



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

Self-assessment for research groups

Institution: University of Oslo (UiO)

Administrative unit: Department of Informatics (IFI)

Research group: Digital Innovation (DIN)

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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 and signal processing, to participatory design and digital innovation. In 2023, IFI hosts five BSc and eight MSc study programmes, with close to 2500 students. The department is organized in four thematic sections, each of which comprising 2–5 research groups.

The DIN research group is part of the section for Digitalization and orients its research broadly to the study of digital innovations and transformation. The group has (as of October 2022) 3 full professors, 5 associate professors, 4 adjunct professors, 3 PostDocs and 7 PhDs. In the period 2006-2018, the DIN and IS research group were part of the Global Infrastructures group. Thus, the two groups shared research projects, activities, members, supervision and publications. We include in the report the research activities and results of Associate Professor Knut Rolland (group member 2018-2021), part of the activities of prof Margunn Aanestad (full-time group member until 2019, 80% on leave in 2020-21, 20% position in 2022, full time from 2023) and prof Sundeep Sahay (who joined the group in 2022 from the IS group).

The DIN group has expanded since the recently established DIGØK Bachelor and Master programs and hired 4 Associate Professors (2 in 2020, 2 in 2022). This has broadened the expertise in the group to include Political Science, Entrepreneurship, Sociology, Organization Science, in addition to the already present expertise in Computer Science and Information Systems. With prof. Sahay the group includes expertise on Global Health and ICT for Development.

The DIN research group has a strong basis in the Scandinavian tradition for systems development, which emphasises an orientation to information technology in use in real-life settings, sociotechnical perspectives and engaged collaboration with the practice field. Further, a defining feature has since the late 1990s been the study of large-scale complex digital infrastructures. Prof. Ole Hanseth has been a pioneer in this research - since his first publications on the topic in 1995 - and formulated the Information Infrastructures perspective in the field of Information Systems research.

The group has expanded and elaborated upon this research perspective and has contributed to the development of a novel research field within Information Systems (IS) research. The orientation to the large-scale infrastructures, (beyond stand-alone locally-bounded information systems) turned out to be prescient, as this has later been reflected in the current research streams on digital infrastructures, platforms and ecosystems in the IS field. The theory development has happened in close contact with multiple empirical cases (from the public healthcare, transport, energy, finance sector In Norway) and the [HISP activities](#) in various low- and middle-income countries (in the period the IS and DIN group were joint). The research approach favours long-standing collaborative and engaged relations with practitioners in the cases. The DIN group has especially focused the research in the Norwegian healthcare sector where has researched the development and evolution of digital infrastructures at national, regional, and organizational level for over two decades.

The research base in information infrastructure studies spurred a novel line of research in IS and contributed to the establishment of an international community of researchers where DIN is a central

actor. DIN has contributed to organizing conference tracks and pre-conference workshops, special issues, an AIS Special Interest Group ([Digital Innovation, Transformation and Entrepreneurship](#)), and a biannual research workshop ([Innovation in Information Infrastructures](#)). DIN research has also spilled over and contributed to other research fields such as Science and Technology Studies (STS), Computer Supported Collaborative Work (CSCW), and Organization Studies (OS).

The DIN group research has had a strong component of externally funded research (research projects and of partnership in research centers) in collaboration with external Norwegian and international partners from academia, public sector organizations and industry.

Table 1. List of number of personnel by categories

	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	Professor (1013)	3	0%	0	0
	Associate professor (1011)	5	80%	0	0
	Researcher (1108)	1	0	0	1
	PostDoc (1352)	3	100%	0	3
	PhD Fellow (1017)	7	57.1%	0	7

1.2 Research group's strategy

a) The DIN group **main objectives** in the period 2012-2022 have been to promote theory development around complex digital technologies by further elaborating on the information infrastructure perspective, and further research its critical implications for research and practice. To achieve the objectives, the DIN group has:

1. broaden the scope of the information infrastructure theory from design and development study to include themes of architecture, governance, data, AI and sustainability.
2. broaden the impact of the theory by publishing and participating in relevant research communities beyond IS (such as Health Informatics, CSCW, Organization Studies and Innovation Studies).
3. broaden the research to new empirical contexts beyond healthcare (such as finance, transport, energy).
4. broaden the research on digital infrastructures in the healthcare sector to include research in other countries (China, India, UK), and a comparative study at European level.
5. improved the research quality by establishing new support means internally in the group: we have established new PhD courses, applied for researcher school, defined the target journals, and organized regular article discussion seminars and writing seminars.
6. improved the research quality by seeking external fundings and collaborations: we have submitted 2 SFF applications including one in finalist position, participated in successful

