

Responsive Architectures for Innovation in Collaborative Healthcare Services (REACH)

1. Relevance relative to the call for proposals

This research proposal addresses two of the VERDIKT program's thematic priority areas: 1) social networks and 3) mobile internet technologies. We propose to study the challenges and opportunities for utilizing these technologies to achieve collaborative patient-centered healthcare. We see this focus as particularly relevant, as current national initiatives tend to be oriented towards supporting conventional technologies (Electronic Patient Records, message exchange, and information access) from a provider-centered perspective. Thus, as was pointed out recently by The Norwegian Board of Technology¹, technologies that allows the patient a different, more active and collaborative role have not yet been explicitly addressed by national health authorities. Currently, these technologies tend to be introduced in local projects with an ad hoc and temporary character, without strategic and long-term considerations². Within this project we therefore aim at generating relevant knowledge that may increase the strategic awareness concerning new technologies' potential for innovative, patient-centered health services. Specifically, our research focus is on the meeting of these technologies with the healthcare sector's existing digital information infrastructures, organizational forms and economic models. Successful merging of the novel with the existing technologies and service models will be crucial for enabling sustained and large-scale usage. Our research contributes to two of the VERDIKT program's scientific priority areas. Through our cross-disciplinary research approach we contribute to an improved understanding of the technological, organizational and economic challenges and opportunities for making productive use of these technologies (Scientific priority area no. 4: "Social, economic and cultural challenges and opportunities"). Secondly, by identifying core qualities of *responsive architectures*, we seek to define the infrastructural requirements for widespread and successful deployment of these novel communication platforms (Scientific priority area no. 2: "Communication technology and infrastructure").

2. Aspects relating to the research project

2.1. Background and status of knowledge

Current reforms in the health sector aim at cutting costs by reducing hospitalization time of patients in specialized hospitals, and by developing less costly follow-up care services. In this context, the ongoing Coordination reform³ of the Norwegian healthcare sector is expected to lead to significant transformations in the relations between the specialist healthcare sector (hospitals), the primary healthcare sector (municipal level), and the patients. The novel task distribution between the actors poses new requirements to collaboration and coordination. So far, the government has mainly addressed reform implementation through regulative measures⁴. However, the wished-for transformations are crucially dependent also on re-organizing the actual health service delivery, as well as on exploiting ICTs that enable communication and information access and flow across institutions

¹ Teknologirådet, 12. mai 2011: Høringsinnspill til Nasjonal helse- og omsorgsplan (2011-2015), meld. St. 16 (2010-2011)

² Exactly addressing this lack of employment of new technologies in Norwegian healthcare sector, see a recent debate article in Computerworld Norge: "Norge kan miste innovasjonsbølge": <http://www.idg.no/computerworld/helse/article208210.ece>

³ Stortingsmelding nr 47 (2008-2009) "Samhandlingsreformen. Rett behandling - på rett sted - til rett tid"

⁴ Two new law proposals and a four year national health plan were presented April 8th 2011.

and outside the hospital context. In this project we *aim at developing knowledge to understand and address the challenges of improving communication and collaboration through implementing novel ICTs in healthcare.*

Novel patient-oriented communication technologies, utilizing mobile and/or web access, have great potential in supporting healthcare systems to shift from a provider centric mode to a patient centric mode and thus offering information and access to services outside traditional hospital structures⁵. However, experience shows that, despite demonstration of clinical value and potential economic value, novel technologies are difficult to implement and utilize⁶. Research in the Information System field has revealed how novel technologies challenge and change existing work patterns, service models and organizations, and how they create tensions in the existing technological infrastructures as well as in the institutionalized legal, financial and organizational frames⁷. For instance, patient-initiated access to providers' information systems via mobile or web technologies may go against security architectures of the health care institutions, which typically state that all transactions should originate inside the secure network. A patient-initiated or needs-driven mode of communication may interfere significantly with how work is organized within hospital departments today, based on scheduled patient encounters. Moreover, the reimbursement regulations in the current activity-based financing system are not adapted to the novel communication modes and new types of service that can be offered. This implies that healthcare workers who utilize these technologies may incur economic losses for their departments and organizations⁸, as well as having professional roles and/or practices challenged⁹.

