TROMSØ TELEMEDICINE LABORATORY

Centre for Research-based Innovation

Established by the Research Council of Norway

Tromsø Telemedicine Laboratory - Annual Report 2009

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1. Summary

Tromsø Telemedicine Laboratory (TTL) is a Centre for Research-based Innovation (CRI) built around the cluster of companies and institutions making up the telemedicine and eHealth research and innovation community in Tromsø. Some of the institutions have been involved in telemedicine and eHealth for as much as twenty years.

TTL has now been in operation for three years. In 2009 the project portfolio focused on research problems and projects within mathematics/statistics, medical informatics and information systems.

TTL is located in the premises of the host partner, the Norwegian Centre for Integrated Care and Telemedicine (NST) at the University Hospital of North Norway (UNN HF), located in the Research Park in Breivika, Tromsø, Norway.

The telemedicine R&I community in Tromsø includes approximately 300 persons, including students and employees working with telemedicine in the partner companies of TTL. The activities of these partners are internationally oriented and comprise collaborating partners in many countries.

The main focus of TTL is on providing research that supports the development of technologies for personalised health, empowering elderly and people with chronic and lifestyle related diseases to manage their own lifestyle and health in order to unload the pressure expected to come on the healthcare services in the future, and enable treatment at the lowest effective level of care.

The research is based on three main research areas with medical informatics as an overall foundation:

- Medical Informatics
- Mathematics and statistics
- Computer-Supported Cooperative Work

Most of the 15 projects running in TTL feature contributions from more than one of the research groups.

In the third year of TTL, the centre consolidated the research groups and tigthten projects' research focus. In addition, innovation study and development of business plans for some of the projects have been completed.

In 2009 the first PhD student from TTL defended his thesis. Erik Årsand has together with the Lifestyle group developed a tool for mobile diabetes management which will go into a large scale clinical trial funded by EU. This innovative research project will be linked up to a commercialization process.

2. Visions and Goal

The Tromsø Telemedicine Laboratory's vision is to become a world-leading centre for research and innovation in the field of advanced telemedicine and eHealth systems for chronic, age, and lifestyle related diseases.

The centre aims at supplying the healthcare industry with viable and sustainable technologies that will promote global health, wellness and disease management by facilitating technological advances in the collection, processing and sharing of medical information. These will generate new products and services, as well as improved processes and workflow, within telemedicine, eHealth, and provision of health care services in general.

2.1 Research Goals

The following short-term goals were defined in the TTL application for the first 2-3 year period (2007-2009):

- Establish a secure and configurable mobile patient terminal.
- Establish a secure and configurable residential eHealth/eCare gateway and platform.
- Construct a demonstrator of an electronic health surveillance system based on input from sensor-based systems.
- Proof of concept for a fully automated system for melanoma detection based on images from a pocket dermascope and a digital mobile phone camera.
- Design a statistical analysis method that can detect changes in the blood glucose level caused by infectious diseases.
- Establish a platform for investigating messaging systems that blend into users' home and are easy to use for the target population.
- Establish work-oriented design conditions for integration of information sources from different levels of health services.

The research will be published in relevant international journals and at international conferences.

2.2 Administrative Goals

The administrative goals for 2009 were:

- Work with the Board of Directors in preparing strategies and policies for TTL
- Improve the infrastructure for the projects and research groups
- Continue to support the ongoing projects
- Provide administrative support for project managers, partners, and researchers
- Establish collaboration tool across platforms and institutional boundaries – while maintaining security and protection of intellectual property rights
- Strengthen Partner commitment to TTL
- Establish reporting routines with all partners and the administration at NST
    - Reports to the Research Council of Norway
    - Reports to the Board of Directors
- Develop success criteria for innovation to be presented to the Board

3. Research Plan and Strategy

Research activities have taken place in projects organised owned by a partner or as part of the overall research portfolio. All PhD projects are currently organised with a main supervisor at the University of Tromsø (UiT).

- Research Manager: Prof. Gunnar Hartvigsen, UiT, the Faculty of Science and Technology, Department of Computer Science, Medical Informatics & Telemedicine Group

The research is further organised into three research groups, each with a research coordinator:

- Medical informatics; coordinator: Prof. Gunnar Hartvigsen
- Mathematics and statistics; coordinator: Prof. Fred Gotliebsen, UiT, the Faculty of Science and Technology, Department of Applied Mathematics
- Information systems; coordinator: Assistant Prof. Gunnar Ellingsen, UiT, the Faculty of Health Sciences, Department of Clinical Medicine

The project portfolio was further organised into five main topics, with contributions from one or more of the research groups, and one or more partners involved. This organisation is dynamic and may change throughout the CRI-period.

- Integrated Medical Sensors
- Health Terminals for Personalised Health Care
- Health Intelligece
- Computer-Aided Diagnoses
- Workflow Management

3.1 PhD School

As the research at TTL is multi-disciplinary, it is important to build a common overview of the research and to bring the students together. To avoid the risk of fragmenting the research groups and projects the Board of Directors decided to organise the research and education as one common PhD School in telemedicine and eHealth. The PhD School is expected to support innovation and collaboration across the disciplines and perspectives of the different research projects.

