qualified applicants worldwide. Our approach includes developing a strategic recruitment plan encompassing temporary and long-term positions. This plan will highlight our group's unique research areas and achievements and showcase the vibrant, collaborative environment we foster.

The integration of research and teaching is at the heart of our philosophy. We envision a more hands-on approach, where students engage directly with ongoing research projects, gaining invaluable practical experience. One of the key strengths of our group lies in the robust collaboration we facilitate between our master's students and our industry partners. A significant proportion of our students not only engage in research with these companies but also publish their work, and many of them have travelled with us to present their work at international conferences. We will continue with this practice in the future.

Our vision extends to continue being a group known for its strong industry ties, resulting in research that is not only academically rigorous but also immediately applicable in real-world scenarios. Therefore, we plan to build a robust network of industry partners, many of whom give guest lectures to students (for example, NRK, Sopra Steria, Visma and Volvo Cars). Additionally, industry-sponsored challenges and projects can be further integrated into our courses, providing students with practical,

hands-on learning experiences. We will also continue with our close collaboration with NTNU, SINTEF and Chalmers University of Technology.

In line with our commitment to teaching excellence, we aim to become recognised for our innovative introductory courses and research in this area. Regular updates to our course content will ensure that it reflects the latest industry trends and research findings, preparing our students effectively for the workforce. We will increase our international cooperation, both in research and teaching. For example, we have started building relationships with Blekinge Institute of Technology, Chalmers University of Technology, LUT University, Aalto University, Aalborg University, University of Groningen, University of Kiel, University of Auckland, University of Milan Bicocca, the School of Computer Science and Information Technology at University College Cork, and Universidad Rey Juan Carlos.

We will incorporate quantitative measures like the number of published articles and qualitative feedback from students and employers to measure our success. Regular reviews of these criteria will help us stay aligned with the evolving landscapes of academia and industry.

Lastly, our group will strongly emphasise increasing international cooperation in research and teaching. This will involve initiating global research collaborations, focusing on cross-cultural issues in software engineering, and encouraging faculty and student exchanges with leading international institutions. Such efforts will not only enhance our group's international standing but also enrich the educational experience we provide.

b) The benchmark of the research group.

The benchmark for our research group is aligned with our strategic goals and reflects our aspiration to achieve excellence in software engineering research and education.

Academic Excellence and Publication Goals:

- We aim to consistently publish in top-tier journals and conferences, targeting an annual output of at least five publications in renowned software engineering journals and 3 in major conferences.
- We strive to contribute actively to the academic community by organising conference tracks and workshops and participating in program committees at international conferences. (We have recently submitted a proposal to organise the “AI for Agile Software Engineering” international workshop in June 2024).
- We will continue to be editors for special issues in high-ranking journals (in recent years, we have been guest editors for Journal of System and Software, Information and Software Technology (IST) journal, AI & Society and Business & Information Systems Engineering).

International Collaboration and Guest Researchers:

- Hosting international guest researchers and organising regular research visits are vital benchmarks. These engagements foster a global perspective and enrich our research environment. We will also ensure our group members have international guest visits (we have visited the University of Auckland, the University of Kiel and the University of Groningen, we will visit the Universidad of Rey Juan Carlos).

Industry Engagement and Practical Application:

- Developing and maintaining strong relations with practitioners is crucial. We aim to engage in collaborative research, invite industry experts for lectures and seminars, and encourage practical applications of our research, particularly in master's theses.

Group Growth and Cultural Development:

- Growth in group size is a core benchmark. We aim for a steady increase in our research group, supporting the group's expanding research capacity.
- Another vital benchmark is cultivating a culture of openness and engagement in research. Regular surveys and feedback from faculty, students, and stakeholders will help assess and enhance our working environment.

c) The research group's contribution to education

The SE group is deeply involved in the education, and especially the PROSA education (Programming and System Architecture). We are responsible for large courses that are mandatory for most students at the department. Additionally, in the last two years alone, we have successfully supervised more than twenty master's students, also in collaboration with industry (some recognition of their work here: <https://www.visma.com/blog/how-we-improve-cyber-security-with-knowledge-sharing/>).

We have two Master's courses (IN5140 Smart Processes and Agile Methods in Software Engineering and IN4240 Software Testing.) and a Continuing Education course, ITLED4350 Modern Systems Development. This course is offered in our department's Executive Master's Program. Those courses in the experience-based master's degree are offered to people with higher education and at least two years of professional experience who want new insights and deepen their academic expertise.

Our involvement in undergraduate education is substantial, especially in the Bachelor's courses. The IN2000 Software Engineering with Project Work is a comprehensive course (20ECTS) emphasising practical, team-based software development projects. It integrates modern software engineering methods, techniques, and tools, offering students an in-depth experience in this field.

