



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

Self-assessment for research groups

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Contact person: Petter Nielsen

Contact details (email): pnielsen@ifi.uio.no

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1. Organisation and strategy

1.1 Research group's organisation

Who we are: The Information Systems Research Group (IS) is at the forefront of qualitative, engaged and interventionist research on digitalisation in the public health sector, focusing on low- and middle-income countries.

Where we are: With a staff of more than 400, The Department of Informatics (IFI) at the University of Oslo (UiO) is a “powerhouse” for informatics training and research in Northern Europe. It is the largest such unit in Norway and has 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 hosts five BSc and eight MSc study programmes with close to 2500 students. The department is organised in four thematic sections, each comprising 2–5 research groups. Our group, IS, is part of the section for Digitalisation.

Our core: Our research is organised around the Health Information System Programme ([HISP](#)), our large, longitudinal research project (initiated in 1997) supporting the implementation of the District Health Information System v.2 ([DHIS2](#)). DHIS2 is an open-source software platform recognised as a [digital public good](#) by the Digital Public Goods Alliance. The first version of DHIS2 was developed in post-Apartheid South Africa in the 1990's and is now a global open-source project coordinated by the HISP Centre at the University of Oslo. IS established, cultivated and promoted the scaling of the global HISP community of researchers and practitioners around DHIS2. Since the inception of HISP, [61 PhD candidates](#) and more than 500 Masters have graduated, and we have contributed to the training of more than 25.000 practitioners (health programme managers, DHIS2 system administrators, implementers, application developers, etc.). These experts are now core building blocks in the global HISP community. Today more than [80 countries worldwide](#) use DHIS2 for collecting and analysing health data. DHIS2 is the world's most extensive health information management system, and 3.2 billion people (40% of the world's population) live in countries where DHIS2 is used.

Our agenda is strengthening public sector information systems through research and capacity building. With a socio-technical perspective, we focus on datafication, digitalisation governance and strengthening digital public platforms and infrastructures. This includes how we can use digital technologies to tackle emerging global health challenges and the impacts of factors such as climate change.

Our approach: We aim to support digitalisation in the public sector in low- and middle-income countries through locally recruited PhD candidates and projects, intervening and engaging with health programmes and non-governmental organisations. HISP/DHIS2 is the engine and platform for our research. We approach digitalisation in the public sector with an engaged and interventionist approach where action research, software development, platform governance, implementation support and local human capacity development go hand in hand.

Our research focuses on digitalisation as using digital technology to change organisational and societal practices and processes. Cutting across sectors and domains, digitalisation comes with the potential to transform and improve public service delivery. At the same time, digitalisation is intrinsically intertwined with its social, institutional, and cultural context, making it an inherently complex

endeavour.

We position our research within the Information Systems research field in general and the Information and Communication Technology for Development (ICT4D) part of Information Systems in particular (see, for example, the special issues on ICT4D in [MIS Quarterly in 2007, 31\(2\)](#) and the [Information Systems Journal in 2021, 31\(6\)](#)).

The funding of staff is core from the Department of Informatics. While some projects are based on funding from the Norwegian Research Council and EU, the primary source of funding for projects, empirical research and external PhD candidates (we currently have 23 candidates in the programme recruited from Africa and Asia who are not employed at the University of Oslo) is from international donors, including [Norad](#), [PEPFAR](#), [WHO](#), [The Global Fund](#), [Bill & Melinda Gates Foundation](#), [CDC](#), [Gavi](#) and [UNICEF](#).

We organise as a vibrant and active research group with frequent seminars and social activities involving faculties, our international group of PhD candidates, and Master students. After a split with the Digital Innovation research group, we were established in 2018. We have since then undergone significant personnel changes, with three professors retiring or leaving and six new associate professors joining over the past three years.

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	3	33		
	Associate professor	6	17		
	Assistant professor	1	0		1
	Postdoc	1	100		1
	PhD Fellow	7	57		7
	Adjunct Professor	2	0		2

1.2 Research group's strategy

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

The immense socio-technical complexity of the ever-evolving DHIS2 digital platform ecosystem with associated modules, apps, innovation processes, capacity building etc., generates a wealth of challenging and relevant research questions that feed our research. Our group is uniquely positioned to take a systems-oriented, critical and engaged approach to understand the complexity of digitalisation and how we can cope with it during attempts at systemic change. IS studies the challenges and opportunities that lie in digitalisation through three main themes: 1) Datafication as the rendering of entities and processes into data and the consequences and challenges this has, which ranges from new insight into details and patterns to data-induced forms of exclusion and injustice, 2) Digitalisation management and the organisation of systems design, innovation, and digitalisation processes, and 3) Digital platforms and infrastructures as networked forms of digital resources and processes that are designed and cultivated to enable innovation and distributed value creation.

IS has four primary goals: 1) Become an internationally leading IS group engaging with ICT4D, 2) Continue a working culture of openness and engaged research, 3) Continue our academic leadership in ICT4D, and 4) Develop further our reciprocal relationship with HISP and DHIS2. We have established a well-working research group which is conducive for students, PhD candidates and faculties. While well-recognised within ICT for Development (ICT4D), we are taking action to improve our impact in the IS research field. With our relations to HISP and DHIS2, we are well-positioned to reach this goal.