SFI and research centres, applied and obtained multiple research projects, and established national and international collaborations.

b) The aim of the DIN strategy has been to maintain its position as a leading group on research in digital innovation, infrastructures and ecosystems. The strategy has the following **benchmark**:

- 4 Publications in level 1 and level 2 journals (in the [AIS basket of 11](#)) per year;
- at least 2 publications per conference at SCIS, ECIS, ICIS every year;
- contribute to organizing conference tracks at ECIS and ICIS, and pre-conference workshops;
- submission of 2 applications per year for external fundings for research projects in collaboration with external partners (academic and industry);
- Organize and host regular research visits by international guest researchers;
- Develop further relations with practitioners through research collaboration (e.g. Master thesis and PhD projects), invited lectures, invited seminars.

c) DIN manages the Digital Economy (DIGØK) [Bachelor](#) and [Master](#) programs, which is a highly competitive programme. The group is also responsible for the continuing and further education through the executive master program in [Digitalization and Leadership](#), and the year-long study in [IT Architecture](#). DIN also manages and contributes to a joint [PhD course](#) (IN9900) for the Digitalization section. DIN also contributes to teaching in the DESIGN Bachelor and the DESIGN, ENT and DIGHEL Master programs. DIN supervises Master students from DIGØK, DIGHEL and DESIGN, and has supervised also master students from PROSA. In the period 2018-2022 the group had 21 completed Master and 6 PhD.

d) IFI provides administrative support to the DIN group in relation to HR, hiring and contracts, PhD formalities, research project administration, research projects applications. IFI also provides technical support for ordering and setting up technical equipment (computer machines, software licences), providing access to resources (research databases, digital libraries), support for home office when needed (screens, headsets).

1.3 Relevance to the institutions

The DIN research group addresses central research topics under the broader theme of digitalization, which has high relevance for the Departments profile.

The group contributes significantly to the teaching and supervision of the Departments students. This goes for both the regular education, where we support two Bachelor study programs, four Master study programs as well as the Researcher Education. Also, we help further the Department's work within lifelong learning, as DIN is the main responsible group for the [Executive Master program](#).

The DIN group contributes to the realization of the Department's strategy of developing its research profile towards global trends, such as e.g. green transition, artificial intelligence and the role of digitalization in relation to societal challenges of both national and international importance. Our research is interdisciplinary and collaboratively oriented, and we collaborate with several other research fields within and beyond the UiO. Also, the research is internationally oriented and draws on

global research networks. In addition, our research is strongly oriented to empirical studies in the industry and public sector, contributing to the Department's visibility and collaborative innovation with practitioners.

1.4 Research group's resources

In the last 5 years the research activities have been funded with research grants from RCN, RFF, EU, and NAV.

The research group received fundings from:

- RCN: Partner in 2 Research Centers: INTRANSIT (2019-2026) and C3 (2015-2023).
- RCN: Partner in 3 Research Projects: DIGIREMOTE (2020-2024), AI4USERS (2020-2025), CORPUS (2019-2024).
- RFF: Lead in 1 Research Project: FIGI (2014-18).
- NAV: lead in 1 Research Project: FRIDA@work (2020-2021).
- Internal strategic funding until 2019 (DEMCA) from Matnat.

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	3291	4035	5486	4470	6268
Funding from industry and other private sector sources					
Commissioned research for public sector					
Research Council of Norway	3225	163	1399	2378	5336
Grant funding from other national sources			34	363	
International funding e.g. NIH, NSF, EU framework programmes					
Other					

1.5 Research group's infrastructures

- a) Employing primarily qualitative research methods, the group does not manage technical research infrastructures. However, the "organizational" research infrastructure we co-manage includes:

- [PhD Days](#): DIN has arranged and contributed to arrange (in collaboration with the IS group) the PhD Days, a doctoral consortium for PhD candidates in IS held every semester since 2001 at IFI and attracting PhD candidates nationally and internationally.
- [IN9900](#): DIN contributes to the PhD theory course “Selected Theoretical Topics in Information Systems Development” offered in collaboration with the University of Agder. The course is a meeting point for PhD candidate in IS on a national level and attracts attendants from UiO, UiA, and NTNU.

b) The DIN group makes use of TSD, the infrastructure for Sensitive Data (managed by UiO). It also makes use of the digital libraries accessible via the UiO Library, and the [AIS Library](#) (library of the Association for Information Systems).

The DIN group uses also the ‘organizational’ research infrastructure for PhDs:

- The PhD Days and the PhD course IN9900.
- Internally, the DIN group regularly arranges a seminar series where articles in progress are presented and discussed (often with invited discussants from other research groups), and a brown bag seminar where PhD candidates present and discuss work-in-progress.