Key aspects of the course include:

- **Learning Outcomes:** Students acquire knowledge of various system development methods and their strengths and weaknesses. The course focuses on critical processes in projects and teamwork that apply agile principles. Students also learn activities related to system development, such as requirements collection and analysis, design, programming, testing, and maintenance.
- **Admission:** The course accommodates more than 300 students. Priority is given to students from specific Informatics bachelor programs where the course is mandatory, followed by students from other Informatics bachelor programs.
- **Teaching Methods and Examination:** The course includes up to four hours of lectures per week. A significant part of the course is a group project assignment, which must be completed and approved. Additionally, there are mandatory assignments that need to be approved before the final exam. The final assessment comprises a written digital exam and a project assignment with an oral presentation.

The IN3240 Software Testing course focuses on fundamental concepts and specific areas of software testing. It covers testing throughout a software system's life cycle, test design techniques, test management, user experience testing, accessibility testing, exploratory and automated testing, and test-driven development. We are also responsible for, in collaboration with the Design group, the IN1030 Systems, Requirements, and Consequences course that is mandatory for most students in our department.

d) The support the host institution provides to the research group

The department effectively supports our research group with administrative tasks, especially in terms of assistance related to student management. This support is important for our operations and contributes to an efficient and well-functioning academic environment for our undergraduate and graduate students. We also receive valuable help with financial questions.

1.3 Relevance to the institutions

The Department of Informatics at UiO's strategic plan for 2023-2026 emphasises, among other things, a balance between research and education, strengthening the learning environment around study programs and increasing the department's visibility in media.

We have a popular 20 ECTS bachelor course, "IN2000 Software Engineering with project work", described above, that exemplifies the group's contribution to the department's educational objectives by giving the students both practical skills and theoretical knowledge. This course is uniquely designed to provide students with hands-on, practical experience in software development, fostering a deep understanding of teamwork and project management in a real-world context.

Additionally, the group's work in helping companies with digital transformations aligns with the department's emphasis on digital innovation and establishing long-term collaborative relationships with the industry. We work closely with the industry, especially in helping organisations with digital transformations. For example, we recognise the challenges organisations face when scaling agile. Both our master's and PhD students have had the opportunity to do research with our industry partners (for example, Knowit, Sparebank1, Entur, Storebrand, Visma, AKVA, Nordea). Further, our group members are active in media and public IT debates.

1.4 Research group's resources

The Software Engineering group's funding primarily comes from the base funding from the University. However, we actively pursue funding opportunities from national and international bodies, such as the Research Council of Norway. A key aspect of our resource strategy is the cultivation of strong ties with industry partners. These collaborations not only provide additional funding avenues but also offer valuable practical experience for our students. Through these partnerships, we facilitate internships and project work, aligning our educational programs with real-world applications and needs. Our group is involved in various research projects, some of which are funded through competitive grants.

Table 2. Describe the sources of R&D funding for the research group in the period 2018-2022.

	2018 (kNOK)	2019 (kNOK)	2020 (kNOK)	2021 (kNOK)	2022 (kNOK)
Basic funding	2656	3864	3936	3237	3293
Funding from industry and other private sector sources	1200	1200	1200		200
Commissioned research for public sector					
Research Council of Norway					
Grant funding from other national sources	341				
International funding e.g. NIH, NSF, EU framework programmes	1500				
Other					

1.5 Research group's infrastructures

a) **Describe which national infrastructures the research group manages or co-manages.**

The SE group does not manage or co-manage any national infrastructures.

b) **Describe the most important research infrastructures used by the group.**

We do not use specific research infrastructures beyond commonly used software packages for analysing data provided by UiO, such as Nvivo, SPSS, R, and Jmp.

1.6 Research group's cooperations

Table 3. Reflect on the current interactions of the research group with other disciplines, non-academic stakeholders and the potential importance of these for the research (e.g. informing research questions, access to competence, data and infrastructure, broadening the perspectives, short/long-term relations).

Interdisciplinary (within and beyond the group)	Traditionally, our research group members have had backgrounds in computer science. But recently we have hired people with other backgrounds such as organisational psychology. The diversification of backgrounds within our group has enriched our research and allowed us to approach software engineering from an interdisciplinary perspective. Our research group has also engaged in interdisciplinary projects within and beyond our department. For example, we have a project with an interior architect firm (supported by Forregion Innlandet) to explore what the construction industry can learn from modern software development. Collaborations with other groups within the department have led to a machine learning project, including a cross-group supervisor team and one PhD student so far, which has enhanced our research capacity and resulted in notable publications and dissemination activities. In addition, we are actively participating in the DSTrain initiative, where we aim at hiring a postdoc at the intersection among software engineering, data science and climate sustainability https://www.uio.no/dscience/english/dstrain/research-areas/informatics/quality-and-sustainability-of-machine-learning-sof/
Collaboration with other research sectors e.g. higher education, research institutes, health trusts and industry.	Externally, our group has established pivotal collaborations with other research sectors, such as higher education institutions (NTNU and Chalmers University of Technologies) and research institutes (SINTEF). These collaborations have enriched our research through diverse perspectives and expertise. Such collaborations have allowed us to explore new research domains, such as Generative Artificial Intelligence, and enhance the practical application of our research, especially in areas like agile software development and