In order to increase our understanding of such tensions, we propose to study how the existing "architectures" (i.e. technological, economic, and organizational structures) impact the process of introduction of new technologies and the reorganization this entails. We plan to conduct and analyze qualitative case studies of both ongoing and emerging deployment of such novel, patient-centered technologies in Norwegian hospitals. Through a theoretically informed analysis of these case studies we will seek to delineate what constitutes "*responsive architectures*", defined as socio-technical configurations that support a productive interplay between the existing technological, economic, and organizational structures and the new, potentially different, structures enabled by new technologies.

To this end, the theoretical basis for our research will combine the respective academic project partner's analytic resources. The researchers from Department of Informatics (IFI, UiO) work within the cross-disciplinary IS field and build on an explicitly socio-technical understanding of technologies¹⁰, emphasizing how technological, organizational and social aspects are interrelated and

⁵ Goldsmith, J. (2004) "Technology And The Boundaries Of The Hospital: Three Emerging Technologies," *Health Affairs* 23:6; Sneha, S., and Varshney, U. (2009) "Enabling ubiquitous patient monitoring: Model, decision protocols, opportunities and challenges," *Decision Support Systems* 46:3.

⁶ Obstfelder, A. Engeseth, K. and Wynn, R. (2007). "Characteristics of successfully implemented telemedical applications". *Implementation Science* 2007, 2:25

⁷ Andersen and Aanestad (2008): "Possibilities and challenges of transition to ambulant health service delivery with ICT support in psychiatry". In Barrett et al. (eds.): *Information Technology in the Service Economy: Challenges and Possibilities for the 21st Century*, pp. 129-141; Ellingsen and Monteiro (2008). "The Organizing Vision of Integrated Health Information Systems. *Health Inform. J* 14(3); Hanseth et al. (2006) "Reflexive Standardisation. Side-effects and complexity in standard-making". *MISQ* 30

⁸ Kraus, K. & Lindholm, C. (2010) "Accounting in Inter-Organisational Relationships within the Public Sector", in Håkansson, H., Kraus, K., Lind, J. (eds) *Accounting in Networks*, Routledge.

⁹ Mørk, B.E., Aanestad, M., Hanseth, O., Grisot, M. (2008) "Conflicting epistemic cultures and obstacles for learning across communities of practice", *Knowledge and Process Management*, vol.15(1) pp 12–23; Mørk, B.E., Hoholm, T., Ellingsen, G., Edwin, B. & Aanestad, A. (2010) "Challenging expertise: On power relations within and across communities of practice in medical innovation", *Management Learning* 41: 575.

¹⁰ Aanestad and Olaussen (2010) "Tverrfaglig teknologiforskning" in Aanestad and Olaussen (eds.) (2010) *IKT og samhandling i helsesektoren: Digitale lappetepper eller sømløs integrasjon?*. Tapir Akademiske Forlag

even mutually constitutive. In this project, this perspective is combined with an explicit economic perspective on collaboration, which forms the theoretical basis for the work on inter-organizational innovation by researchers from the Department of Innovation and Economic Organization at the Norwegian Business School (BI). The researchers at IFI draw specifically on “information infrastructure theory”. As the name implies, the theory targets Information Infrastructures (II) - large-scale interconnected assemblages made up by multiple information systems, communication technologies, regulatory measures, organizational routines and skills¹¹. This research stream sees specific technologies not as isolated and self-standing solutions, but as elements that are introduced into an existing ‘ecosystem’¹² of sociotechnical elements. Thus the evolution of IIs happens over long time frames, through a mixture of intentionally planned, emergent and opportunistic decisions, and strongly shaped by the already existing “installed base”. The notion of installed base comes from an economic tradition, where the significant role of the existing investments was early recognized¹³. Attention to the existing structures is also significant in the BI researchers’ studies of inter-organizational innovation networks partly rooted in the Industrial Network approach¹⁴, and partly in the ‘economic turn’ of Actor-Network Theory (ANT)¹⁵ and it is conceptualized in notions such as “investments in place”¹⁶ that indicates the existing resources, and the confrontations (direct; between the new and the old) and frictions (indirect; between interdependent resources) produced in change attempts¹⁷. Further, both research groups work with notions such as path dependence/creation, lock-ins, technological trajectories, momentum, inertia and closure¹⁸.