To reach these goals, we have 1) Actively worked towards establishing partnerships with other recognised IS research groups, improving our presence at IS conferences (in particular [ECIS](#) and [ICIS](#)), publishing in and taking senior editorial roles in top-tier IS journals, and supervision of junior faculties, 2) Kept an open door policy, arranging weekly seminars, encouraging social activities among PhD candidates and students, and nurturing a value-set of engaged scholarships towards partners and stakeholders, 3) Continued to publish and take senior editorial roles in core ICT4D journals and continued with a leadership position in the [IFIP 9.4 community](#), and 4) Nurtured our relationship with HISP and developed frameworks and platforms to improve the links between DHIS2 implementation, capacity building and research.

b) The benchmark of the research group.

The strategy of IS is based on four targets with benchmarks:

1. Become an internationally leading IS group engaging with ICT4D. Benchmarks:

- Publications in core IS journals (annually 5 in [AIS senior Scholars' List of Premier Journals](#)) and IS conferences (annually 3 in [ECIS/ICIS](#))
- Regular visits by international guest researchers
- Participation in IS conference panels and chair tracks (ECIS in particular)
- Editorial roles/guest editorial roles in core IS journals
- Close collaboration with IS research groups in other countries

2. Continued working culture of openness and engaged research. Benchmarks:

- Faculties, PhD candidates and students recognise a culture of openness from work environment surveys
- Recognised as engaged researchers by stakeholders, partners, and those we do research with and on

3. Continued academic leadership in ICT4D. Benchmarks:

- Publications in core ICT4D journals (annually 3 in [ITD/EJISDC](#))
- Contribute as track chairs and organising IFIP9.4 conferences
- Editorial roles/guest editorial roles in core ICT4D journals

4. Develop further our reciprocal relationship with HISP. Benchmarks:

- Considered by HISP as a relevant contributor to innovation, implementation and capacity building
- Participation in and delivery of sessions in the [DHIS2 annual conference](#)

c) The research group's contribution to education

IS contributes to four different master programmes at IFI: DIGHEL DESIGN, PROSA, and the continuing and further education in IT and Management. IS manages the interdisciplinary [DIGHEL](#) Master's program, recruiting students from informatics and health (30 new students annually). We are responsible for 8 Master's courses (10 study points each) and supervise candidates in the programmes. 89 students graduated in the period 2018 - 2022. We also offer 2 PhD-level courses. We currently have 32 active PhD candidates, and since 1997, 61 candidates have [graduated](#). 13 candidates graduated in the period 2018 - 2022. We have further supported establishing and developing integrated Masters in Health Informatics in South Africa, Mozambique, Malawi, Tanzania, Ethiopia and Sri Lanka.

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

IS has established its administrative staff to handle most practicalities related to research, which primarily relates to fieldwork, travels and supporting incoming guest researchers and international PhD candidates. IFI provides administrative support related to the formalities of the PhD education and IT and HR services for the employees. We further receive support for budgeting when applying for research grants.

1.3 Relevance to the institutions

The focus of the IS group relates to IFI's Strategic Plan (2014-2017) and Action Plan (2019-21) in the following ways:

- 1) IS explicitly addresses societal challenges of both national and international nature. Through its engagement with HISP/DHIS2 and role in the ICT4D community, IS builds knowledge on and contributes to improving health information systems, focusing on low- and middle-income countries.
- 2) Interdisciplinary environments are central to solving global challenges. IS contributes by bringing together information systems researchers, public health experts, computer scientists, epidemiologists, medical doctors, etc., through engaged and applied research and capacity-building initiatives.
- 3) IS disseminates knowledge to society by training master's and PhD candidates. With more than 61 graduated PhD candidates, our alumni are now essential resources in the digitalisation of the health sector in a range of low- and middle-income countries. The group also disseminates knowledge by participating in HISP conferences and workshops, which bring together researchers and practitioners within health globally.
- 4) IFI explicitly focuses on the health domain as a core area of applied informatics. We contribute to this through our action research projects and hosting a Master's program in "Digitalisation in the Health Sector".
- 5) IFI further emphasises interdisciplinarity and collaboration with the private and public sectors. We have a close and comprehensive collaboration with the national (Norwegian Institute of Public Health, the Faculty of Medicine at UiO, Oslo University Hospital, etc.) and international health organisations and institutions (the World Health Organization, PEPFAR, GAVI, etc.).
- 6) In both plans, HISP is mentioned as an essential project for IFI to improve health information systems in resource-constrained settings. This is seen as one approach to working towards the UN sustainable development goals.
- 7) The HISP-centre, where IS is a foundational part, is meeting IFI's aim to have cutting-edge research environments.

1.4 Research group's resources

IS research activities receive external funding from donor-supported HISP/DHIS2 projects and research grants. The HISP/DHIS2 projects fund travel, fieldwork as well as stipends for external PhD candidates. Much of the external funding goes into action research/implementation research projects where intervention and research activities are aligned and complimentary.

Table 2. 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	5 327	5 862	7 069	8 378	8 628
Funding from industry and other private sector sources					
Commissioned research for public sector	225	131	938	1 181	1 635
Research Council of Norway	1 170	1 170	1 120	1 120	870
Grant funding from other national sources	1 100	2 190	1 150	1 050	1 470
International funding e.g. NIH, NSF, EU framework programmes	926	2 090	4 222	2 079	8 423
Other					

1.5 Research group's infrastructures

a) National infrastructures the research group manages or co-manages.