	technical debt. Our collaboration with NTNU has fostered exchanges of teaching methodologies and organised educational workshops, enriching the educational landscape for both faculty and students.
Transdisciplinary (including non-academic stakeholders) <i>Transdisciplinary research involves the integration of knowledge from different science disciplines and (non-academic) stakeholder communities with the aim to help address complex societal challenges.</i>	Our group has developed relationships with several long-term industry companies, leading to a unique integration of academic research, teaching and practice. For example, our close collaboration and symbiotic relationship with the Norwegian Meteorological Institute in the course IN2000 Software Engineering with project work. Additionally, we have been an active participant in the network GoforIT (collaboration between Industry, Research and Education about green IT) and we have acted on the board on The Norwegian Computer Society (Dataforeningen). These networks not only broaden our perspective but also enhances our engagement with non-academic entities, furthering our impact in helping Norwegian companies with their digital transformations.

2. Research quality

2.1 Research group's scientific quality

Externally, our group has established pivotal collaborations with other research sectors, such as higher education institutions (NTNU) and research institutes (SINTEF). These collaborations have enriched our research through diverse perspectives and expertise. Such collaborations have allowed us to explore new research domains, such as Generative Artificial Intelligence, and enhance the practical application of our research, especially in areas like agile software development and technical debt. Our collaboration with NTNU has fostered exchanges of teaching methodologies and organised educational workshops, enriching the educational landscape for faculty and students.

We focus on publications in high-impact journals, prioritising quality over quantity. Consequently, we have a large proportion of “Level 2” publications. For example, we have six publications in *IEEE Transactions on Software Engineering* with an Impact Factor of 9.3 (2021).

Google h-index overview for the permanent SE group members:

Position	Citations	H-index (January 2024)
Professor	11017	45
Professor	2546	31
Associate Professor	1795	25
Associate Professor	877	9
Senior Lecturer	878	9

We give keynotes at national and international academic conferences, including at the International Conference on Product-Focused Software Process Improvement (PROFES) in 2016, NIK (Norsk Informatikkonferanse) in 2020 and at the PhD symposium, Empirical Software Engineering Week, Helsinki in 2022.

We are (co-) organisers of a wide range of scientific conferences and symposiums:

- Dagstuhl Seminar 22231 (June 2022): “Theories of Programming” Thomas D. LaToza, Amy Ko, David C. Shepherd, Dag Sjøberg, and Benjamin Xie. In *Dagstuhl Reports*, vol. 12, no. 6. Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2023.
- Conference organisations
 - Steering committee ICSOB 2023 – present
 - Minitrack chair at Agile and Lean, 2022, 2023: Organisations, Products, and Development Minitrack, HICSS
 - General Chair of TechDebt2021 @ ICSE
 - Program chair XP 2022- International Conference on Agile Software Development
 - Program Chair of ICSOB 2021 International conference on software business
 - Proceeding Chair EASE 2020
 - Program Chair of Euromicro SEAA 2020
 - Program chair XP 2020 - International Conference on Agile Software Development
 - Proceedings chair, ICSOB 2020 and ICOSB2021, International Conference on Software
 - Program chair at the International Workshop on Autonomous Agile Teams (2018-2020)
 - Business Local Chair of ICSEA 2017 in Gothenburg (the 14th WICSA Conference on Software Architecture)
 - Track Chair of SEaTeD track at Euromicro SEAA (2017-2019)
 - Steering committee TechDebt@ICSE 2020-2023
 - Steering committee XP2020 - present

Our leadership extends beyond academic research. We’ve played pivotal roles in steering committees and advisory boards of major conferences and organisations in our field. Our collaborations with industry partners have led to practical applications of our research, bridging the gap between theoretical knowledge and real-world practice. Our commitment to the agile community is evident through our active role in organising and chairing prominent international conferences. Notable among these are:

We have been guest editors for special issues and sections in journals:

- **Business & Information Systems Engineering Journal** “The Future of Systems Development: Managing Technology, Social, and Individual Aspects” (2024)
<https://link.springer.com/article/10.1007/s12599-023-00819-6>
- **Information and Software Technology (IST) Journal** “Special section on IST for ICSOB2021” (2023) <https://www.sciencedirect.com/science/article/pii/S0950584923000976?via%3Dihub>
- **IEEE Software** “The Future of Hybrid Software Development: Challenging Current Assumptions” (2022)
<https://www.computer.org/csdl/magazine/so/2023/02/10043613/1KJsdZ9yZwl>