In addition to some common activities, each research group is organising seminars within their field. The Medical Informatics Group has regular meetings and discusses papers and review work from group members, but also from the international research literature. Senior researchers and postdocs are invited and regularly participating in these meetings.

The applied mathematics group are also collaborating closely. The Information Systems group have organised regular meetings discussing theories and methods relevant for their research.

Some students participate in more than one group.

Student Forum

One of the immediate results of the PhD School is the establishment of a student forum. So far the student forum has helped organise events and has given the students a way of organising input to the administration and the Board of Directors.

The PhD school and gathering of the students in the TTL location in the Research Park (Forskningsparken) seems to give the wanted effect of belonging and a sense of community.

3.2 Innovation

The Board of Directors has spent some time to discuss innovation and how TTL can ensure a process where the results and knowledge from the research is fed into innovation processes. One of the aspects of innovation in healthcare is to improve processes and workflow.

The activity regarding the Melanor-project has resulted in the process of developing new methods to segment elements in picture of moles. There has been initiated an activity to look at the possibility to make a system, based on the same method, to simplify the segmentation of pictures in the planning of cancer radiation. This activity is a possible innovation off-spin of the melanoma project.

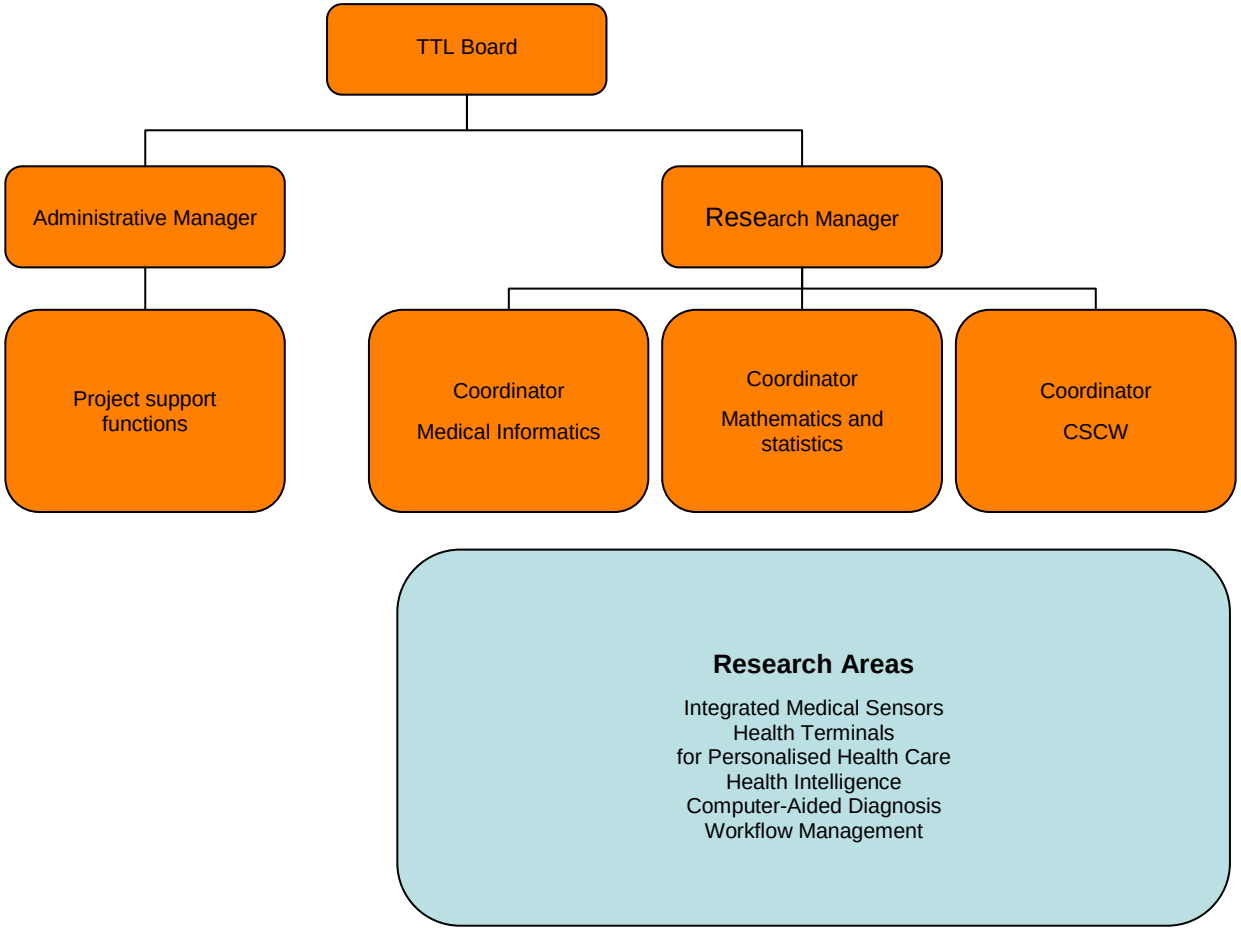
The Lifestyle Tool developed by Telenor, is a product that will help people to be more physically active. This product is almost ready to be put on the market as a Facebook-service, and it is also considered to establish a company to market this product further on. A standalone version has been tested during fall 2009 with very good results.