For 22 years, IS and DIN have biannually arranged a national IS doctoral consortium ([PhD days](#)). It recruits participants from the larger IS research groups in Norway (primarily the University of Agder and NTNU) but is also open to international participation.

One of our PhD courses jointly given by DIN, [IN9900](#) (Selected Theoretical Topics in Information Systems Development), is offered jointly with the University of Agder and acts as a national arena for IS faculty and PhD candidates to meet and discuss theory. This course is important for PhD candidates to meet candidates and faculty members from other institutions and spur research collaboration.

We arrange an [IS seminar series](#) inviting scholars (senior and junior) relevant to the group to present their work (recently including Lucy Suchman, Susan Scott, Wanda Orlikowski, Youngjin Yoo and Michael D. Myers). The seminar is open and announced internationally, and remote participation is possible.

b) The most important research infrastructures used by the group.

HISP/DHIS2 is the lab and platform for our research and, thus, the most critical research infrastructure co-managed and used by IS. We are an active part of the HISP centre at UiO and collaborate closely

with the 19 HISP groups (typically managed by HISP alumni) in the global south (<https://dhis2.org/hisp-network/>). The HISP model is a three-legged approach where software development, capacity building, and action research are all equally important and interrelated. By action research, we mean exploring real-world problems and developing solutions in a local context, generating knowledge about what elements of the solution are contextual vs. generic, and transforming the generic elements into frameworks that can be shared globally at the same time as they inspire local innovation and adaptation in other countries. These processes of local problem-solving and generic platform development occur in parallel, forming a cycle of innovation, country-to-country sharing, and feedback between local stakeholders and the core DHIS2 team. This model is the success formula for DHIS2 growth and the sustainability of DHIS2 systems and implementations.

IS also arranges an internal bi-weekly paper writing seminar where we discuss a paper in progress (written by faculty or PhD candidate). In addition, we make extra effort with dedicated paper writing workshops before important conference deadlines (such as ECIS, IFIP 9.4 and ICIS).

1.6 Research group's cooperations

Table 3. Current interactions of the research group with other disciplines, non-academic stakeholders and the potential importance of these for the research.

Interdisciplinary (within and beyond the group):	The group is predominantly geared towards IS and ICT4D research and collaborates with multiple institutions including the London School of Economics (LSE), the University of Manchester, and the City University of Hong Kong. IS has extensive cooperation with Universities in the global south related to Master's programmes and researcher education, including the University of the Gambia, the University of Dar Es Salaam, the University of Malawi, the University of Rwanda, the University of Colombo, Universidade Eduardo Mondlane (Mozambique) etc. We have a long tradition of cooperating with researchers in other disciplines. For example, within public health, we are involved in several research projects globally. The group has, for example, a long-standing engagement with projects to improve measurement and use of data connected to maternal and newborn care, led by the London School of Hygiene and Tropical Medicine.
Collaboration with other research sectors e.g. higher education, research institutes, health trusts and industry.	With the Norwegian Institute of Public Health, the group is currently collaborating on implementation research for improved antenatal care in Uganda and has previously collaborated on research on COVID-19 contact tracing in Norway and globally. This cooperation is essential in shaping the group's research focus, while the group's activities enable cooperating groups to have access and infrastructure (through the DHIS2 platform) to perform public health studies. Related to our Master's programme and research, IS collaborates with several institutions in the Norwegian health sector, including the Health Agency of the Municipality of Oslo, Oslo University Hospital,

	Sykehuspartner. This collaboration provides direction to the scope of our master's programme and offers a venue for master thesis projects that might lead to future research collaboration.
Transdisciplinary (including non-academic stakeholders)	The group's research activities involve and depend on integrating knowledge from different stakeholder communities. This includes ministries of health and education in several countries in the global south, global development funding organisations (e.g., Norad, PEPFAR, the Global Fund), standardisation bodies (e.g., WHO, UNESCO), and the HISP network of digitalisation organisations (e.g., HISP Tanzania, HISP Rwanda). IS has multiple research efforts to operationalise and implement standards in the domain of public health and education based on collaboration with regional organisations, including WAHO, ECOWAS, ADEA and IPED. We have recently started a cooperation with machine learning researchers (e.g., from the Scientific Computing and Machine Learning Group at the Department of Informatics), predominantly on monitoring and analysing climate and climate health data. Based on a socio-technical and systems thinking perspective, we expect this climate-health initiative to have a significant impact in the following years on the research questions and perspectives of the group.

2. Research quality

2.1 Research group's scientific quality

We contribute to the IS research field in general and the ICT4D part of Information Systems in particular. The group's focus is on enhancing digital public infrastructures and the effectiveness of data-driven governance, with a focus on public health in low- and middle-income countries. This includes leveraging digital technologies to address emerging global health issues and the consequences of climate change. Thus, our strategy has been to focus publications in venues targeting and available for researchers and practitioners from the global south. While we are well-recognised within ICT4D research in IS, our core ambition is to improve our impact in the IS research field broadly. With our relations to HISP/DHIS2, we are well-positioned to reach this aim. The research group has recently undergone significant personnel changes, with three professors retiring or leaving and six new associate professors joining over the past three years.

We have a few central AIS Senior Scholars' List of Premier Journals publications and a reasonable track record of ICT4D journal publications. We have a large and significant volume of publications in peer-reviewed IS and, in particular, ICT4D conferences. The high number of PhD candidates from the global south contributes to this. During 2012-2022, the IS group published 47 journal articles (13 AIS Senior Scholars' List of Premier Journals, 12 general IS, 20 ICT4D and 42 in other journals).