- **Information and Software Technology** (IST) Journal “Theories in Agile Software Development: Past, Present, and Future Introduction to the XP 2020 Special Section” (2022) <https://www.sciencedirect.com/science/article/pii/S0950584922001689?via%3Dihub>
- **AI & Society** Journal “Team Autonomy and digital transformation” (2022) <https://link.springer.com/article/10.1007/s00146-022-01406-1>
- **IEEE Software** “10 years of research and practice on Technical Debt” (2021) <https://www.computer.org/digital-library/magazines/so/call-for-papers-special-issue-on-10-years-of-technical-debt-research-and-practice>
- **Journal of System and Software** “Special section on Recent Trends in Engineering Software-Intensive Systems” (2021) <https://www.sciencedirect.com/journal/journal-of-systems-and-software/vol/183/suppl/C#article-10>

In addition, we are members of numerous PC committees and PhD committees. We are reviewers for a range of journals: IEEE Transactions on Software Engineering (TSE), Empirical Software Engineering (EMSE), Journal of Systems and Software (JSS), Information and Software Technology (IST), IEEE Software, ACM Transactions on Software Engineering and Methodology (TOSEM), Project Management Journal, Heliyon, Science of Computer Programming, IET Software, Journal of Intelligent Systems, Journal of Software - Evolution and Process, IEEE Access, Production Planning and Control, Journal of Product Innovation Management, International Journal of Agile Systems and Management, International Journal of Management Reviews, Journal of Business Research, International Journal of Information Systems and Project Management, Information Systems Journal.

A link to the research group’s publication list is available on the research group’s website:

<https://www.mn.uio.no/ifi/english/about/strategy/evalmit/se.html>

Table 4. List of projects

Project 1: <i>ARLET, Marie Curie co-funded TecnioSpring+</i> <i>December 2017-December 2018</i>	Project owner(s) (project leaders organisation)	Antonio Martini
	Total budget and share allocated to research group	2.5 M NOK. It covered 90% of Antonio Martini's salary as an associate professor for two years (but it was stopped after one year as the industrial partner was acquired) plus additional costs such as travelling and open access and 150k NOK in donation from the company to UiO
	Objectives and outcomes (planned or actual) and link to website	Developing a tool to manage architectural technical debt. The project is not available online after the company was acquired.
Project 2: <i>Managing architectural technical debt 2017 - present</i>	Project owner(s) (project leaders organisation)	Antonio Martini
	Total budget and share allocated to research group	Around 7M NOK. It covered 20% of Antonio Martini's salary as an external researcher at Chalmers University of Technologies until 2020, plus travelling and other expenses. It also covered a PhD student employed at Chalmers for whom I was the main supervisor (she has defended now) and with whom we had many joint publications.
	Objectives and outcomes (planned or actual) and link to website	The project is an industrial project directly funded by a consortium of companies in the nordics (especially Sweden) to study how to manage technical debt. Several publications and practical contributions were achieved in this project. https://www.software-center.se/research-themes/technology-themes/continuous-architecture/managing-architectural-technical-debt/
Project 3: Coordination and digital collaboration	Project owner(s) (project leaders organisation)	Viktoria Stray
	Total budget and share allocated to research group	200KNOK, 100% to research group

2022-present	Objectives and outcomes (planned or actual) and link to website	Working with industry to see what other sectors can learn from agile software development.
Project 4: <i>Agile Coaching</i> 2019-2022	Project owner(s) (project leaders organisation)	Viktoria Stray
	Total budget and share allocated to research group	400KNOK, 50% to research group
	Objectives and outcomes (planned or actual) and link to website	Investigating the topic of agile coaching. The partners involved were Scrum Alliance, Duke Energy, Bayer, and Disney.
Project 5: <i>Research Council of Norway: Milepælsprosjekt – Kommersialisering fra offentlig finansiert forskning (ref 312635), 2019</i>	Project owner(s) (project leaders organisation)	Antonio Martini
	Total budget and share allocated to research group	500KNOK, 50% to research group
	Objectives and outcomes (planned or actual) and link to website	Inven2 was the main applicant, and I was the leading researcher and product owner. The outcome was the commercialisation plan for the AnaConDebt tool and startup https://www.inven2.com/lisensmulighet/anacondebt-analysis-of-contagious-technical-debt/?lang=en
Project 6: <i>The Norwegian Directorate for Children, Youth and Family Affairs (Bufdir), 2017-2018</i>	Project owner(s) (project leaders organisation)	Norwegian Computing Center (NR)
	Total budget and share allocated to research group	660KNOK, 50% to research group

	Objectives and outcomes (planned or actual) and link to website	We investigated how to integrate accessibility testing in agile software development. The project aimed enhance awareness and ease of testing for accessibility with the aim of making software solutions more inclusive and accessible to all. We evaluated and integrated accessibility testing methods into agile processes for developers and testers. The partners were IFI, the Norwegian Computing Center, Kantega and Sparebank1. http://www3.nr.no/nb/projects/its-integrasjon-av-tilgjengelighetstesting-i-en-smidig-utviklingsprosess?language=nb