In collaboration with TTO Nord AS and Norinnova AS, TTL participated in the UNN-KA project funded by FORNY where new and faster methods for commercialization of research results was developed and tested. A SCRUM inspired methodology was used on 4 TTL projects for early detection of potentials for business development. The project brought a stronger focus on innovation for TTL and TTO Nord supported TTL with an innovation officer.

In 2009 TTL started a close cooperation with the Master students in Business development and entrepreneurship (BCE) at UiT. Students investigated the potential for commercialization of the Melanor and the Lifestyle project. Two students were also hired for summer job where different business models were further explored. A request for funding from FORNY Verification grants was send but rejected.

4. Organization

4.1 Structure



4.2 Board of Directors

Board Members 2009

- Lars Vorland, Chairman of the Board of TTL, Managing Director, Northern Norway Regional Health Authority
- Toralf Hasvold, Vice Chairman of the Board of TTL, Manager for the Norwegian Centre for Integrated Care and Telemedicine, University Hospital of North Norway
- Sigurd From, Member of the board of TTL, Research Manager, DIPS ASA
- Morten Thorkildsen, Member of the Board of TTL, Country Manager, IBM Norway AS
- Lars Vognild, Member of the Board of TTL, Researcher Manager, Northern Research Institute Tromsø
- Trond Are Bjørnvold, Member of the Board of TTL, Telenor R&I
- Trygve Deraas, Member of the Board of TTL, Research scholar, University of Tromsø

Deputy Board Members 2009

- Finn Henry Hansen, Helse Nord RHF
- Richard Wootton, NST
- Bengt Olsen, DIPS ASA
- Tore Havre, IBM Norway AS
- Ellen Brox, NORUT IT AS
- Lilly Ann Stensvold, Telenor R&I
- Svein Tore Jensen, UiT

4.3 Managers

- Research Manager: Professor Gunnar Hartvigsen, Computer Science, UiT
- Administrative Manager: Per Hasvold, NST

4.4 Senior Research Staff

The host institution managed to recruit Richard Wootton, a world leading professor in telemedicine, as Head of Research & Innovation. Prof. Wootton is expected to bring a substantial contribution to the research quality for TTL and has aimed for a more clinical relevant focus with closer cooperation with the rest of the University Hospital of North Norway.

(See Appendix 1 for a complete listing of the involved research staff).

4.5 TTL Partners

Norwegian Centre for Integrated Care and Telemedicine

University Hospital for Northern Norway Trust (UNN HF) (Host)

NST expects that TTL projects will result in research-based innovation for new telemedicine and eHealth services. TTL projects will lead to new health services that use integrated medical sensors with wireless and ubiquitous communication with different health terminals.

The research results from TTL will fuel research and innovation activities at NST, as well as provide a foundation for the advisory services offered by the NST in its role as a national centre of competence. NST is already benefitting from the raised levels in the quality and quantity of publishing in TTL.

UNN believes that by participating in TTL new knowledge will be obtained in how to improve the quality of treatment by means of an integrated out-of-hospital data acquisition system and how to

reduce work-intensive screening and follow-up of large patient groups generated from these systems.

During 2009 UNN went through an overall reorganization process that also affected NST. In the reorganization, NST was merged with three other departments, bringing NST closer to the clinical activities of UNN and increasing the staff from 100 to approximately 200.

http://www.telemed.no, http://www.unn.no

University of Tromsø (UiT)

Based on UiT's participation in TTL the research in telemedicine at UiT has strengthen as well as the relationship to UNN/NST and industrial partners. Through extended international cooperation in TTL, UiT have established strong international connections to leading research groups in telemedicine and medical informatics. Through a unique cooperation with industrial partners, we expect that research ideas and projects that origin from UiT to a larger degree will find their way to new industrial innovations and products.

Two Faculties at UiT are involved in the TTL projects: The Faculty of Science and Technology and the Faculty of Health Sciences.

http://www.uit.no <http://www.uit.no>

Helse Nord IKT

TTL will meet our need to explore different ways to utilized the total resources in a more efficient way, and bring the healthcare system closer to the patients. The clinicians will gain simpler and more uniformed access to information of his or her patient through a patent-centric architecture, and not application-centric architecture as today. This will improve workflow, cooperation and follow-up of patients outside the hospitals.

TTL and Helse Nord IKT will do research on dynamically updated, cross-institutional, patient-centric, multi modal information systems. An important aspect is to include the patient as a source of information. The innovations will prepare the ground for new products like IT supported evidence based medicine systems on an individual and epidemiological scale.

http://www.helse-nord.no

IBM Norway AS

IBM wants to bring together healthcare expertise, best practices, innovation and leading edge IT technology to handle the most challenging issues within healthcare.

One of the most exciting healthcare initiatives found in this sector, is the research carried out at Tromsø Telemedicine Laboratory. The laboratory focus on areas that fits well with IBM's smarter healthcare vision, which we believe will have a massive impact on the future of patient treatment, as well as on society as a whole.