We have edited several special issues in the AIS Senior Scholars' List of Premier Journals and ICT4D: "Digital Platforms For Development" (Information Systems Journal, 31:6, 2021), "Critically Studying Openness: A Way Forward" (Information Systems Journal, 29:4, 2019), "Flipping the Context: ICT4D, the Next Grand Challenge for IS Research and Practice" (Journal of the Association for Information Systems, 18:12, 2017). "Healthcare information technology for development: improvements in people's lives through innovations in the uses of technologies" (Information Technology for Development, 24:2, 2017), "Identification in a Digital Age: Implications for Development" (Information Technology for Development, 27: 1, 2021).

Link to the research group's publications at the research group's website:
<https://www.mn.uio.no/ifi/english/research/groups/is/research-library/index.html>

Table 4. List of projects

Project 1: <i>BETTEReHEALTH: Human, technical and political factors for better coordination and support of e-health in Africa/ (2021-2022)</i>	Project owner(s) (project leaders organisation)	SINTEF, Horizon 2020 research and innovation programme under grant agreement No 101017450
	Total budget and share allocated to research group	Total budget € 2 mill, Share allocated to the research group: € 122 000
	Objectives and outcomes (planned or actual) and link to website	1. To collect evidence and map existing resources to inform the successful deployment of e-health in LLMICs in Africa 2. To address the human factors related to successful e-health technologies in African LLMICs 3. To address the technical factors related to successful e-health technologies in African LLMICs 4. To address the public policy factors related to successful e-health technologies 5. To facilitate national initiatives by authorities for the successful deployment of e-health in LLMICs in Africa 6. To disseminate the actions and the results of the project so all relevant stakeholders get informed 7. To promote cooperation and networking between European countries and LLMICs in Africa in e-health https://www.sintef.no/en/projects/2021/betterehealth_eng/
Project 2: <i>Global health e-infrastructures: Integration and use of information (2009 – 2015)</i>	Project owner(s) (project leaders organisation)	Jørn Braa (IS/Universitetet i Oslo), VERDIKT, Norwegian Research Council
	Total budget and share allocated to research group	Total budget: 11,9 mill NOK Share allocated to research group: 11,9 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The principal aim of SIGH is that of conceptualising -and subsequently intervening -in the fragmented (i.e. non-integrated) information systems in health care, typified by large scale fragmented, technical and institutional, systems. The broader aim is to maximise the societal impact of such ICTs in health care by intervening in key health problem areas such as maternal and child health.

Project 3: <i>Harmonized Reproductive Health Registry Communication Strategies: Using Health Data to Empower Women and Health Systems (2014-2021)</i>	Project owner(s) (project leaders organisation)	Frederik Frøen (Norwegian Institute of Public Health), GLOBVAC - Research for Global Health and Vaccination, Norwegian Research Council
	Total budget and share allocated to research group	Total budget: 11,6 mill NOK Share allocated to research group: 2,0 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The most important outcome of the project is not a singular finding, but the combination of our implementation reports, showing feasibility; our trials, showing effect; and our technology transfer with tools and implementation guidance for the global community of DHIS2 users. Scientifically, our trials will support the evidence underpinning WHO guidelines for digital health interventions. We have introduced a new paradigm for DHIS2 health information systems in low- and middle-income countries. The case study of the Palestinian eRegistries has become a core component of the curriculum of DHIS2 Expert Academies worldwide. Large donors in global health, such as UNICEF, Gates Foundation, and GAVI, are specifically funding deployments of DHIS2 Tracker registries for e.g. immunisation, maternal and child health, and child nutrition - built on the eRegistries technologies from the project.
Project 4: <i>MobiHealth: Developing Health Service Networks through Mobile Solutions in Low Resource Settings (2010 – 2015)</i>	Project owner(s) (project leaders organisation)	Kristin Braa (IS/University of Oslo), VERDIKT, Norwegian Research Council
	Total budget and share allocated to research group	Total budget: 11,6 mill NOK Share allocated to research group: 10,3 mill NOK
	Objectives and outcomes (planned or actual) and link to website	MobiHealth extends the vision of health services information infrastructure to the villages drawing upon the potential of mobile IT solutions. The international consortium behind MobiHealth is cross-disciplinary (informatics, medicine, public health) comprising researchers, users, and providers of health infrastructure and information systems. Using action research, the project develops new knowledge on building sustainable health service networks in low-recourse settings. Health service networks refer to the multitude of vertical and horizontal ties between health workers, possibly also clients, in low-resource environments. Given the existing insufficient support of such networks, it is relevant to investigate to what extent and in which ways health service networks can be enhanced through the use of mobile technology.