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)	The DIN group is internally interdisciplinary as group members have expertise in Political Science, Entrepreneurship, Sociology, Organization Science, Computer Science, Information Systems, Global Health and ICT for Development. DIN primarily targets IS research but collaborates more broadly than IS. Research partners in Norway include: the Department of Education (UiO), the Institute for Strategy and Entrepreneurship (BI), the Center for Technology, Innovation and Culture (UiO), Oslo University Hospital (OUS), the Department of Strategy and Management (NHH), the Institute of Design (AHO), Department of Information Systems (UiA), Department of Computer Science (NTNU), Department of Health and Care Sciences (UNN). Internationally we collaborate with LUISS (IT), CBS (DK), DTU (DK), Aalborg University (DK), University of Edinburgh (UK), London School of Economics LSE (UK), ESADE (ES), Bayes Business School (UK), University of Innsbruck (AT). These collaborations support exchange of ideas and competence across disciplines, the possibility to conduct comparative research across countries, to participate in international collaboration (e.g.
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	co-organizing workshops, tracks, special issues), and to have short- and long-term visits, and host visiting scholars.
Collaboration with other research sectors e.g. higher education, research institutes, health trusts and industry.	DIN collaborates with <u>industry</u> (DNB (finance), Cognite (data), DNV (assurance) Dignio AS (health)), <u>public organisations</u> (Helse SØ, Oslo University Hospital, Sunnaas Rehabilitation Hospital, Østfold Kalnes Hospital, NAV, Municipality of Oslo) and <u>research institutes</u> (Institute of Public Health and SINTEF Digital). The collaboration with industry and public organizations is critical for the group and its engaged and collaborative approach to research as it ensures access to empirical cases of digitalization and impact on societal challenges.
<u>Transdisciplinary</u> (including non-academic stakeholders)	The DIN group is transdisciplinary as its research combines knowledge across disciplines and sectors. Research on digital infrastructures and platforms involves and integrates knowledge from Information Systems, Computer Science, Organization Studies and Strategy. In addition, the DIN group contributes to knowledge development in transdisciplinary research centers (C3 2015-23 and INTRANSIT 2019-26) involving several academic from different disciplines (in C3: Service Design, Medical Research, Management Research, IT Security), public sector (Municipalities and Directorate of Health) and industry (IT company) partners. The research addresses complex societal challenges such as healthcare innovation and sustainability transitions, and it follows the engaged scholarship approach based on the coproduction and use of research by non-academic stakeholders.

2. Research quality

2.1 Research group's scientific quality

The DIN group orients its research broadly to the study of digital innovations and transformation, and currently works in three main research areas: Digital Innovation, Digital Ecosystems and Platforms, AI and Data Infrastructures. The DIN group primarily targets IS research, but also contribute to research fields relevant to the study of digitalization such as CSCW, STS, OS and Strategy. Contrasted with the mainstream IS field, the group belongs to the sub-stream that employs qualitative methods, is oriented to organizational and societal phenomena, and includes public sector cases. The group is well recognized by researchers who study large-scale phenomena, such as information infrastructures and digital platforms, e.g., in the "[Innovation in Information Infrastructure](#)" workshop series.

The DIN group profile has been stable over the years with a primary interest in digital infrastructures and platforms and in information infrastructure theory, while at the same time being receptive of novel theoretical ideas, engaging with new empirical domains, and working across a broad range of research fields.

To ensure and improve scientific quality the group organizes activities for peer-feedback on research-in-progress and draft of papers, such as bi-monthly research article seminars, PhD-oriented monthly brown bag seminars, writing seminars targeting specific submission deadlines, and 'shut-up-and-write' writing sessions.

The group contributes to the IS field with publications: the group's track record in 2012-22 includes publications in level 2 journals, including the [AIS 'Basket of 11' journals](#), and in level 1 outlets. In addition, DIN has contributed to editing special issues (e.g. [JAIS special issue on Innovation in Information Infrastructures 2014](#)), tracks at ECIS and ICIS conferences (e.g. [IT and Healthcare ICIS 2017](#) and pre-conference workshops (e.g. on [Platformization](#) in the public sector at ECIS 2019). Group members are members of international research networks (AIS, IRIS, IFIP 8.2, IFIP 9.4, EUSSET), are on the editorial board (as senior or associate editors) of several central IS journals (the Journal of IT, Information Technology and People, Journal of the AIS, Information and Organization, Information Systems Research). In the Scandinavian and Norwegian IS community, the DIN group is on the board of NOKOBIT and the IRIS association and has been on the [SJIS](#) editorial board. The DIN group has contributed to organize [NOKOBIT](#), [SCIS and IRIS](#), and regularly publishes in these research venues. The DIN group has also participated as mentors in the ECIS and ICIS Doctoral Consortiums.