Our contribution will provide efficient collaboration tools and hardware solutions, in addition to our competency and support related to smart healthcare technology. IBM and TTL are also exploring how we can share experience, solutions and research between TTL in Tromsø and IBM's Global Centre of Excellence for

Health in La Gaude, France. TTL represents a cross disciplinary consortium, which combines academia, healthcare institutions and complementary suppliers who share the same vision of a smarter planet. We are pleased to support TTL as an industrial partner.

http://www.ibm.com/no/

Telenor Corporate Development

The core business of Telenor Group is telecommunications. Telenor provide voice, data, content and other communication services in 14 countries across Europe and Asia. The Telenor Group is dynamic and flexible in its business approach, always exploring new markets and new technologies to make long-term investments.

The Department of Corporate Development is an innovation hub for the Telenor Group. With three locations in Norway and a satellite in Kuala Lumpur, Malaysia, the department employs people from more than 20 countries. We were the initiators of telemedicine in Tromsø and have for many years been an active partner in the development of this field. As TTL targets innovative solutions to health care challenges, it is natural for us to participate in the consortium.

http://www.telenor.com

Northern Research Institute, NORUT Tromsø AS

Norut has been involved with technological e-health research since 1990, focusing the last years on personal health technology, serious games and exergames for health purposes, and social web and medicine 2.0. We have been working together with several of the TTL partners through the years, and is convinced that a long term partnership between industry, R&D and health-providers in TTL will lead to highly innovative technologies and services – both for the individual citizen and for all the actors in the health care sector.

Norut believe there will be a huge marked for personal health-care technologies and services in the future. Developing solutions that are easy-to-use, open and flexible, and affordable will be a vital factor for the success. Within TTL we will aim at making personal health-care technology and services that involve all levels of health-care, and provide the individual with novel and rich health services tailored to each person's needs and profile.

http://www.norut.no

DIPS ASA

Participation in TTL enables DIPS to get valuable knowledge on the design of systems for improving patient flow through effective and secure interaction between the different levels in healthcare. These systems have to interact with a large base of existing hospital-based information systems, as well as possible new products developed in TTL

DIPS are a leading eHealth Company in Norway. To develop its position they need to be in the forefront when developing the new version of its "Care Plan system" Through the TTL consortium DIPS gets the unique opportunity to work closely together with researchers and the University Hospital of North Norway (UNN) in creating the "Care Plan system" for the future.

Developing a new "Care Plan system" based on standard classification is also necessary to be able to penetrate the foreign

market for DIPS. This innovation will enhance the potential to establish DIPS abroad. In addition this will strengthen DIPS' position in Norway.

http://www.dips.no

Norwegian Health Net SF (Norsk Helsenett SF)

TTL is expected to develop new telemedicine services, based on new technologies, and offered in residential and mobile surroundings where such services are not presently available.

It is the Norwegian Health Net's ambition that the current national health network should be extended and adapted to incorporate these new service aspects. Project participation might provide an opportunity for the Norwegian Health Net to become more proactive with respect to evaluation and introduction of new service elements into the health network.

Demographic changes and patient empowerment is projected to change many aspects of today's health services. Some of these changes concern the way services are delivered, the environment services are delivered in, and the communication technologies involved in the service deliveries.

The TTL projects have the potential to serve as an "early warning system" for the Norwegian Health Net, providing indications of development trends and maturing services and technologies. This will contribute to the Norwegian Health Net's ability to adapt its service portfolio to match the changes in requirements from the organizations connected to the national health network

http://www.nhn.no

4.6 Collaboration between partners

The most important instrument for collaboration in TTL has been participation in the research projects. Several of the partners have one or more PhD or Postdoc projects working on research related to fundamental problems or to the development of new products, services, or processes for the partner.

An important element in the consortium agreement between the partners was to regulate the ownership of intellectual property. The current structure allows a high degree of openness and collaboration between the partners.

In addition, TTL has staged research seminars and workshops on specific topics, and the partners are invited when there are visiting lecturers or other arrangements that may be of interest.

During 2009 TTL held several internal forums to further collaboration between the students, researchers, and partners. The most important forum is the student forum, as this has brought together the student across the research groups and partners, and given them a stronger voice towards the Board of Directors and the Administration.

The administration has worked to establish a collaboration tool for sharing documents, project management, instant messaging, and resource overview. Unfortunately, this work has run into technical problems, and is delayed into 2010. The collaboration tool is expected to provide an important platform for collaboration and awareness of activities, as well as providing an arena for internal blogs and exchange of ideas.

During 2009, Telenor ends their activities regarding the Lifestyle Tool within the TTL, and they will in 2010 make some changes of theme for their participation in TTL.

IBM has contributed with the installation of a joined collaboration tool, which will be ready in 2010, in addition to concrete research contributions to the Lifestyle/diabetes project. Arrangements for establish collaboration between TTL and IBMs Global Healthcare Center of Excellence in La Gaude in France is initiated.