Project 5: <i>Designing Information Systems for Strengthening Patient Based Care in Resource Constrained Settings (2015 – 2019)</i>	Project owner(s) (project leaders organisation)	Sundeep Sahay (IS/University of Oslo), INTPART - International Partnership for Excellent Education and Research, Norwegian Research Council
	Total budget and share allocated to research group	Total budget: 4,6 mill NOK Share allocated to research group: 4,6 mill NOK
	Objectives and outcomes (planned or actual) and link to website	The design and development of a patient-centric system for primary care settings in the Indian context are fully operational in the primary health care clinic in Chandigarh. A living lab, a core concept guiding the project, was established and made operational through this project. Research outputs: 1 book, 6 lectures and 3 articles for international conferences and journals for multi-disciplinary audiences. Two IFI Masters students completed their thesis based on this project. PGIMER doctoral student will be submitting his thesis in July based on this project. A course module on Public Health Informatics for medical/public students was built and is actively used. At the external level, further impacts may be earlier detection of epidemics by reporting real-time patient data from slum areas to the authorities.
Project 6: <i>Information Systems for Emergency Diseases Emergency Response to the Covid-19 Pandemic- Supporting global and national surveillance (2020 – 2022)</i>	Project owner(s) (project leaders organisation)	Kristin Braa (IS/University of Oslo), GLOBVAC - Research for Global Health and Vaccination, Norwegian Research Council
	Total budget and share allocated to research group	Total budget: 4,8 mill NOK Share allocated to research group: 2,6 mill NOK
	Objectives and outcomes (planned or actual) and link to website	This research led us to understand the appraisal of COVID-19 surveillance platforms across five countries, four of which used the DHIS2 system and one, Ghana, using SORMAS. Working across Norway, Ghana, Sri Lanka, Mozambique and Kenya, the project drew important insights regarding how contact tracers, health managers and national health implementers used digital platforms for disease surveillance, noting features and patterns associated with key variables, including simplicity, acceptability of the technology and quality of the data collected. Findings on the two platforms have high value for disease surveillance, especially as technologies are increasingly participating in contact tracing in low-resource settings. Our research has developed important insights on the role of digital platforms in disease surveillance and on how this may vary across countries. The research has produced findings on digital contact tracing that enhance future pandemic

		preparedness, by unpacking the role of digital technologies within disease surveillance and illuminating how different actors perceive the same technologies.
Project 7: <i>mHealth4Afrika (2016 – 2019)</i>	Project owner(s) (project leaders organisation)	<i>IIMC INTERNATIONAL INFORMATION MANAGEMENT CORPORATION LIMITED, Ireland, Horizon 2020, EU</i>
	Total budget and share allocated to research group	Total budget: € 2 mill, to the group: € 315.000
	Objectives and outcomes (planned or actual) and link to website	- Increase quality and impact of care by strengthening the capacity of primary healthcare professionals to capture comprehensive histories as well as current medical conditions. This will support continuity of care between visits and inform diagnosis. - Support implementation of sustainable Prevention Strategies by building necessary community trust to increase the frequency of contact with patients - Automate and significantly increase the accuracy of aggregate program indicator data. mHealth4Afrika can support strengthening policy formulation and decision-making by the Ministry of Health - mHealth4Afrika aims to strengthen the current skills of clinic staff by facilitating onsite access to educational materials (important for those who cannot easily access continuous professional medical education). Finally, it aims to support health education sensitisation of patients and local communities.
Project 8: <i>EDU: Education Data Use (2019 – 2024)</i>	Project owner(s) (project leaders organisation)	Terje Aksel Sanner (IS/University of Oslo), Norad & IDRC / Global Partnership for Education
	Total budget and share allocated to research group	Total budget 54 mill NOK Share allocated to research group: 7,1 mill NOK

	Objectives and outcomes (planned or actual) and link to website	The project aims to develop information systems that can make data-driven decision-making accessible to schools, districts, and the national level to inform policy planning and design of education sector interventions. The research project centres on activities in The Gambia, Uganda, and Togo, but also draws learnings from DHIS2 for education implementations in Mozambique, Sri Lanka, and Eswatini. The project addresses the following key problem areas: - the need for systematic education data collection based on international standards - the need to improve data utilisation at multiple levels of the education system, and - the need to scale sustainable EMIS data use innovations across country borders https://www.mn.uio.no/ifi/english/research/projects/edu/index.html In terms of theory development, the project explores the governance of digital platforms and digital public goods across domains (from health to education) and national borders, which involves pooling of scarce resources and collective action in developing and appropriating a shared digital resource.
Project 9: <i>QZA-21/0329 Digital Public Goods Capability Strengthening for Digital Public Infrastructure Cultivation (2022 - 2025)</i>	Project owner(s) (project leaders organisation)	Kristin Braa (IS/University of Oslo), Norad
	Total budget and share allocated to research group	Total 21,4 mill NOK, all to the research group
	Objectives and outcomes (planned or actual) and link to website	Build on the well known HISP model to develop a community of practice to support countries to govern their initiatives, by aligning DPGs with national DPI. We will recruit approximately 10 PhD scholars in countries through the 16 regional HISP groups where these initiatives are relevant and leverage the existing regional HISP groups to facilitate and support capacity building on DPG solutions like MOSIP where this is relevant. We will address the important questions highlighted in the outcome of the Aug 2021 Co-Develop Digital Public Infrastructure for an Equitable Recovery global discussions on: How will we measure progress on DPI? What is the impact of DPI?, and What works?