Table 5. Research group's contribution to publications

Publication 1: <i>D. I. K. Sjøberg and G. R. Bergersen, "Construct Validity in Software Engineering," in IEEE Transactions on Software Engineering, vol. 49, no. 3, pp. 1374-1396, 1 March 2023, doi: 10.1109/TSE.2022.3176725</i>	Authors (Please highlight group members)	Dag I. K. Sjøberg Gunnar Rye Bergersen
	Short description	The SE group is among the world leading on research methods in software engineering. This article is an effort to improve the validity of empirical studies in software engineering, in particular, construct validity. The article was published in May 2022 and has thus not received many citations yet, but has been download 2032 from IEEE Xplore.
	Research group's contribution	100 %
Publication 2:	Authors (Please highlight group members)	Saulo S. de Toledo (PhD student at UiO) Antonio Martini (main supervisor for the PhD student) Dag I.K. Sjøberg (co-supervisor for the PhD student)

Saulo S. de Toledo, Antonio Martini, Dag I.K. Sjøberg, <i>Identifying architectural technical debt, principal, and interest in microservices: A multiple-case study, Journal of Systems and Software, Volume 177, 2021, https://www.sciencedirect.com/science/article/pii/S0164121221000650?via%3Dihub</i>	Short description	Investigation of what constitutes technical debt specifically for microservices. The PhD student conducted several interviews to define a key concept in software engineering research. JSS (Journal of System and Software) is one of the top journals in software engineering
	Research contribution group's	The main author was Saulo S. de Toledo, PhD student at UiO. The work was supervised by Antonio Martini (associate professor at the SE group and main supervisor) and Dag Sjøberg (professor at the SE group and co-supervisor). The paper was one of the main studies in Saulo's PhD thesis.
Publication 3: Stray, Viktoria, and Nils Brede Moe. 2020. "Understanding Coordination in Global Software Engineering: A Mixed-Methods Study on the Use of Meetings and Slack." <i>Journal of Systems and Software</i> 170 (December): 110717 (open access). https://doi.org/10.1016/j.js.2020.110717.	Authors (Please highlight group members)	Viktoria Stray and Nils Brede Moe
	Short description	The SE group is among the world leading in agile software development. This paper won best paper award in the journal in 2020. At the journal home page, the article was in December 2023 listed as one the most cited articles published in the past three years.
	Research contribution group's	The main author was Viktoria Stray (group manager of the SE group).

Publication 4: Lindsjörn, Yngve, Dag IK Sjøberg, Torgeir Dingsøy, Gunnar R. Bergersen, and Tore Dybå. "Teamwork quality and project success in software development: A survey of agile development teams." <i>Journal of Systems and Software</i> 122 (2016): 274-286. https://doi.org/10.1016/j.js.2016.09.028	Authors (Please highlight group members)	Yngve Lindsjörn, Dag I. K. Sjøberg, Torgeir Dingsøy, Gunnar Rye Bergersen, Tore Dybå
	Short description	The main authors were Yngve Lindsjörn and Dag Sjøberg who are in the research group.
	Research contribution group's	
Publication 5: <i>Project(s): 217594/O30, 193236/I40</i> <i>G. R. Bergersen, D. I. K. Sjøberg, T. Dybå, "Construction and validation of an instrument for measuring programming skill," in IEEE Transactions on Software Engineering, vol. 40, no. 12, pp. 1167–1184, 22 August 2014, doi: 10.1109/TSE.2014.2348997</i>	Authors (Please highlight group members)	Gunnar Rye Bergersen Dag I. K. Sjøberg Tore Dybå (SINTEF, 20% position at the group at the time)
	Short description	Valid measurement instruments of programming skills are needed in both industry and academia. The paper reports on the construction and validation of such an instrument developed in two NRC projects (totalling 2.8 MNOK). The instrument is in use in the software industry today.
	Research contribution group's	The group contributed fully to all role taxonomies except for "software." Statistical software was written by the group, but software for the production environment was developed by an external professional software engineer.

Table 6. Please add a list with the research groups monographs/scientific books. Max 10 listed: title, first three authors et al and link to webpage (if any). Please delete lines which are not used.

1	Authors-Title (Please highlight group members) - link to webpage/review
2	
3	
5	

2.2 Research group's societal contribution

Our research group has made significant contributions to society, both in Norway and internationally, through various initiatives, collaborations, and projects.

1. Software process improvement initiatives

- As partners in organising international conferences
- Our collaborative efforts with Norwegian and European companies help them in their digital transformation.
- Through teaching software process improvement for employees in full jobs, we have played a role in raising awareness of how to do digital transformations, and we have contributed to lifelong learning.

2. Advancing education

- We have profoundly impacted education in Software Engineering through the development and teaching of courses like IN2000 and IN1030, IN5140.
- We publish research papers on teaching in Software Engineering Capstone courses.