DIPS ASA has positive experiences with their PhD students with part-time positions at DIPS, and they have developed a working model where knowledge from the research front is transformed to DIPS. This has contributed to a significant research focus as basis for their development of products.

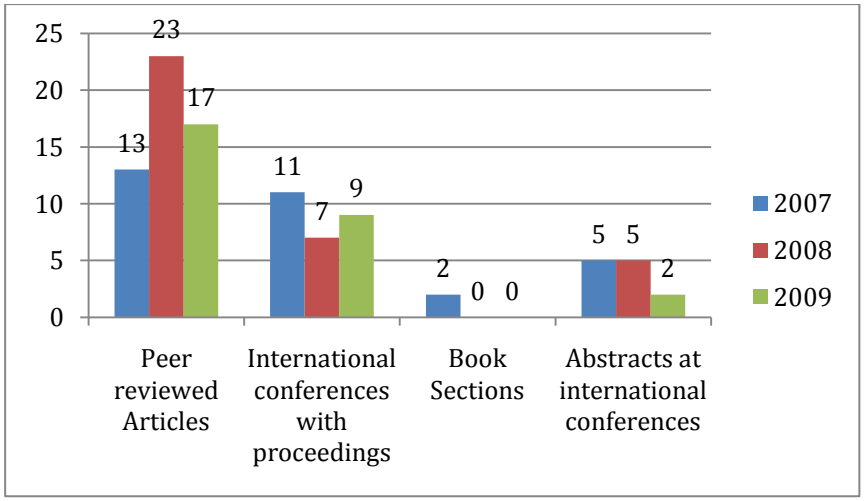
The host institution NST/UNN has been through a significant re-organization process, but does now have a clearer research focus through the establishment of a research department. This will probably enhance the activities in TTL and make the results from TTL go faster from research into implementation to the health care sector. The projects and results from TTL creates important pieces in the strategy and plans for larger priority areas for the use of ICT for collaboration between the units at the University Hospital of Northern Norway and towards the municipalities.

5. Research Activities and Results

Research results	2007	2008	2009
Peer reviewed Articles	13	23	17
International conferences with proceedings	11	7	9
Book Sections	2	0	0
Abstracts at international conferences	5	5	2

Cooperation with master students within entrepreneurship has given an exciting input on different business models for the Few-Touch-application which is developed in the Lifestyle/diabetes project. This project does now have contracts regarding deliveries to EU-projects and other research projects next year, which gives exciting possibilities for innovation and actually implementation of products and services.

The scientific production is according to the plans with four post docs and 17 PhD students, where the first one defended his thesis in 2009. TTL published 26 scientific papers and conference proceedings.



6. International Collaboration

Extensive international collaboration is common and necessary for small research communities.

Many of the TTL partners are used to collaborate with international partners through EU projects, academia, standardisation work, WHO, etc.

During 2009 some of the partners have established new relations to international communities and institutions through the projects or dissemination work at TTL.

The students are encouraged to seek a stay abroad as part of their research work. The administration and the Board have worked on defining the terms and conditions for such stays. The students fully funded by TTL are likely to seek stays abroad in 2010.

The project MyHealthService has been establishing cooperation with students and researchers in Spain (especially ITACA in Valencia), and the project has been growing according to EU-projects; Better Breathing; IS-ACTIVE; JOIN-IN.

TTL also succeed in getting external financing for the Lifestyle-project through Renewing Healht (EU). In addition, Helse Nord RHF has financed, a post doc (CCPD) and also financed Diastat which starts in 2010. Both these projects are part of the diabetes area.

(See Appendix 1 for a complete overview of TTL's international collaborations).

7. Recruitment

2009 has been a year focusing on scientific work and innovation. All positions are filled and there has not been much new recruitment. Stein Olav Skrøvseth has replaced Heidi Nilsen as Research manager for Mathematics and statistics. Stein Olav comes from NTNU with a PhD in Theoretical Physics.

6.1 Gender Equality

The goal set by the Board of Directors is to have at least a 40/60% gender distribution. Of the TTL or partially TTL funded PhD candidates we have a 50-50-gender distribution. In total, TTL has 33% female and 66% male PhD candidates.

8. Communication and Dissemination

The most important communication and dissemination channel is through the publications and the participation of researchers and staff at TTL in conferences and patient societies.

Communication of results	**2007**	**2008**	**2009**
Other publications	72	58	56
Popular science	10	16	5
Mass media	58	35	16

In addition, the website (http://www.telemed.no/ttl) provides an important channel for general information and an overview of research activities and publications.

An information strategy has been developed and approved by the board.

The annual report for 2008 was revised as an information brochure in 200 copies that were spread through the administration and the partners. The brochure was well received and will be revised and updated for 2009/2010, but emphasis will now be on a version more suitable for downloading from the web and for reading on a computer screen.