Project 10: <i>NORPART-2016/10134 – ExTending Health Informatics Capacity (ETHIC) (2016 - 2023)</i>	Project owner(s) (project leaders organisation)	Petter Nielsen (IS/University of Oslo), Norwegian Directorate for Higher Education and Skills
	Total budget and share allocated to research group	Total 5,5 mill NOK, all to the research group
	Objectives and outcomes (planned or actual) and link to website	ExTending Health Informatics Capacity (ETHIC) is a student mobility project aiming to support international student mobility between Universidade Eduardo Mondlane, the University of Malawi and the University of Oslo; improve health informatics curriculums at these partner institutions, and bring the long term collaboration between the three partners to the next level - from the University of Oslo initiating and building sustainable health informatics teaching capacity and programmes at the institutions in the South, to student mobility, internships at joint partners, joint curriculum development, joint student supervision and joint high-quality academic research. The project has up until 2022 resulted in more coordinated health informatics curriculums between the institutions; 82 Master and PhD student exchanges, involving coursework, supervision, master thesis workshops, fieldwork and internships.

Table 5. Research group's contribution to publications

Publication 1: Degenerative outcomes of digital identity platforms for development (2021) Information Systems	Authors	Silvia Masiero and Viktor Arvidsson
	Short description	The paper conducts a case study of the incorporation of Aadhaar, India's digital identity platform, in the country's largest digital identity system. Problematising the overarching view of digital identity as a carrier of socio-economic development, the paper theorises a type of outcome called <i>degenerative</i> , as it reduces the system to an outcome worse than the original status in which the system was. The paper draws implications of Aadhaar's adoption for the below-poverty-line communities induced into enrolling in the platform.

Journal, 31 (6), 903-928	Research group's contribution	Silvia Masiero has 14 years of experience studying digital identity infrastructures, with a focus on India's Aadhaar, on which this paper is centred. The paper relies on 12 years' worth of Masiero's qualitative data on Aadhaar's implementation in southern India. She also led the theorisation of digital identity platforms as inductors of degenerative outcomes leading to legal, informational and design-related types of injustice.
Publication 2: The digital is different: Emergence and relationality in critical realist research (2022) Information and Organization	Authors	Alexander Moltubakk Kempton
	Short description	The paper expands on the existing theorisation of relationality and relational explanations in Critical Realist research. It introduces the notion of transformational emergence to explain why the digital seems more tightly coupled to social phenomena than other types of technologies, illuminating the theorisation with empirical instantiations
	Research group's contribution	Alexander Kempton has theorised the notion of transformational emergence and introduced it in the literature with this paper drawing on his doctoral work. The notion has constituted an important theoretical innovation in the Information Systems domain and has been recognised across multiple forums of the discipline, including conferences of the Association of Information Systems (AIS).
Publication 3: Digital platforms for development. (2021) Information Systems Journal, 31 (6), 863-868	Authors	Brian Nicholson (adjunct professor in IS group), Petter Nielsen and Johan Ivar Sæbø
	Short description	The paper is the opening piece of the Information Systems Journal's Special Issue on <i>Digital Platforms for Development</i> , edited by the three authors. The piece provides the theoretical rationale for studying digital platforms for development, opening a new phase of ICT4D research that sees platforms as a core enabler/disabler of societal and economic development outcomes.
	Research group's contribution	All three authors are members of the research group and have been actively engaged in the launch of digital platforms for development as a new area of ICT4D research. The paper has proven highly impactful in the ICT4D field, generating engagement at conferences and providing the basis for the current focus of the field on digital global public goods.
Publication 4:	Authors	Brian Nicholson (adjunct professor in IS group), Sundeep Sahay and Richard Heeks

Global sourcing and development: New drivers, models, and impacts (2018) Information Systems Journal 28 (3), 532-537	Short description	The paper identifies core discourses in the literature on global sourcing and development. Drawing on a historical examination of global sourcing in the Information Systems discipline, it details how this practice has evolved in relation to global supply chains and vulnerable subjects, ultimately qualifying as a practice of involvement of communities below the poverty line in IT-related tasks. The roles of global sourcing within development and the uplifting of vulnerable subjects is highlighted through empirical examples.
	Research group's contribution	Brian Nicholson and Sundeep Sahay draw on extensive empirical data on global sourcing, collected across countries over three decades. Their theorisation contributes significantly to ICT for Development (ICT4D), where global sourcing has been widely recognised as a central phenomenon in uplifting people, countries and enterprises.
Publication 5: The role of affordances in the deinstitutionalization of a dysfunctional health management information system in Kenya: An identity work perspective (2019), MIS quarterly 43 (4), 1177-1200	Authors	Roberta Bernardi, Suprateek Sarker and Sundeep Sahay
	Short description	The paper draws on a longitudinal study of Health Management Information Systems (HMIS) in Kenya to investigate the link between information technology affordances and institutions. It identifies four types of identity work (disruptive, legitimising, reinforcing, and transformative), which lead to different institutional consequences in the Kenyan context.
	Research group's contribution	Sundeep Sahay has conducted extensive empirical work on HMIS in developing countries, actively contributing to theorising identity work in the Kenyan context. His work on the topic has obtained widespread recognition, which qualifies him as a global expert in the domain of health information systems that the paper discusses.
Publication 6: Engaging with uncertainty: Information practices in the context of disease surveillance in Burkina Faso	Authors	Stine Loft Rasmussen (PhD candidate in the IS group) and Sundeep Sahay
	Short description	The paper studies the role of formal and informal information practices in identifying and responding to communicable diseases. Drawing on empirical research conducted in Burkina Faso, it coins the concepts of “general and specific metis” to describe practices which were neither established formally nor informally but which evolve as the disease unfolds. The concepts illuminate health data in a context of constrained resources and vulnerability to disease outbreaks.