The shared interest in conceptualizing how the existing takes part in shaping innovation thus forms the core theoretical basis for the joint project, however at the same time the two complementary theoretical approaches challenge each other. Existing II theory has seldom gone beyond describing

¹¹ Monteiro, E., and Hanseth, O. 1995. “Social Shaping of Information Infrastructure: On Being Specific about the Technology,” in Orlikowski, Walsham, Jones, and DeGross (eds.) *Information Technology and Changes in Organizational Work*, Chapman & Hall, pp. 325-343; Star, S. L., and Ruhleder, K. (1996). “Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces,” *Information Systems Research* 17(1), pp. 111-134. Hanseth, O., Lyytinen, K. (2010) “Design theory for dynamic complexity in information infrastructures: the case of building internet”. *Journal of Information Technology* 25(1); Tilson, Lyytinen, Sørensen (2010): “Digital Infrastructures: The missing IS research agenda”, *Information Systems Research* 21(4).

¹² Tiwana, Konsynski, Bush (2010) “Platform Evolution: Coevolution of Platform Architecture, Governance, and Environmental Dynamics”, *ISR* 21(4); El-Sawy, Malhotra, Park (2010) “Seeking the Configurations of Digital Ecodynamics: It Takes Three to Tango”, *ISR* 21(4). Yoo, Henfridsson, Lyytinen (2010) “The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research” *ISR* 21(4);

¹³ Farrell and Saloner (1986) “Installed Base and Compatibility: Innovation, Product Preannouncements, and Predation”. *The American Economic Review* 76(5), pp. 940-955; Schilling, M. (1999): “Winning the standards race: : Building installed base and the availability of complementary goods”. *European Management Journal* 17(3), pp. 265-274

¹⁴ Håkansson, Ford, Gadde, Snehota, Waluszewski (2009) *Business in Networks*, John Wiley; Håkansson, H. & Waluszewski, A. (eds) (2007) *Knowledge and Innovation in business and industry: The importance of using others*, Routledge.

¹⁵ Hoholm T. & Olsen, P.I. (forthcoming) “The contrary forces of innovation: A conceptual model for studying networked innovation processes”, in *Industrial Marketing Management*; Mouritsen, J., Mahama, H., Chua, W.F. (2010) “Actor-Network Theory and the Study of Inter-Organisational Network-Relations”, in Håkansson, H., Kraus, K., Lind, J. (eds) *Accounting in Networks*, Routledge; Nicolini, D. (2007) “Stretching out and expanding medical practices. The case of telemedicine”, *Human Relations*, 60, 889-920.

¹⁶ Håkansson, H. and Snehota, I. (1989): No business is an island: The network concept of business strategy. *Scandinavian Journal of Management* 5(3), pp. 187-200; see also ch.1 in Håkansson, H., Kraus, K., Lind, J. (eds) *Accounting in Networks*, Routledge

¹⁷ Håkansson, H. and Waluszewski, A. (2001), “Co-evolution in technological development: the role of friction”, paper presented at the IMP-Conference in Oslo, available at: www.impgroup.org; Hoholm & Olsen (see note 12).