The DIN group scientific quality is excellent: publications from DIN have received prestigious recognitions: the JSIS Best Paper and AIS Best Paper Award (Grønsund and Aanestad 2020), the MISQ Impact Award (for the paper published a decade ago that has made the greatest impact) (Henfridsson and Bygstad 2013), and also JIT runner up for best paper 2019 (Øvrelid and Bygstad 2019), SCIS 2015 best paper award, ECIS 2016 best paper award, ICIS 2017 track best paper award.

Link to the research group's publication list at the research group's website:
<https://www.mn.uio.no/ifi/english/about/strategy/evalmit/din.html>

Table 4. List of projects

Project 1: FIGI - From IT Silos to Generative Infrastructures 2014-2018	Project owner(s) (project leaders organisation)	Bendik Bygstad, Department of Informatics, University of Oslo Funded by Regionale Forskningsfond
	Total budget and share allocated to research group	Total budget: 12,049 mill NOK Share allocated to research group: 12,049
	Objectives and outcomes (planned or actual) and link to website	The project had two practical objectives: (i) to identify core requirements to, and establish successful examples of, architectures for interaction between heavyweight IT and lightweight IT; (ii) to establish a living lab infrastructure, for experimentation, innovation and implementation. The research objectives was to contribute to the theory of generative IT infrastructures, and to identify successful patterns of generativity in large digital infrastructures. https://www.mn.uio.no/ifi/english/research/projects/figi/
Project 2: C3 - Center for Connected Care - Accelerating adoption and diffusion of patient-centric innovations 2015-2023	Project owner(s) (project leaders organisation)	Kari Kværner, Oslo University Hospital Funded by the Research Council of Norway
	Total budget and share allocated to research group	Total budget: 217,608 mill NOK Share allocated to research group: 22,997 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The primary objective of the center was to accelerate adoption and diffusion of patient-centric innovations that change patient pathways and delivery systems, empower the patients and increases growth in the health care industry. https://c3connectedcare.org/en/
Project 3: CORPUS -Changing competence requirements in public services:	Project owner(s) (project leaders organisation)	Monika Nerland, Department of Education, University of Oslo Funded by the Research Council of Norway through the programme Welfare, working life and migration (VAM) DIN role: Miria Grisot and Margunn Aanestad, 1 PhD fellow

Consequences of digitization in general and highly specialized work 2019-2024	Total budget and share allocated to research group	Total budget: 16,244 mill NOK Share allocated to the group: 3,6 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The CORPUS project objective is to generate new knowledge about how work-related skills and competencies are transformed in specific ways as a consequence of digitization processes in the public health services. https://www.uv.uio.no/iped/english/research/projects/nerland-corpus/index.html
Project 4: INTRANSIT -The Centre for the study of innovation policy for industrial transformation, sustainability and digitalization 2019-2026	Project owner(s) (project leaders organisation)	Taran Thune, Centre for Technology, Innovation and Culture, University of Oslo Funded by the Research Council of Norway
	Total budget and share allocated to research group	Total budget: 42 mill NOK Share allocated to the group: 9,3 mill NOK
	Objectives and outcomes (planned or actual) and link to website	INTRANSIT aims to develop new theoretical and empirical knowledge on the role of industries and industrial change in sustainability transitions. The research explore questions like: How can we foster industrial transformation towards a smarter and more sustainable Norwegian economy? What are the most important barriers and drivers of industrial transformation? What is the role of incumbent industries in transitions, and to what extent is the growth of new industrial niches connected to the diversification of existing industries? https://www.sv.uio.no/tik/english/research/centre/intransit/ .
Project 5: AI4Users - Responsible Use of Artificial Intelligence through Design for Accountability and Intelligibility 2020-2025	Project owner(s) (project leaders organisation)	Polyxeni Vassilakopoulou, University of Agder Funded by the Research Council of Norway through the programme IKTPLUSS-IKT and digital innovation DIN role: Miria Grisot as PI in WP, 1 PostDoc
	Total budget and share allocated to research group	Total budget: 16,0 mill NOK Share allocated to research group: 3,966 mill NOK