TTL is, through NST and UiT, present and active in the Resource Network The Wireless Patient (Trådløs Pasient). NST and the TTL consortium were, together with Sintef and the Intervention Centre at the University Hospital of Oslo (Rikshospitalet), responsible for organising the pHealth conference in Oslo in June 24.-26. 2009.

http://www.sintef.no/Projectweb/pHealth2009/

Appendix 1 Personnel

Key Researchers

Name	***Institution***	***Main research area***
Researcher Tatjana Burkow	NST	My Health Service
Researcher Stein Olav Skrøvseth, PhD	NST	Melanoma prosjektet
Thomas Schopf, MD	NST	Melanoma prosjektet
Prof. Richard Wootton, PhD	NST	All of NST/TTL projects
Professor Gunnar Hartvigsen, PhD	UiT, NST	Head of TTL
Assoc. Prof. Ole Heljesen	Aalborg University, Denmark	The ICT lifestyle and health motivation project
Signe Vikkelsø	Copenhagen Business School, Denmark	Designing DIPS nursing plans
Roland Bal	Eramus University, Rotterdam	Workflow systems across health organizations
Prof. Probal Chaudhuri	Indian Staststical Institute, Calcutta, India	Detection and prediction of spreads of disease outbreak based on syndromic data
Brit Ross Winthereik	IT University, Denmark	Designing DIPS nursing plans

Pernille Bjørn	IT University, Denmark	Designing DIPS nursing plans
Researcher Lars Vognild	Norut IT	My Health Service
Researcher Ellen Brox	Norut IT	The ICT lifestyle and health motivation project
Prof. Carl-fredrik Bassøe	NTNU	Automatic detection of infectious diseases
Jesper Simonsen	Roskilde University, Denmark	Designing DIPS nursing plans
Ellen Balka	Simon Fraser University	Workflow systems across health organizations
Researcher Lilly Ann Stensvold	Telenor	Monitoring systems in home based health services
Researcher Eivind Rinde	Telenor	Monitoring systems in home based health services
Professor Niels W. Lund, PhD	UiT	Information Science
Assoc.prof. Frank Siebler	UiT	Monitoring systems in home based health services
Prof. Joar Vittersø	UiT	Monitoring systems in home based health services
Assoc.prof. Gunnar Ellingsen, PhD	UiT, Helse Nord IKT	Group leader CSCW
Assoc.prof. Randi Karlsen, PhD	UiT, Norut	Computer Science and medical informatics
Professor Fred Godtlibsen, PhD	UiT, NST	Group leader Extended Decision Support

Assoc.prof. J.Gustav Bellika, PhD	UiT, NST	Computer Science and medical informatics
Professor Alexander Horsch, PhD	UiT, TU Munich	Computer Science and medical informatics
Professor Rolf Wynn, MD, PhD	UiT, UNN	Clinical Research
Prof. James Stephen Marron	University of North Carolina at Chapel Hill, USA	Detection and prediction of spreads of disease outbreak based on syndromic data
Prof. Mark Foskey	University of North Carolina at Chapel Hill, USA	Automatied radiation treatment planning
Prof. Lasse Holmström	University of Oulo, Finland	Detection and prediction of spreads of diseaseoutbreak based on syndromic data
Prof. Silvano	University of Sevilla	My Health Service
Assoc. Prof George Demiris	University of Washington, USA	Telemedicine in Private Homes
Ina Wagner	Vienna University of Technology	Workflow systems across health organizations
Dr. Jörg Polzehl	Weierstrass Institut für Angewandte Mathematik und Statistikk, Berlin, Germany	Detection and prediction of spreads of disease outbreak based on syndromic data

Visiting Researchers

Name	*Affiliation*	*Nationality*	*Sex M/F*	*Duration*	*Topic*
Dr Vicente Traver	University of Valencia	Spain	M	3 months from July-September 2009	Web 2.0

Postdoctoral researchers

Name	*Nationality*	*Period*	*Sex M/F*	*Topic*	*Funding*
Taxiarchis Botsis	Greese	03.2008-03.11	M	Electronic disease surveillance	University of Tromsø
Maciel Zortea	Brasil	01.09-01.11	M	Melanoma-project	University of Tromsø
Jeremiah Scholl	USA	09.06-02.11	M	Context sensitive systems for mobile communication inhospitals	NFR/Verdikt
Eirik Årsand	Norway	02.09-01.13	M	Collocated Personal Diabetes Data (CPDD)	Helse Nord RHF

PhD students with financial support from the Centre budget

Name	*Nationality*	*Period*	*Sex M/F*	*Topic*
Mr Kevin Thon	Norway	08.07-08.11	M	Detection of malignant melanoma based on lesion images
Ms Liv Karen Johannessen	Norway	12.07-12.11	F	Workflow systems across health organizations

Ms Naoe Tatara	Japan	06.07-6.11	F	User interaction patient terminals
Mr Luis Fernandes Luque	Spain	08.07-08.11	M	My Health Service
Mr Rune Pedersen	Norway	03.08-03.12	M	Nursing plans
Ms Torbjørg Meum	Norway	03.08-03.12	F	Nursing plans
Ms Kjærsti Thorsteinsen	Norway	01.10-12.13	F	Monitoring systems in home based health services