¹⁸ Arthur (1986) “Industry location and the importance of history”. Stanford; David (1985) “Clio and the Economics of QWERTY”, *Am.Econ.Rev.* 75(2), 332-7; David (1986) “Understanding the economics of QWERTY: the necessity of history”, in Parker (ed.) *Economic history and the modern economist*, Blackwell. Dosi (1982) “Technological paradigms and technological trajectories. A suggested interpretation of the determinants and directions of technical change”, *Research Policy*, 11(3), 147-162; Hughes (1983) *Networks of power: Electrification in western society, 1880–1930*. John Hopkins, Bijker (1987) *Of bicycles, bakelites and bulbs: towards a theory of social technical change*. MIT press.

installed base as being either ‘enabling’ and ‘constraining’, and having “inertia” and will be in this project be confronted with more elaborated concepts such as “friction” and “confrontations” which point to more relational and transformative dynamics. Thus, in this study we aim to achieve a refined and more granular understanding of the installed base dynamics, through investigating *which organizational, technical and economic resources* are mobilized, *how* are they transformed, with *which effects*. Simultaneously, the theorizing of inter-organizational innovation networks will gain additional analytic leverage by exposing it to the complementary II theory which is more explicit on technology. Moreover, with respect to the traditional IS innovation research the proposed theoretical approach and analytical focus is challenging the dominant understanding of innovation dynamics on different levels. First, differently from much of emerging research on digital ecologies and platforms which is conducted in the business sector and around the development of new commercial products, we will investigate complex innovation dynamics in the domain of public health services. This domain differs in significant respects as it is heavily politicized, strongly regulated and information intensive¹⁹ and can be expected to require more emphasis on service innovation than on traditional product innovation. Thus, we will pursue conceptualizations that accord more attention to the scope for human agency (e.g. path creation literature²⁰, institutional entrepreneurship). Secondly, the proposed study allows us to study explicitly multi-scalar phenomena, where local technology usage, meso-level economic, organizational and technological structures, and macro-level regulation all co-exist and interact. Understanding this multilevel interplay is key to successful introduction of large-scale, collaborative health care technologies, and in our view, a lack of this understanding may explain much of the limited success of digitizing the communication in healthcare. Thus, through the application of the analytic framework to the study of the dynamics of the healthcare digital ecosystem, we gain fertile opportunities for furthering research as well as practice.

2.2. Approaches, hypotheses and choice of method

As described above, we will study the process where novel technologies are added to the already existing “installed base”. This implies a research approach that is able to encompass the role of information systems, communication channels, work practices, service models and organizational structures in the healthcare sector. In our approach, we will draw on theoretical and methodological resources from multiple research fields, including Information Systems Research, Science and Technologies Studies and Organizational theory. This inter-disciplinary domain uses a qualitative, field-work oriented and interdisciplinary approach with which the core researchers taking part in this project are already familiar. We will conduct qualitative studies of ongoing activities within the partner hospitals to document and analyze the experiences of introducing novel ICTs and associated service models to link specialist healthcare, local healthcare and patients more closely. The case studies are designed to be longitudinal over a three year period, as we seek to understand the unfolding of a complex and slow paced phenomenon (i.e. introduction of novel technologies and emerging dynamics of existing installed base), and exploratory in nature, as we aim at exploring a phenomenon that is not well understood. Our project partners, OUS and Sunnås Hospital will ensure access to empirical cases. Case studies will be developed both in form of individual cases as well as used for comparative analysis. The cases are selected as they offer the opportunity to study different facets in processes of implementation and use of novel technologies in existing care practices. Specifically, case 1 deals with the redesign process of the ICT architecture in OUS, case 2 deals with the use of new devices to

¹⁹ Contini and Lanzara (2008): *ICT and Innovation in the Public Sector. ICT and Innovation in the Public Sector*. Palgrave Macmillan.