3. Innovative research

- Our project on tools for analysing technical debt in collaboration with Inven2 <https://www.inven2.com/teknologi-for-handtering-av-teknisk-gjeld/>
- Our project on measuring Java programming skills (NRC project #217594)

4. Networking and collaborative efforts

- Leading the national Gemini Center Software Engineering and our role in organising webinars and summits underlines our commitment to fostering a collaborative software engineering community in Norway. See <http://smidig.org/>.
- Our general and track chair roles at international conferences (such as XP, TechDebt, etc.) exemplify our international collaboration and academic contribution.

5. Impact on agile software development and research methods

- Our efforts in disseminating knowledge through high-ranked publications and practical changes <https://ieeexplore.ieee.org/document/9976055/>

6. Dissemination activities

- The members of the SE group have held between 50 and 80 presentations over the last decade at non-academic conferences, companies and organisations, for example, Knowit, Orkla, Volvo, Ericsson, Siemens, Visma, Bekk, Sunnaas sykehus, Twoday, NRK, Læringsfabrikken, and Kongsberg Gruppen.

We often disseminate research findings in media outlets to increase the public understanding of critical issues in software engineering. We have contributed to various feature articles, commentaries and interviews in major media outlets, both general media and industry-specific media. This illustrates our ability to communicate complex ideas to a broader audience, enhancing public discourse on technology and its societal implications. A selection is listed below.

Television and Radio Appearances

- TV2 (09.02.2023). Viktoria Stray, TV show appearance, *Nei, mobilen gjør deg ikke til en gullfisk*. Attended an episode of “Norske tilstander”, which addresses current issues in Norwegian politics. (Link to Season 3, episode 6).
- TV2 Nyhetskanalen (27.09.2018). Viktoria Stray, Interview, *Møteforsker: - Daglige møter truer effektiviteten på jobb*. (Link to TV segment).
- NRK P2 (18.09.2018). Viktoria Stray, Interview, *Slik stopper du møteplageren*. Participated in the program Ekko.

Newspapers and industry magazine appearances

- Bjørkeng, Per Kristian; Stray, Viktoria & Moe, Nils Brede (2023). [Konsentrerer vi oss virkelig dårligere enn en gullfisk? Det moderne mennesket makter bare å konsentrere seg i 47 sekunder, hevdes det. Men noe skurrer](#). [Avis]. Aftenposten.
- Stray, Viktoria (2023). [Er møter arbeidsplassens største tidstyv?](#) [Business/trade/industry journal]. tu.no.
- Sjøberg, Dag (2023). Interview. AI Engineer. [Business/trade/industry journal]. kode24.
- Sjøberg, Dag (2023). Interview. Studie antyder at IT-fag ikke bør undervises på engelsk. Det blir ikke lett, mener professor. [Business/trade/industry journal]. Digi.no.
- Bergersen, Gunnar R. & Sjøberg, Dag Ingar Kondrup (2023). Popular scientific article. [Education of software developers in a fast-growing job market: Giving more students with “non-standard” backgrounds an opportunity](#). [Show summary](#)
- Stray, Viktoria & Grimsrud, Simen Aker (2022). [Syns du det er for mange møter på jobb? Her er møteforskerens tips](#). [Internett]. Fontene.no.
- Stray, Viktoria (2022). [Melina trodde Teams-møter skulle frigjøre tid. – Det er litt merkelig, for det har blitt mer hektisk](#). [Internett]. Fontene.no.
- Stray, Viktoria (2022). [Den hybride møtekulturen: – Møter er ikke bare møter lenger](#). [Internett]. Psykologisk.no +.
- Stray, Viktoria (2022). [Løper du fra møte til møte gjennom arbeidsdagen? Her er forskerens tips for en god møtekultur](#). [Internett]. Psykologisk.no +.
- Gramnæs, Katrine & Stray, Viktoria (2021). Denne feilen gjør mange i «hybride møter». [Avis]. e24.no.
- Stray, Viktoria (2021). Fortsatt behov for fysiske møter. [Avis]. Budstikka. [Vis sammendrag](#)
- Stray, Viktoria (2021). [Vurderer å fortsette med digitale foreldremøter etter pandemien](#). [Internett]. Budstikka.
- Moe, Nils Brede; Stokke, Ole Petter Baugerød & Stray, Viktoria (2021). [Én av tre misfornøyd med video-møter og sam-arbeid på hjemme-kontor](#). [Business/trade/industry journal]. Kode 24.
- Sjøberg, Dag (2021). Opinion piece. Utenlandske forskere: Jobbene nordmenn ikke vil ha. [Newspaper]. Aftenposten.
- Torgersen, Eivind & Stray, Viktoria (2020). [Hvordan blir jobbverdagen etter koronakrisen?](#) [Internett]. titan.no.
- Benjaminsen, Christina; Stray, Viktoria & Moe, Nils Brede (2020). [Ten tips for productive online meetings](#). Gemini (English edition). ISSN 0804-8568. [Vis sammendrag](#)