	Objectives and outcomes (planned or actual) and link to website	The AI4Users project addresses the “black box” problem contributing to the responsible use of AI for the digitalisation of public services. The novelty of AI4Users is that it targets specifically non-experts extending the reach of research beyond data scientists. The project takes a human-centred perspective addressing the needs of different groups including citizens, case handlers at the operational level, middle managers and policy makers. https://ai4users.uia.no
Project 6: DIGI REMOTE - Digital technologies for post-operative remote care and rehabilitation of thoracic and cardiac surgery patients 2020-2024	Project owner(s) (project leaders organisation)	Kari Kværner, Oslo University Hospital Funded by the Research Council of Norway, IKTPLUSS, through the programme Chinese-Norwegian Collaboration Projects on Digitalisation DIN role: Miria Grisot as PI, 2 PostDocs
	Total budget and share allocated to research group	Total budget: 9,992 mill NOK Share allocated to research group: 3,7 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The project aims to understand how digital technologies for remote care can be scaled to support large numbers of patients and a variety of conditions for high-quality services. The research will impact on the development of primary healthcare services in China and Norway, improve the implementation and use of a new type of remote care service adapted to the local cultural, organisational and technical contexts, and lead to ensure scalability of high-quality remote care technologies in China and Norway. https://www.mn.uio.no/ifi/english/research/projects/digiremote/index.html
Project 7: Frida@work 2020-2021	Project owner(s) (project leaders organisation)	Miria Grisot, Department of Informatics, University of Oslo NAV FoU midler
	Total budget and share allocated to research group	Total budget: 1 mill NOK Share allocated to research group: 1 mill NOK

	Objectives and outcomes (planned or actual) and link to website	The Frida@work project investigated the critical role trust plays in the use of NAV's chatbot Frida. By investigating the importance of trust in interaction between humans and chatbots, the project addressed the problem of unfinished conversations, i.e. conversations that are not completed in Frida. The aim was to ensure that a greater number of conversations with Frida are completed, or seamlessly transferred to a supervisor (case manager) where there is a need. The outcome of the project are 11 design principles for the further development of the Frida chatbox (project report in Norwegian).
Project 8: Governing digital personal data for strengthening RMNCH services: Health services delivery in fragile settings of Jordan and Palestine 2019-2024	Project owner(s) (project leaders organisation)	PI: Sundeep Sahay, Department of Informatics, University of Oslo Partners include Birzeit University, West Bank, Palestine, Jordan Institute of Science and Technology. and Privacy International, UK.
	Total budget and share allocated to research group	Total budget: CA\$ 458,500.00 Funded by: International Development Research Centre (IDRC), Canada
	Objectives and outcomes (planned or actual) and link to website	The project is studying how concerns of human rights and gender sensitivity are incorporated or not into digital initiatives for RMNCH services based on digital personal data. https://idrc-crdi.ca/en/project/governing-digital-personal-data-strengthen-reproductive-maternal-newborn-and-child-health
Project 9: DMgtAsia - Digital Platforms for Disease Surveillance and Control: Best Practice Case Studies from Asia 2021-2025	Project owner(s) (project leaders organisation)	Sundeep Sahay, Department of Informatics, University of Oslo Funded by Utforsk
	Total budget and share allocated to research group	Total budget:
	Objectives and outcomes (planned or actual) and link to website	The aim is to build the design and development of digital health education modules for the following five course modules in collaboration with educational institutions in Norway, India and South Korea.

Project 10: EquityAMR - – Digital Equity in AMR policy and practice - Building equity in digital global health: the case of antimicrobial resistance in LMICs 2021-2025	Project owner(s) (project leaders organisation)	Sundeep Sahay, Department of Informatics, University of Oslo Funded by the Research Council of Norway under Global Health
	Total budget and share allocated to research group	Total budget: 12 mill NOK Share allocated to research group: 7,5 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The research of the project will analyze dynamics in the interconnected domains of surveillance, diagnosis and prescriptions and how they interrelate and influence each other. This analysis is situated within the context of social structures such as literacy, poverty and caste, the violence it creates and how these influence processes of AMR related health care access and utilization for people. The project will develop and implement various interventions related to digital surveillance and use this data for informing the development of antibiotics stewardship policy and clinical practice of empirical therapy. https://www.med.uio.no/she/english/projects/equityamr/