²⁰ Garud, R. & Karnøe, P. (2001) *Path Dependence and Creation*, Mahwah, NJ, Lawrence Erlbaum Associates

support novel patient-hospital collaboration models, case 3 deals with a flexible web-based technology that is offering a variety of services for patients in their interaction with OUS, and case 4 deals with the need to redefine the information flow in a newly redesigned handover process in which novel technologies are expected to play a key role. Responsible researchers, case characteristics, and core challenges are summarized in the following table:

Case study	Type of health service initiative	Installed base aspects	Core challenge
1. ICT architecture (Resp.: prof. Ole Hanseth, IFI)	Process of redesign and reconfiguration of the ICT architecture at OUS	Many and diverse existing information systems in use and existing ICT architecture	Integration of multiple existing, different information systems, implementation of new elements, and design strategy of ICT architecture
2. Novel collaboration models for patient-hospital interaction (resp.: Prof. Margunn Aanestad, IFI, with IFI PhD)	Use new communication technology (videoconference, secure email, access to existing information) to support e.g. rehabilitation process in the home. Improved collaboration with municipal teams, home based care, and patients in homes	Existing economic models not feasible. Technological barriers against extending secure communication to patients' homes	Design devices (in conjunction with OUS) that offer the patient at home a suitable, stable and secure multichannel interface for communication. Develop new service models (organizational forms, work practices etc)
3. MinJournal (resp.: PhD Miria Grisot)	This generic and modular tool (developed by OUS) can offer a patient interface to existing information, secure email. It can also support redistribution of tasks between health workers and patients (for instance information collection, analysis, distribution etc).	Achieve adequate linkage to internal hospital information infrastructure. Redesign of internal information-related work processes and of communication patterns.	Organization of clinical departments process redesign. System level: how to reuse modules, and manage the dynamics of differentiation and scaling.
4. Aker Hospital (resp.: PhD Thomas Hoholm, BI with BI PhD student) - closely linked with the CHISO activity	Develop new intermediary organizational forms that help collaboration and patient handover processes (Aker hospital as collaborative arena between Oslo University Hospital and Oslo Municipality)	OUS and Oslo municipality has existing, different information systems, routines and practices	Process of identifying appropriate technology support and organizational form within economic context. The adaptations of existing information and documentation tools and practices

These four longitudinal case studies will be conducted to document two main processes, the installed base response and the process of introduction of new technologies, and to arrive to the identification of the core qualities of responsive architectures. Specific research questions will guide our research in each dimension:

1. *Installed base response*: the focus on 'installed base responsiveness' helps us identify the preconditions for innovation related to the existing information infrastructures (i.e., to what degree current technological, organizational and economic structures are 'responsive' to future innovation). Central research questions under this theme include:
 - a. Which technological, organizational and economic structures constitute the installed base? What is their interplay?
 - b. Which main technological, organizational and economic aspects have influenced the shaping of the installed based?

- c. To which degree are these technological, organizational and economic structures open to change by local/organizational actors? To which degree are they defined outside the organization, and by whom?
2. *Process of introduction of novel elements*: studying the process of introduction of novel technologies help us identify approaches during which the transformative potential of new tools, solutions and service models can (or may not) be productively realized. Central research questions here will be:
 - a. What are the characteristics and the technical demands of the considered novel technologies? How are they selected and introduced?
 - b. Which changes and transformation of the existing care practices do they stimulate or require? And how do these changes play out? How radical are they?
 - c. Which new organizational forms they enable or require? And which economic models can work with them?
3. *Qualities of Responsive architecture*: based on the case experiences and the findings from research conducted according to the previous questions we will then seek to identify core qualities of responsive architectures and to define how should the installed base and the new technologies be co-configured so to create a productive interrelation. Central research questions here will be:
 - a. Which productive interplay (between new/old) can we find in the case studies?
 - b. Which resources are mobilized in the transformative process in the case studies?
 - c. What are the effects of the transformative process emerging from the interplay between the old and the new?