PhD students with financial support from other sources

Name	***Funding***	***Nationality***	***Period***	***Topic***	***Sex M/F***
Ms Monika A Johansen	Helse Nord RHF/HST	Norway	06.07-07.11	System based surveillance	F
Mr Terje Solvoll	NFR/Verdikt	Norway	09.06-02.11	Context senstive systems for mobile communication in hospitals	M
Ms Eli Larsen	Helse Nord RHF/HST	Norway	01.07-01.11	Net based Medication Card	F
Ms Klaske van Vuurden	University of Tromsø	The Netherlands	11.07-11.11	Models for automatic detection of infectious diseases at an early stage in disease progression	F

Mr Bernt Ivar Olsen	University of Tromsø	Norway	8.04-09.08	Using display walls for improved treatment	M
Mr Jörn Schulz	NFR/eVita	Germany	01.08-1.12	INR and Tumor detection	M
Mr Kristoffer Røed	University of Tromsø	Norway	12.07-12.10	Organizational use of ICT	M
Mr Andre Serra	From the Portugals Research Counsil	Portugal	02.08-02.11	Patient modelling basedon epidemic and sensor data	M
Mr Marc Geilhufe	University of Tromsø	Germany	07.08-07.12	Monitoring of high risk patients by combining telemedicine and statistical methods	M
Ms Kajsa Møllersen	NST/NFR -eVita	Norway	01.09-01.14	Classification of moles - Melanor	F
Mr Kristian Hindberg	University of Tromsø	Norway	12.06-12.10	Statistical methods for spatiotemporal data	M

Master degrees (in 2009)

Name	***Sex M/F***	***Topic***	**From**
Ashok Babu Ravuri	M	"Prototype for context sensitive mobile communication system"	University of Tromsø
Steffano Fasani	M	Tittel: "test platform for context sensitive mobile communication system"	Capstone project/bachelor oppgave for Universitetet I Milano

Annelies Tiemersma	F	"Evaluation and redesign of the Ascom 9d24 user interface for context-sensitive communication in hospitals"	Internship program (Univerity of Twente)
Edouard Kerbage	M	Videreføring av arbeidet til Annelis - "Evaluation and redesign of the Ascom 9d24 user interface for context-sensitive communication in hospitals"	Internship (Boulevard de l'Universitè)
Jonas Lauritzen	M	"Snow project "and "The context sensitive systems…"	University of Aalborg, Denmark
Borja Drake	M	6 months internship in the project "My Health Service"	

Appendix 2 Economy

Funding

	Amount *Public*	Amount *Research*	Amount *Enterprise*	***Total***
The Research Council	10 699			
The Host Institution (NST)		10 113		
Norut IT		739		
Dips ASA			4 786	
Norwegian Health Net			14	
Telenor R&D			1 496	
IBM			130	
UiT	9 942			
Northern Norway Regional Health Authority	102			
Total	***20 743***	***10 852***	***6 426***	***38 021***

Costs

	Amount *Public*	Amount *Research*	Amount *Enterprise*	***Total***
The Host Institution (NST)		15 350		
Norut IT		1 374		
Dips ASA			5 979	
Norwegian Health Net			25	
Telenor R&D			2 363	
IBM			130	
UiT	12 469			
Northern Norway Regional Health Authority	177			
Equipment	22	132		
Total	***12 668***	***16 856***	***8 497***	***38 021***

Appendix 3 Publications

Journal Papers

Andreassen, K., Bellika, J.G.
The Reliability of the XMPP Protocol Extensions as a File Transfer Mechanism in Dedicated Healthcare Networks.
The Journal on Information Technology in Healthcare. 2009; 7(1):68-76.

Hartvigsen G, Årsand E, Botsis T, Vuurden K, Johansen M, Bellika JG.
***Reusing Patient Data to Enhance Patient Empowerment and Electronic Disease Surveillance*.**
The Journal on Information Technology in Healthcare 2009; 7(1): 4-12.

Loniewski G; Ramon E L; Walderhaug S; Franco S M; Esteve J J C; Marco E S.
Data Management in an Intelligent Environment for Cognitive Disabled and Elderly People.
I: Electronic Healthcare. Springer 2009 ISBN 978-3-642-00412-4. Pp. 50-57

Walderhaug, Ståle; Stav, Erlend; Johansen, Ulrik; Olsen, Gøran K..
Traceability in Model-Driven Software Development.
I: Designing Software-Intensive Systems: Methods and Principles.
IGI Global 2009 ISBN 978-1-59904-699-0. pp. 133-159

Bellika, J.G., et al.,
Authentication and encryption in the snow disease surveillance network.
Stud Health Technol Inform, 2009. 150: pp. 725-9.

Henriksen, E., et al.,
Threats to information security of real-time disease surveillance systems.
Stud Health Technol Inform, 2009. 150: pp. 710-4
Appendix to conference paper: Henriksen E, Johansen M.A., Baardsgaard A, Bellika J.G.
Threats to Information Security of Real-time Disease Surveillance Systems.
Stud Health Technol Inform, 2009. 150: pp. 710-4

Johansen, M.A., et al.,
Bridging the Gap between Patients' Expectations and General Practitioners' Knowledge through Disease Surveillance.
Stud Health Technol Inform, 2009. 150: pp. 423-7.