Table 5. Research group's contribution to publications

Publication 1: <i>Project</i> <i>title/Journal/Year/DOI/URL</i> The role of discourse in transforming digital infrastructures Journal of Information Technology 2019, 34 (3) pp.221.242 https://doi.org/10.1177/0268396219831994	Authors	Egil Øvrelid and Bendik Bygstad
	Short description	The paper investigates the role of discourse when digitalization programmes encounter problems. Building on Foucault's theory of discourse, the authors investigate how particular strong technological trends interact with the digital infrastructure to facilitate transformation. The empirical evidence is from research on three cases from the Norwegian Health sector that experienced different degrees of success. The findings show that transformation happens when discourse and materiality, guided by the contextual factors, is integrated, leading to the emergence of actual solutions that ultimately transform the digital infrastructure. The findings are conceptualised through a layered configurational framework that demonstrates transformation of digital infrastructures.
	Research group's contribution	Egil Øvrelid and Bendik Bygstad conducted the data collection and analysis, and contributed to conceptualization, theorization, writing of draft and final manuscript.
Publication 2: Architectural alignment of process innovation and digital infrastructure in a high-tech hospital European Journal of Information System 2020, 29 (3), pp. 220-237 https://doi.org/10.1080/0960085X.2020.1728201	Authors	Bendik Bygstad and Egil Øvrelid
	Short description	Two central approaches to IT-enabled organisational change are process innovation and digital infrastructure research. This study investigates the alignment between them, both from a theoretical and a practical perspective. They have quite different basic assumptions on evolution; process innovation is a top-down approach, while digital infrastructures evolve bottom-up and are partly outside direct managerial control. The research question is, how can a process innovation initiative successfully align with an underlying digital infrastructure? The empirical evidence is an in-depth case study at a new high-tech hospital in Norway. Building on a proposed framework of alignment between process innovation and digital infrastructure, the research identifies and analyses three architectural alignment mechanisms.

	Research group's contribution	Bendik Bygstad and Egil Øvrelid conducted the data collection and analysis, and contributed to conceptualization, theorization, writing of draft and final manuscript.
Publication 3: Augmenting the algorithm: emerging human-in-the-loop work configurations Journal of Strategic Information Systems 2020, 29 (2), https://doi.org/10.1016/j.jsis.2020.101614	Authors	Tor Grønsund and Margunn Aanestad
	Short description	The paper explores the question of how configurations of humans and algorithms evolve as firms adopt artificial intelligence (AI) capabilities, and what the implications are for work and organization. It is based on a two-year long case study of an organization in the international maritime trade that introduced automated algorithmic support for data analysis and prediction work. Drawing on a human-machine configuration perspective, the paper found that humans and the algorithm were configured and reconfigured in multiple ways over time as the organization dealt with the introduction of algorithmic analysis. In contrast to replacing human work, the emergent configurations required new roles and redistribution of extant expertise to augment and improve the accuracy of the algorithm. The analysis suggests that the new configuration resembled a human-in-the-loop pattern, comprised of both the augmentation work of auditing (i.e. the generation of a ground truth and assessment of the algorithmic output against this) as well as the work of altering the algorithm and the data acquisition architecture. The research points to the strategic importance of a human-in-the-loop pattern for organizational reflexivity to ensure that the performance of the algorithm meets the organization's requirements and changes in the environment.
	Research group's contribution	Tor Grønsund conducted the data collection and analysis and contributed to conceptualization and writing of the draft, revisions and final manuscript.
Publication 4: The dynamics of architecture-governance	Authors	Ole Hanseth and Juan Rodon Modol

configurations: an assemblage theory approach Journal of the Association for Information Systems 2021, 22(1) https://doi.org/10.17705/1jais.00656	Short description	This research demonstrates that evolution of digital infrastructures and platforms is driven by tensions between stability and change, which in turn are determined by the systems' architecture and governance structures. The paper conceptualises this as architecture-governance (A-G) configurations. The paper focuses on how the dynamics of A-G configurations shape the evolution of digital infrastructures while at the same time change as emergent outcomes of the evolution of infrastructures. The paper applies Assemblage Theory as a lense and is based on a empirical case study on an electronic prescription infrastructure in Catalonia, Spain.
	Research group's contribution	Ole Hanseth was the leading author in the conceptualization, analysis, and theorization, and contributed equally to the writing of the draft, revisions and final manuscript.
Publication 5: Effectual tactics in digital intrapreneurship: a process model The journal of Strategic Information Systems 2020, 29(3) https://doi.org/10.1016/j.jsis.2020.101617	Authors	Polyxeni Vassilakopoulou and Miria Grisot
	Short description	The research builds on extant conceptualizations of complexity in innovation journeys, in conjunction with perspectives on effectual entrepreneurial tactics. Empirically, it investigates uncertainty handling through a longitudinal case study on an in-house venture for the introduction of novel electronic services for patients in a major university hospital. The research provides insight into the processes through which intrapreneurs handle uncertainty by leveraging the potential of digital technologies, and develops a process model that traces the dynamics among uncertainty, digitally enabled tactics, and organizational novelty
	Research group's contribution	Miria Grisot conducted the data collection and analysis, and contributed to conceptualization, theorization, writing of draft and final manuscript.
Publication 6: Managing digital platforms in user organizations: The	Authors	Knut H. Rolland, Lars Mathiassen, and Arun Rai