(2022) Information and Organization 31 (3), 100366	Research group's contribution	The paper draws on empirical data collected by Rasmussen, who was a PhD candidate with the group, and theorisation developed in collaboration with Sahay. The paper has introduced novel concepts in theorising health management information systems.
Publication 7: Digital public goods platforms for development: The challenge of scaling (2022) The Information Society 38 (5), 364-376	Authors	Brian Nicholson (adjunct professor in IS group), Petter Nielsen , Sundeep Sahay , and Johan Ivar Sæbø
	Short description	The paper studies the development of DHIS2, a global health platform for data management and visualisation, focusing on the paradoxes involved in the scaling process. Drawing on primary data on DHIS2 implementations, it examines the tensions connected to achieving the features of non-rivalry and non-exclusion that a public good entails.
	Research group's contribution	The four authors, all members of the group, have rich empirical experience with DHIS2, which was leveraged in the paper's theorisation. The paper constitutes one of the first-ever efforts to theorise scaling in digital global public good platforms and has inspired important debates on the topic taken up, among others, at the European Conference of Information Systems (ECIS) 2023.
Publication 8: Decolonising critical information systems research: A subaltern approach. (2023) Information Systems Journal, 33(2), 299-323.	Authors	Silvia Masiero
	Short description:	The paper proposes a subaltern approach to deal with the issue of Western bias, a bias in the origins of theorisation that affects the Information Systems research field. Drawing on works conducted in Ghana, Taiwan and India, the author illuminates the value of a subaltern approach for Information Systems work. Such an approach allows “deconstructing historiography” from the voices of the marginalised, which the paper puts at the centre of the narration of ICT4D projects involving below-poverty-line recipients.
	Research group's contribution	The author has theorised the subaltern approach in the Information Systems field and demonstrated its value in overcoming Western bias. The work has already been presented across institutions in seven countries and has obtained significant recognition in the Information Systems community.
Publication 9:	Authors	Terje Aksel Sanner and Egil Øvreliid

Informing hospital workflow coordination (2019), Computer Supported Cooperative Work (CSCW) 29, 387-417	Short description	The paper reports from a qualitative case study at Kalnes General Hospital in Norway. The authors investigate the use of workflow information to manage hospital resources and coordinate patient flow from emergency unit admission to patient transfer and discharge. The paper theorises how hospital staff leverage an integrated hospital information infrastructure to share, validate and use workflow information. Interestingly, interdepartmental visibility of workflow information raises awareness of menial and often-overlooked hospital housekeeping work and simultaneously motivates collaborative efforts to monitor and improve workflows as part of hospital digitalisation.
	Research group's contribution	The first author conducted extensive fieldwork at the new Kalnes hospital in Norway and was the lead on all aspects of the paper development, from data collection to data analysis, theorisation and positioning of the paper in the CSCW literature.
Publication 10: Innovation in the fringes of software ecosystems: the role of socio-technical generativity (2017) Information Technology for Development (ITD), 24, 398-421	Authors	Brown Msiska (PhD candidate in the IS group) and Petter Nielsen
	Short description	This paper contributes to the discourse on how the attributes of software platforms influence who can innovate on top of them and the kind of innovations possible within the larger ecosystem of technologies and people these platforms are part of. In particular, it addresses the limited attention to innovation unfolding in the fringes of the ecosystems peripheral to and disconnected from where the central software components are developed and where the resources necessary for digital innovation are scarce. Drawing upon Zittrain's characteristics of generativity and Lane's concept of generative relationships, the key contribution of this paper is a socio-technical perspective on innovation and generativity in this setting. The case illustrates how the technical attributes of the platform played a key role in concert with human relationships in shaping innovation activities in Malawi.
	Research group's contribution	Msiska did substantial fieldwork in Malawi by collecting the data and was the lead author. Both authors worked together to analyse the data, read up on the literature, theorise and write the paper.

Table 6. Research groups monographs/scientific books.

1	Sundeeep Sahay , T. Sundararaman and Jørn Braa (2017). <i>Public Health Informatics: Designing for Change - a Developing Country Perspective</i> , Oxford University Press.
2	Sahay, S., Mukherjee, A. Walsham, G. & Eriksen. T. H. (2022) <i>Digital Development: Stories of Hope from Health and Social Development</i> . Warwickshire: Practical Action Publishing.

2.2 Research group's societal contribution

The group's societal contribution revolves mainly around the DHIS2 platform, a public good which constitutes the world's most extensive health information system. With over 80 countries worldwide using DHIS2 to visualise and represent health data, DHIS2 leverages the open-source philosophy to provide an essential tool for data collection and analysis free of charge. Developed initially as a health data software, DHIS2 has diversified into the domains of education management information systems (EMIS), logistics (LMIS) and agricultural data management, with a recent focus on the actionability of climate health data across countries of the global South.

IS engages with DHIS2 in terms of research, which qualifies primarily as qualitative research on data and information use practices and of action, involving direct co-development of the platform's implementation across countries. Close collaboration with the platform's developers and implementers corroborates the group's ability to contribute to converting data into health, education, and climate health impact. Such a contribution was recognised in 2013, with the University of Oslo's Innovation Prize to Jørn Braa, Kristin Braa and Sundeeep Sahay for contributing to developing DHIS2. Further, Kristin and Jørn Braa were in 2020 awarded the Roux Prize, a global recognition for turning evidence into health impact. The same achievement was recognised with the prestigious [AIS impact award](#) of 2023. The uptake of DHIS2 as the 'standard' information management system by Ministries of Health in low- and medium-income countries and in education and agriculture across countries with which the research group engages is another sign of the perdurance of such impact.