- Benjaminsen, Christina; Stray, Viktoria & Moe, Nils Brede (2020). [Ti råd for effektive møter på nett](#). Gemini. ISSN 0802-085X. [Vis sammendrag](#)
- Telle, Ingvid & Stray, Viktoria (2019). [Hvorfor så mange møter?](#) [Fagblad]. Finansforbundet.
- Myklemyr, Anita & Stray, Viktoria (2020). [Møteforsker – Benytt muligheten til å teste digitale møteverktøy](#). [Avis]. Dagens perspektiv.
- Moe, Nils Brede; Stray, Viktoria & Stokke, Ole Petter Baugerød (2020). [Unge utviklere minst effektive på hjemmekontor](#). [Business/trade/industry journal]. Kode 24.
- .Grimstad, Bjørn; Stray, Viktoria. Ikke gå i møtefellene: Her er ti tips til gode møter. Fagbladet [Fagblad] 2019-01-24
- Telle, Ingvid; Stray, Viktoria. Hvorfor så mange møter?. Finansforbundet [Fagblad] 2019-12-13
- Sjøberg, Dag (2018). Feature article. Forskning er skriving. Forskerforum. ISSN 0800-1715. p. 43–43.
- Kalveland, Julie; Stray, Viktoria. Viktoria er Norges ledende ekspert på møter. Hun anbefaler at alle får lov å «ta en Musk». Digi.no [Business/trade/industry journal]. 2018-11-11
- Brombach, Harald; Stray, Viktoria. Mange har endret standup-møtene på grunn av forskningen til Viktoria. Digi.no [Business/trade/industry journal]. 2017-07-31
- Bergersen, Gunnar R. & Sjøberg, Dag (2016). Interview. Ser butikk i it-flauser. [Newspaper]. Dagens Næringsliv.
- Sjøberg, Dag (2016). Opinion piece. Programmering i skolen er hverken frelse eller rør. [Newspaper]. Aftenposten.
- Sjøberg, Dag (2015). Opinion piece. Programmering bør være allmennkunnskap. [Newspaper]. Dagens Næringsliv.
- Sjøberg, Dag (2015). Interview. Bruk av IT-konsulenter i offentlig sektor. [Newspaper]. Bergens Tidende.
- Sjøberg, Dag (2015). Interview. [Vil ikke forske på it](#). [Newspaper]. Dagens Næringsliv.
- Sjøberg, Dag (2014). Opinion piece. [Spekulativ sykkelforskning](#). [Forskning.no](#). ISSN 1891-635X.
- Sjøberg, Dag (2013). Interview. Viktigste faktorer for å redusere teknisk gjeld.
- Sjøberg, Dag (2013). Interview. Smidig må finne sin form. [Newspaper]. Computerworld.
- Sjøberg, Dag (2013). Interview. Kjemper innbitt mot stammespråket. [Newspaper]. Computerworld.
- Sjøberg, Dag (2012). Interview. Organisering av offentlige IT-prosjekter. [Newspaper]. Aftenposten.
- Sjøberg, Dag (2012). Interview. [Har brukt 425 millioner på IT-konsulenter](#). [Newspaper]. Aftenposten.
- Sjøberg, Dag (2012). Interview. Smidig forskning. [Newspaper]. Computerworld.
- Sjøberg, Dag (2012). Interview. Smidig utvikling krever opplæring. [Newspaper]. Computerworld.
- Sjøberg, Dag (2012). Opinion piece. Tall opplyser. [Newspaper]. Klassekampen.
- Sjøberg, Dag (2012). Interview. [Skandalene er kommet for å bli](#). [Newspaper]. Aftenposten.
- Sjøberg, Dag (2012). Interview. [Kompleksiteten vil bli enorm dersom man skal samle alt på ett sted](#). [Newspaper]. Aftenposten.

Table 7. The research group's societal contribution, including user-oriented publications, products (including patents, software or process innovations

No.	Name of publication/product	Date of publication/product	Link to the document
1	Greps: Science-Based Testing Platform for Software Developers	Continuous development of a product for measuring coding skill. Spin-off company established.	https://www.greps.com/
2	Integrating Agile with an Offshore Strategy: A practical kit for adopting agile methods in distributed projects and teams	A book for educators used as curriculum on master level courses. Published October 2018. Agile projects put teamwork, close cooperation and continuous communication among the project members in the spotlight. Offshore projects, on the contrary, are infamous for unwillingness to cooperate, communication gaps, cultural misunderstandings and injured trust among the remote parties. So, is there any way to blend the two strategies?	https://leanpub.com/integratingagilewithanoffshorestategy
3	TD-Pulse	Software companies can effectively assess their Technical Debt management using this tool. The results are demonstrated in a study with three companies. The tool is being used in the RCN TechDebtOps project in Norway, aiming for continuous improvement in daily operations. Prof. Martini's project, supported by European companies and a 2-year EU Marie Curie project, collaborates with US firms and includes a 3-year RCN project with Norwegian companies like Visma, AKVA Group, and Knowit.	