interactions between digital options and digital debt. Information Systems Research Special Issue: Digital Infrastructure and Platforms 2018, 29(2), pp. 419-443. https://doi.org/10.1287/isre.2018.0788	Short description	The paper investigates how digital options and digital debt were implicated in a large Scandinavian media organization's management of a news production platform over nearly 17 years. Drawing on extant literature and the findings from this case, it theorizes the progression of and interactions between digital options and digital debt during an organization's digital platform management in relation to its infrastructure and work processes. The theory reveals the complex choices that organizations face in such efforts: While they may have to resolve digital debt to make a platform's digital options actionable, hesitancy to plant digital debt may equally well prevent them from realizing otherwise attractive digital options. Similarly, while identified digital options may offer organizations new opportunities to resolve digital debt, eagerness to realize digital options may just as easily lead to unwise planting of digital debt.
	Research group's contribution	Knut Rolland conducted the data collection and analysis, and was leading the theorizing and conceptualization, writing of the draft, revisions and final manuscript.
Publication 7: Bridging analog and digital expertise: Cross-domain collaboration and boundary-spanning tools in the creation of digital innovation Research Policy 2019, 48(9), pp. https://doi.org/10.1016/j.respol.2019.103819	Authors	Raissa Pershina, Birthe Soppe and Taran Mari Thune
	Short description	The purpose of this paper was to explore how specialists rooted in digital and analog knowledge domains engage in cross-domain collaboration to jointly create digital innovation. We cross-examined the literature on knowledge integration and coordination focusing explicitly on the role of boundary-spanning tools in fusing divergent types of knowledge. The empirical setting for our study was the development of digital serious games whose creation involves a wide range of gaming/digital and learning/analog expertise.
	Research group's contribution	Raissa Pershina collected and analysed data, and contributed to every stage of the development and writing of the research paper including theorization, drafting and revisions of the final manuscript.

Publication 8: Loyalty, Voice and Exit: A Call for More Nuanced Responses to Enterprise Architecture Management Journal of MIS 2019, 36(1) https://doi.org/10.1080/07421222.2018.1550549	Authors	Lena Hylving and Bendik Bygstad
	Short description	We investigate how different stakeholders in a large governmental agency connected to three on-going projects and their response to EAM initiatives. We identify three options of response to EAM initiatives: (i) active compliance with the EAM strategy, (ii) loyal but passive response, and (iii) rebel solutions.
	Research group's contribution	Lena Hylving and Bendik Bygstad conducted the data collection and analysis, and contributed to conceptualization, theorization, writing of draft and final manuscript.
Publication 9: From dual digitalization to digital learning space: Exploring the digital transformation of higher education Computers and Education 2022, 182 https://doi.org/10.1016/j.compedu.2022.104463	Authors	Bendik Bygstad, Egil Øvreliid, Sten Ludvigsen and Morten Dæhlen
	Short description	Inspired by the fast digitalisation during the Covid-19 crisis, we investigate a key aspect of digital transformation of higher education – the emergence of a digital learning space. In developing our analysis, we focus on two streams of digitalization in higher education; digitalisation of education and digitalisation of subjects. We call this dual digitalisation, which has been an obstacle for digital transformation of the sector, and made it challenging to develop a shared digital space. Our research question is, how can we develop a shared digital learning space in higher education? We conducted our study at the University of Oslo, where we analysed three phases of digitalisation. We identified three underlying forces of the digital learning space. First, the alignment of digital education and digital subjects provided a technical foundation. Second, the digital learning space was enacted and harnessed by redefinition of roles between students and teachers, allowing for new and deeper learning forms. And third, the digital learning space enables universities to transcend the physical and institutional borders, and engage in interactions with the broader society.

	Research group's contribution	Bendik Bygstad and Egil Øvrelid conducted the data collection and analysis, and writing of draft and final manuscript. Ludvigsen and Dæhlen contributed to conceptualization and theorization.
Publication 10: When Stars Align. The Interactions and Transformations of e-Health Infrastructure Regimes Historical Social Research / Historische Sozialforschung , Vol. 47, No. 3 (181), Special Issue: Digital Transformation(s): On the Entanglement of Long-Term Processes and Digital Social Change (2022), pp. 40-80 https://www.jstor.org/stable/27176653	Authors	Ole Hanseth
	Short description	The article outlines the shifting approaches to digital transformation of the Norwegian e-health sector from the 1970s through the lens of the Multi-Level Perspective (MLP) from the (industry) Transition Studies field, and its concept of sociotechnical regimes which include an industries technological architecture, its organizing structures, and the dominant knowledge. The paper's focus is on how regimes emerge, stabilize and then destabilize.
	Research group's contribution	Ole Hanseth conducted data collection (over a period of 30 years), data analysis, conceptualization and writing of the draft, revisions and final version of the manuscript.