Since 2017, we have been designated as a World Health Organization Centre for Innovation and Implementation Research for health information systems strengthening.

Beyond DHIS2, the group is characterised by active engagement with the ICT4D part of IS, a field in which the group's work is internationally recognised. Societal contributions generated over the last decade pertain to the area of digital platforms for development, a novel area of ICT4D which the group's members have inaugurated with a conference track in Tanzania in 2019 and which now constitutes one of the edges of ICT4D practice and impact. We also pertain to digital identity systems, with the group engaging in networks and initiatives centred on denouncing the risks of centralised, data-heavy systems and promoting fair forms of ID. The group's involvement with the International Federation for Information Processing (IFIP) Working Group 9.4 on the implications of information and digital technologies for development cement our ICT4D engagement, putting our activities into direct relation with civil society across developing nations. The group contributes to international policy debate in various forums to promote values of open source, open data, open standards and open innovation. With DHIS2 recognised as an exemplary digital public good by the DPG alliance, the research group has a key stake in demonstrating the societal value of pooling resources into open and shared public goods and applying these goods as common resources in the public sector across borders.

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	<i>The DHIS2 software</i> , with related resources such as impact stories: https://dhis2.org/category/impact-stories/	Newest version (40) was released 14/09/2023	http://dhis2.org and https://www.mn.uio.no/hisp/english/
2	<i>The DHIS2 Design Lab</i> : Explores how we can support and promote design and innovation within the DHIS2 software ecosystem. Engages directly with HISP groups in capacity building and develops and maintains online and dynamic resources for HISP groups and other digitalisation experts supporting digital innovation processes.	Continuously updated	https://www.mn.uio.no/hisp/english/dhis2-design-lab/
3	DHIS2 metadata & toolkit for health (collaboration with WHO & others).	Continuously updated	https://www.who.int/data/data-collection-tools/health-service-data/toolkit-for-routine-health-information-system-data/modules
4	Data Quality Assurance toolkit to support countries in assessing and improving the quality of Routine Health Information Systems (RHIS) data. The toolkit includes an application for use in the DHIS2 for routine data quality checks and for annual data quality desk reviews.	Updated in 2022	https://www.who.int/data/data-collection-tools/health-service-data/data-quality-assurance-dqa
5	A digital platform ecosystem approach to education management information system strengthening (UNESCO policy paper).	Published in 2023	https://doi.org/10.54676/PQSS8201
6	Health Data Toolkit, Community Health Information Systems implementation guide, Health Program Monitoring and WHO toolkit, Real time stock management tools, tracker system design guide.	Continuously updated	https://docs.dhis2.org/en/implement/health/dhis2-health-data-toolkit/about-the-dhis2-health-data-toolkit.html https://docs.dhis2.org/en/implement/implement.html https://docs.dhis2.org/en/implement/health/dhis2-health-data-toolkit/about-the-dhis2-health-data-toolkit.html https://docs.dhis2.org/en/implement/logistics/real-time-stock.html https://docs.dhis2.org/en/implement/database-design/tracker-system-design/design-objectives-and-ideation.html

3. Challenges and opportunities

Due to the recent renewal of the staff and our responsibility for organising and teaching the master's education in Digitalisation of the Healthcare sector, IS is currently at an exciting juncture characterised by several challenges as well as significant opportunities for strengthening our impact and position within ICT4D and the wider Information Systems research community:

Challenges:

1. Consolidating a renewed research group: Including six new associate professors has considerably altered the group's average age and mix of research competence and expertise. It is, therefore, a high priority to assimilate these new researchers into the group, ensure sufficient knowledge transfer and intentionally develop new synergetic relationships within the group's faculty. This challenge is currently addressed by offering new associate professors the required funding and support in developing their research skills, such as mentoring and joint efforts in developing new projects and funding proposals.
2. Ensuring relevant research in teaching: Until now, IS has maintained a strong position within research on the digitalisation of healthcare systems in the global south. As the group has assumed responsibility for the master's education in Digitalisation of the Healthcare System, which primarily addresses challenges of digitalisation within the Norwegian healthcare systems, it has become essential to ensure new synergies between research and teaching. This challenge is being addressed by developing new collaborations with partners within the Norwegian context and leveraging transferable theoretical contributions emerging from the global south in the teaching material.

Opportunities:

1. We have worked with datafication and digital platforms for several decades, while this has only recently been introduced to the IS research agenda. We can further capitalise on our globally unique large-scale approach to global health promoted by HISP/DHIS2 to strengthen and deepen our research contributions on IS related to datafication and digital platforms.
2. Diversity in expertise: The arrival of six new associate professors offers a significant opportunity to diversify the portfolio of research within the group, including a more robust engagement in critical studies on the effects of digitalisation, research directly related to the digitalisation in a Scandinavian context, artificial intelligence and large language models.
3. Opportunities for new interdisciplinary collaboration through emerging collaborations on climate health.
4. Student engagement: The education of digitalisation of the Healthcare Sector offers an excellent opportunity to continue to engage students actively in research projects, involve them in real-world projects, offer them first-hand experience, and ensure a strong link between research and education.