Dias, A., Fisterer, B., Lamla, G., Kuhn, K., Hartvigsen, G., Horsch, A.
Measuring Physical Activity with Sensors: A Qualitative Study.
Stud Health Technol Inform, 2009. 150: pp. 475-479.

L Fernandez Luque, R Karlsen, LK Vognild ,
Challenges and Opportunities of using Recommender Systems for Personalized Health Education
MIE 2009, September 2009, Bosnia-Herzegovina,
Stud Health Technol Inform. 2009. 150: pp. 903-7.

Scholl J, Lambrinos L, Lindgren A.
Rural Telemedicine Networks Using Store-and-Forward Voice-over-IP.
Stud Health Technol Inform. 2009. 150: pp. 448-52.

Johannesen L-K, Ellingsen G.
Integration and Generification—Agile Software Development in the Healthcare Market
Computer Supported Cooperative Work (CSCW), Springer Netherlands ISSN 0925-9724 (Print) 1573-7551 (Online). DOI 10.1007/s10606-009-9097-8. Subject Collection Humanities, Social Sciences and Law

Sørbye, S., Hindberg, K., Olsen, L.R. and Rue, H
Bayesian multiscale feature detection of log-spectral densities
Computational Statistics and Data Analysis, Vol. 53, 2009.

Rue, H., Martino, S., and Chopin, N
Approximate Bayesian Inference for latent Gaussian models by using integrated nested Laplace approximations. (wuseith discussion)
J. R. Statist. Soc. B , 71, Part 2, pp. 319–392, 2009.

Chaudhuri, P., Ghosh, A. K. and Oja, H.
Classification based on hybridization of parametric and nonparametric classifiers
IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 31, pp.1153-1164, 2009

Taxiarchis Botsis, Ståle Walderhaug, André Dias, Klaske van Vuurden, Johan Gustav Bellika and Gunnar Hartvigsen.
Point-of-care devices for healthy consumers - a feasibility study.
J Telemed Telecare. 2009;15(8):419-20.

Botsis T, Anagnostou VK, Hartvigsen G, Hripcsak G, Weng C.
Modeling prognostics factors in respectable pancreatic adenocarinomas.
Cancer Informatics, 2009; 7:281-291

Published Conference Papers

Naoe Tatara, Eirik Årsand, Heidi Nilsen, Gunnar Hartvigsen,
A Review of Mobile Terminal-Based Applications for Self-Management of Patients with Diabetes
etelemed, pp.166-175, 2009 International Conference on eHealth, Telemedicine, and Social Medicine, 2009
ISBN: 978-0-7695-3532-6

Svendsen, GB, Søholt, Y, Munch-Ellingsen, A, Gammon, D, Schurmann
The Importance of Being Useful and Fun: Factors Influencing Intention to Use a Mobile System Motivating for Physical Activity
System Sciences 2009. HICSS '09. pp 1-10, 2009, ISSN: 1530-1605, ISBN: 978-0-7695-3450-3

Botsis, T., Bellika, J.G., Hartvigsen, G.
New Directions in Electronic Disease Surveillance: Detection of Infectious Diseases during the Incubation Period.
Proceedings of International Conference on eHealth, Telemedicine, and Social Medicine (eTELEMED 2009).
IEEE Computer Society, 2009, pp. 176-183. (ISBN 978-0-7695-3532-6)

Olsen, B.I., Laeng, B., Kristiansen, K-A., Hartvigsen, G. (2009).
Spatial Tasks on a Large, High-Resolution Tiled Display: Females Mentally Rotate Large Objects Faster than Men.
HCI International 2009 (19-24 July 09, San Diego, CA, USA). Lecture Notes in Computer Science, Volume 5639/2009, pp. 233-242.
Springer; Berlin / Heidelberg (ISBN 978-3-642-02727-7)

Tatara, N.,
Designing mobile patient-centric self-help terminals for people with diabetes
Proceedings of the 11th International Conference on Human-Computer Interaction with Mobile Devices and Services. 2009,
ACM: Bonn, Germany. ISBN:978-1-60558-281-8

LK. Vognild, TM Burkow, L Fernandez-Luque
The MyHealthService Approach for Chronic Disease Management Based on Free Open Source Software and Low Cost Components
Conf Proc IEEE Eng Med Biol Soc. 2009;2009:1234-7.

Fernandez-Luque L.
My HealthEducator: Personalization in the Age of Health 2.0
Workshop on Adaptation and Personalization for Web 2.0,
UMAP'09, June 22-26, 2009, pp 139-142

Fernandez-Luque, Luis, Najeed Elahi, and Francisco J. Grajales III.
An Analysis of Personal Medical Information Disclosed in YouTube Videos Created by Patients with Multiple Sclerosis
pp. 292-296. In K.P. Adlassnig et al., eds. Medical Informatics in a United and Healthy Europe. IOS Press, 2009.

Røed, K. and Ellingsen, G. (2009):
Transformations trough laboratory work – When visions are facing complex work processes.
IRISS-32. 31st Information Systems Research Seminar in Scandinavia. August. Molde, August 9-12, 2009.