Table 6. Please add a list with the research groups monographs/scientific books.

1	Margunn Aanestad, Miria Grisot, Ole Hanseth, Polyxeni Vassilakopoulou - Information Infrastructures within European Health Care. Working with the Installed Base https://link.springer.com/book/10.1007/978-3-319-51020-0
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2.2 Research group's societal contribution

The DIN group's societal contribution relates primarily to the impact of the research conducted for over two decades on the digitalization of the health care sector in Norway at municipal, regional and national level. Through research collaboration with practitioners in the healthcare sector, the group has impacted their work through discussions, presentations of research in progress, and workshops.

In particular, long-term collaborations have occurred with the IT department at Rikshospitalet (later Oslo University Hospital) since the mid 1990's, Sunnaas Rehabilitation Hospitals (since 2005) and the regional Health Authority (Helse Sør-Øst RHF). The collaboration has been significant for the region's IT strategy, reflected in the [FIGI project](#) and subsequent joint SFI application (2019). Specifically, the framework (developed by the FIGI project) for distinguishing between 'lightweight' and 'heavyweight' IT has been taken up by many actors in the sector. This includes the Regional Health Authority which used the framework both in their innovation strategy as well as in their Enterprise Architecture. In general, they have worked to shift their IT strategy towards more agile and learning-oriented processes, based on architecture choices that build on research-based knowledge. In addition, the framework was used in the national digital collaboration architecture developed by the Norwegian Directorate of E-health.

The DIN group's research results on handling complex sociotechnical infrastructures, encouraging bottom-up, user-driven, and learning-oriented approaches to the design of digital infrastructures, was also the base for group members' engagement in the broader public debates around the "One Citizen-One Record" national strategy and its implementation, (the Akson project, later Felles Kommunal Journal), in which a constellation of healthcare practitioners, researchers and IT industry was instrumental in re-directing a problematic project onto a more feasible trajectory.

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	Håndbok i helseinnovasjon Forskningsbaserte råd og verktøy for å forme fremtidens helsetjeneste	2023 Project publication (in Norwegian)	https://cappelendamm.no/handbok-i-helseinnovasjon-9788202796440
2	Frida@work – forskningsprosjekt om betydningen av tillit i bruken av chatboten Frida i NAV	25.03.22 Project report (in Norwegian)	https://www.nav.no/_attachment/download/a9ba64cd-c8ee-4177-a0e7-e1c5ae2749d1:1563c75472fae37937be5b64d6a796569fe35160/Frida@work_sluttrapport.pdf
3	Information Infrastructures Within European Health Care: Working with the Installed Base	2017	https://link.springer.com/book/10.1007/978-3-319-51020-0

3. Challenges and opportunities

Due to our new DIGØK Master program and the EVU program, the DIN group has recently grown both in staff, expertise, and research areas (e.g. energy, AI, sustainability). In addition, prof. Sundeep Sahay and prof. Margunn Aanestad have recently joined the group. The DIN group is in an exciting expansive phase which poses both challenges and opportunities.

The challenges:

- To maintain coherence in research in relation to the multiple expertise and engagement in multiple research fields.
- To support a more even production of publication in the group.
- To facilitate a culture of group engagement in addition to strong project engagement.
- To facilitate the transition in the coming years as 2 professors who have been central in the profile and success of the group will retire.

The opportunities:

- The diverse expertise can contribute to interdisciplinary research and stronger impact across research fields and on societal challenges related to digitalization.
- The participation in INTRANSIT is an opportunity for expanding the research network, include new empirical research domain and increase the scope of the infrastructure perspective.
- The infrastructure perspective has become more established and known: this is an opportunity for organizing attractive conference tracks, workshops, SI as well as PhD courses on a national level and applying for becoming a Research Center.
- The DIGØK Master is an opportunity to develop further relations with practitioners through research collaboration (e.g. Master thesis), invited lectures, invited seminars, and engaging alumni who have graduated from the program and work in the public sector and industry.
- The recently added interest and expertise in Global Health is an opportunity to broaden the scope of the research and to greater impact to societal challenges beyond Norway.