The longitudinal case studies will be approached with the same research questions to make possible comparison across cases and to contribute to a solid theoretical development²¹. Data collection will employ ethnographic research methods such as interviews, observations, and document analysis²². Fieldwork and data gathering will be tightly interwoven with data analysis and will be carried over the whole case study period. In the analysis the hospital partners and the international partners will also be involved to provide questions, comments, and directions to the ongoing processes both within each case and across cases.

Our approach to case study research will be interpretive²³, with the purpose to generate descriptions and explanations of events in order to understand an increased insight of the phenomena under study. While the interpretive approach is said to provide understandings rather than prescriptions, we will in this project aim in addition at formulating guidelines and directions for managers. Based on the project activities in drawing together the insights from these case studies, we will seek to formulate a better understanding of the dynamic interplay between old and new and to define core qualities of *responsive architectures*, i.e. technological, organizational and economic structures that manage to incorporate the existing and the novel technologies in a productive way. This is relevant for practitioners seeking to achieve change in the context of existing conservative forces.

²¹ Eisenhardt, K. M. (1989). Building Theory from Case Study Research, *Academy of Management Review* Vol.14, No. 4.

²² Myers, M.D. (1999). "Investigating information systems with ethnographic research", *Communication of the AIS*, Vol2; Hoholm, T. & Araujo, L. (2011) "Studying innovation processes in real-time: The promises and challenges of ethnography", forthcoming in *Industrial Marketing Management*; Hammersley, M. & Atkinson, P. (1995) *Ethnography: Principles in practice* (2nd ed.), London, Routledge

²³ Walsham, G. (1993). *Interpreting Information Systems in Organizations*, Wiley, Chichester.

We will ensure the quality of our research approach by attending to the evaluation criteria for conducting interpretive case study identified by Klein and Myers²⁴.

2.3. The project plan, project management, organisation and cooperation

2.3.1 Project plan

The project implementation will be organized as concurrent empirical case studies conducted by individual researchers, where the PhD students will collaborate with more experienced researchers. We will organize regular project group meetings, and a 3-monthly cycle of reporting from the case studies as integrative activities to link the empirical activities together. These three-monthly reports will be thematic (theme to be interactively selected within project). Every year, a preliminary sum-up of the empirical and analytic work (across all cases) will be presented to the hospital partners, and an open seminar will be organized to present the project's preliminary findings. When preliminary results from the research activities start to emerge, the activities related to theory building are stepped up, and together with dissemination, constitutes the major activities during the latter part of the project (Month 36-48), where also the international partners' role increases.

(See also milestones in web form)

2.3.2 Project Organization

The project will be administratively located at the Department of Informatics (IFI), University of Oslo. The PhD students will be enrolled in the doctoral programme either at IFI or BI. The project will be coordinated and managed by a management group consisting of prof. Margunn Aanestad (IFI, project leader), prof Ole Hanseth (IFI), postdoc Thomas Hoholm (BI), postdoc Miria Grisot (IFI), and postdoc Bjørn Erik Mørk (IFI/BI). The senior researchers have previously collaborated on empirical projects and in scientific publications. They have their backgrounds from Informatics (Aanestad and Grisot) and Innovation Studies (Hoholm and Mørk) (see CVs), and so make a team that complement each other with their different disciplinary (theoretical and methodological) emphasizes. At the same time as they also share a position in the intersection of these research fields. The Project Management group will collaborate closely and meet on a regular basis. Prof. Margunn Aanestad will be Project Manager and track progress of activities, maintain collaboration within the team and be responsible for reports and deliverables to the Norwegian Research Council. The Project will make use of an External Scientific Advisory Board, consisting of prof. Eric Monteiro (NTNU/IFI), prof. Håkan Håkansson (BI), assoc.prof. Per Ingvar Olsen (BI), prof. Bendik Bygstad (NITH), prof. Gunnar Ellingsen (UiT), and prof. Ola Henfridsson (Viktoria, SE). This group is intended to contribute to improving the scientific quality of the research output, give input on strategic decision making, and help strengthening the international visibility and strategic positioning of the consortium.