3. Challenges and opportunities

The Software Engineering (SE) group is currently in an exciting phase of development, characterised by expansions in both our employees and research areas. Our focus has broadened to encompass fields such as artificial intelligence and large-scale agile methodologies, reflecting our commitment to staying at the forefront of academic inquiry.

One of the primary challenges we face is the relatively limited pool of strong applicants, especially from Norway, for new positions in our group. This situation, while posing a difficulty in terms of recruitment, also offers an opportunity to broaden our search internationally, thereby enhancing the diversity and richness of our group's intellectual landscape.

Being a relatively small research group can be a vulnerability, particularly in terms of handling large projects. This size may limit our capacity to undertake large research projects. And developing new master's level courses are also therefore currently constrained. This challenge encourages us to focus on maximising the impact and quality of our existing courses, fostering innovation within our current curriculum, and exploring collaborations for course development.

Despite the challenges, our research group, distinguished by its high-quality research, is positioned at the forefront of software engineering education and innovation. These strengths give us unique opportunities to enhance our academic and industry impact further. In line with this growth, we are excited that we recently secured funding for a 4-year postdoctoral researcher position, which Marthe Nordengen Berntzen will hold. The addition of Marthe Nordengen Berntzen to our team is a significant milestone. Her expertise and research interests align perfectly with our group's strategic objectives, promising to bring fresh perspectives and innovative approaches to our ongoing and future projects. In addition, we are actively participating in the DSTrain where we aim at hiring a postdoc at the intersection among software engineering, data science and climate sustainability <https://www.uio.no/dscience/english/dstrain/research-areas/informatics/quality-and-sustainability-of-machine-learning-sof/>. As we continue to expand and diversify, we will aim to foster an environment of learning, innovation, and excellence in Software Engineering.

High Quality of Research and Publishing Achievements: Our group's ability to consistently publish in reputable software engineering journals is a testament to our academic rigor and research excellence. This strength not only enhances our reputation but also positions us to contribute significantly to the advancement of software engineering knowledge. Our publications, particularly in the field of education, underscore our commitment to both theoretical and practical aspects of software engineering.

Strong Industry Connections and Collaboration: Our established connections with the industry, exemplified by the successful innovation project with Visma that secured 6 million in funding, open doors for real-world applications of our research and opportunities for commercialisation. These industry collaborations provide valuable insights into emerging industry trends and challenges, allowing us to tailor our research and education programs to meet the evolving needs of the software engineering sector.

National and International Collaborations: Our collaborations with renowned research institutions, both nationally and internationally, foster a rich exchange of ideas, methodologies, and best practices. These partnerships not only enhance the quality and scope of our research but also expand our network, offering opportunities for joint ventures, funding, and cross-disciplinary projects.

Proficiency in Beginner Education: Our proficiency in beginner education in software engineering lays a solid foundation for nurturing future professionals. This strength is crucial in attracting and retaining talented students, ensuring the continued supply of well-trained software engineers to the industry.

Industry-Relevant Course Offerings: The positive feedback on the IN2000 course, particularly for its industry relevance, highlights our commitment to aligning education with real-world requirements. This practical approach to education ensures that our graduates are well-prepared to meet the demands of the software engineering industry, enhancing their employability and readiness to contribute effectively from the outset.

Integration of Teaching and Research: Our active integration of teaching and research is a distinctive feature that enriches our educational offerings. By embedding the latest research findings into our curriculum, we ensure that our students are exposed to cutting-edge knowledge and practices. This integration also allows for a dynamic learning environment where students can engage with ongoing research projects, fostering a culture of inquiry and innovation.

In conclusion, our group's strengths not only underline our current standing in the field of software engineering but also pave the way for future growth and success. Leveraging these strengths will enable us to maintain our leadership position in research and education, continue our impactful industry collaborations, and foster a vibrant academic environment that is responsive to the needs of both students and the broader software engineering community.

Opportunities:

1. **International Collaboration:** There's substantial potential for increased collaboration with international research institutions. Such collaborations can bring diverse perspectives, foster cross-cultural academic exchanges, and lead to groundbreaking research in emerging areas like Generative AI. These partnerships can also enhance our group's global visibility and influence.
2. **External Research Funding:** The current academic and technological climate offers favorable prospects for obtaining external research funding. With our strong track record in software engineering and emerging interest areas like Generative AI, we are well-positioned to attract funding from various sources, including government grants, industry partnerships, and international funding bodies.
3. **Growing Student Interest:** The high student interest in software engineering and specific areas like Generative AI reflects the relevance and attractiveness of our curriculum. This interest provides an opportunity to expand our educational offerings, engage students in research projects, and foster a new generation of software engineers who are well-versed in cutting-edge technologies.
4. **Industry Relevance:** Our programs' relevance to the industry, demonstrated by the eagerness of companies to contribute to teaching, opens doors for collaborative projects, internships, and job placements for our students. This not only enhances the practical aspect of our courses but also strengthens our ties with the industry, ensuring that our education remains current and industry-aligned.