Interaction among the researchers will be ensured through a variety of measures: (i) regular seminars within IFI and BI for the project participants (PhD students, researchers and master students if any), aimed at reading appropriate literature and discussion of work in progress; (ii) monthly seminar, jointly organized by IFI/BI for the project participants; (iii) quarterly project meetings open to partners and other interested; (iv) three two-days' research workshops (Learning forums) with international partners. The aim of these seminars is ongoing dialogue around preliminary findings and project progress; (v) exchange of PhD students with international partners; (vi) yearly meetings with

²⁴ Klein, H.K. and Meyers, M.D. (1999). A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems, *MIS Quarterly*, Vol.23, No.1

scientific advisory board. In addition, we will establish a project website and a mailing list, as well as a shared workspace to serve as a common repository for preliminary results and working papers.

The project activities are part of a strategic initiative within all partner institutions, and the activities in this project will be aligned with other ongoing research activities. The project will work in close alignment with the recently funded VERDIKT innovation project at the Interventional centre at Oslo University Hospital (KINT, project no. 210511) which deals with challenges of ICT and innovation in healthcare. There are also several current initiatives where funding is sought for R&I activities. Two project applications are submitted to Helse and Omsorgs-programmet: a research application from BI with Oslo University Hospital (OUS) and IFI as partner (CHISO) and one innovation project oriented towards technologies for home-based care, coordinated by Sunnås hospital and including OUS as partners. While the former proposal constitutes complementary research in novel institutional forms for collaboration, the latter proposal presents rich opportunities to study the ongoing design, development and introduction of the kind of solutions we aim to study here, and is listed as case no. 2.

2.3.3 International Partners

International partners have been selected for their knowledge and experience in the interdisciplinary field of IS on organisational and social aspects of ICT, and experience in conducting research in the healthcare context. We have aimed to select partners that have current research activity and updated research orientation, as our focus on novel technologies demands. The following partners have confirmed an intention to actively participate in the project:

Name and Position	Affiliation	Competence	Contribution
Dr Michael Barrett <i>Reader in Information Technology and Innovation</i>	Cambridge Judge Business School, UK.	Organizational change, inter-organizational systems, innovation	Involvement in the conduction of one case study, contributing to case analysis and theory development
Dr Ela Klecun <i>Lecturer in Information Systems</i>	Dept. of Management, London School of Economics and Political Science (LSE), UK	Evaluation, telehealth, policy	Contribute to case analysis and theory development
Dr Tina Blegind Jensen <i>Associate Professor</i>	Department of Informatics, Copenhagen Business School, DK	Implementation, org. change, health information infrastructures	Active involvement in case studies conduction, case analysis and theory development
Dr. Teun Zuiderent-Jerak <i>Associate Professor</i>	Department of Health Policy and Management, Erasmus University, Rotterdam, NL	Health policy, evaluation, innovation, STS	Contribute to case analysis and theory development
Prof. Davide Nicolini <i>Professor co-director of Warwick Institute of Health</i>	Warwick Business School, UK	Practice-based studies of knowing, learning and change in organizations	Contribute to case analysis and theory development
Prof. Luis Araujo <i>Professor in Industrial Marketing</i>	Lancaster University Management School, UK	Inter-organizational interaction, supply networks, innovation. Actor-network theory, industrial network theory	Contribute to case analysis and theory development
Prof. Johnny Lind <i>Professor in Management Accounting</i>	Dept. Accounting, Stockholm School of Economics, SE	Accounting in networks, public and private sector	Contribute to case analysis and theory development

Prof.C-F Helgesson <i>Professor</i>	Dept.Technology and Social Change, Linköping University, SE	Medical knowledge (trials, guidelines, etc) and economic organization in healthcare (STS).	Contribute to case analysis and theory development
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2.4. Budget

Budget information can be found in the grant application form

3. Key perspectives and compliance with strategic documents

3.1. Compliance with strategic documents

The proposed project is in line with objective 3 of the strategic plan of UiO (“Strategy 2020”) which emphasises the focus on employment of research-based knowledge to address major challenges in today’s society. Beyond the primary orientation towards furthering academic research on large-scale and complex information infrastructures (their design process, architectures and governance mechanisms) the Project has a national orientation and seeks to contribute to practitioners within healthcare, strategic management, policy making. Similarly, BI aims at expanding its research on the health sector and be at the forefront in understanding innovation processes in complex inter-organizational networks.

3.2. Relevance and benefit to society

Knowledge that may contribute to a better utilization of technology in healthcare is of large societal value, both in Norway and internationally. Failed implementation projects, lack of benefits realization of already implemented solutions, and delayed utilization of novel technologies generates both significant costs and lost “income”. The project’s studies on the enabling or constraining role of existing information infrastructures will develop knowledge and understandings that contribute to guiding interventions that make this interplay productive. The notion of “responsive architectures” and the insights on appropriate governance mechanisms are of general relevance for information infrastructures within all domains, both commercial and public sector. Specifically, our research will also contribute to a better understanding of patient-centred service provision and may contribute to an improved patient-healthcare system relation.

3.3. Environmental impact

No extra-ordinary environmental impacts are expected from the research activities in themselves. The proximity of the partners (IFI and BI) reduces the need for travels within the research project itself. Moreover, the visions associated with improved use of ICT in the health sector stipulates digitisation of the previously paper-based information flows, reduction of transportation and general improvement of work process efficiency. This is expected to generate significant environmental effects.

3.4. Ethical perspectives

The researchers are obliged to comply with the requirements to ethical conduct of research as stipulated by Norwegian law, of which informed consent by study objects is a cornerstone. Depending upon the concrete project activities, the researcher will need permission from the regional committees for medical research ethics (REK), the Norwegian Social Science Data Services (NSD), or other entities. Within the academic institutions, issues of appropriate research conduct and integrity are discussed both in research methods courses and in group plenary seminars (e.g. the bi-annual Research

Days or the PhD days in the GI/IFI group). We further seek to perform our research in a transparent and accountable manner. Our research methods hinge upon close collaboration with our research objects, and thus the reliability, relevance and accountability of our research is strengthened.

3.5. Gender issues (Recruitment of women, gender balance and gender perspectives)

The University of Oslo considers gender equality a strategic matter, and the University's strategy plan "Strategy 2020" and associated Gender Equality Action Plans will govern the work. The current proportion of women in the GI/IFI group (the major applicant) is 24 % for PhD students (10 females out of 42 PhD students in total), and 40 % (9 of 23) of PhD students graduated since 2006 were women. Also, 75% among postdoc/postgraduate employees are women, and 28 % among the faculty (2 of 7 professors). We assess the organizational culture and the working and learning environment as being conducive to women, and will seek to maintain this. Among the central researchers and partners the gender distribution is approximately equal, and we will seek to maintain this by actively encouraging female applicants to the announced positions in the project.

4. Dissemination and communication of results

4.1 Dissemination plan

(The dissemination plan is included in the grant application form)

4.2 Communication with users

The qualitative case studies are conducted to document the challenges and opportunities emerging when the partner hospitals seek to integrate novel technologies into the existing ICT infrastructures. We seek to document these experiences and disseminate our results also to interested practitioners, and plan to arrange open seminars. Such seminars will be coordinated with the other ongoing research projects within this area. It seems relevant to collaborate with the existing innovation networks and actors²⁵ established within the health regions, both the formally appointed and the user-driven, emerging, and less formal communities of health workers interested in e-health technologies²⁶.

²⁵ E.g. the "Clinic of Ideas" at Oslo University Hospital.

²⁶ E.g. the activities following from the "Telemedisin Arena" in Helse Sør-Øst, see e.g. <http://telemed.custompublish.com/presentasjoner.4899478-181703.html>