

Mobile@JIT

Mobile Life VINN Excellence Centre

Operational Plan Stage 2

2009 – 2012

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Centre Objectives and Long-term Strategic Plan

Vision (in a 5-10 years perspective)

We are facing a *second* IT-revolution, caused by the spread of mobile and ubiquitous services, in combination with a broad consumer-oriented market pull. The first IT-revolution, the introduction and deployment of Internet and the World Wide Web during the 1990's, had a major impact on all parts of our society. As mobile, ubiquitous technology now becomes widespread, the design and evaluation of mobile services – i.e. information technology that can be accessed and used in virtually any setting – represents an important business arena for the IT- and telecom industry. The industry must prepare to design services for a sustainable web of work, leisure and ubiquitous technology we can call the *mobile life*.

The *Mobile Life Centre* will be a vital strategic component in ensuring that the IT and telecom industry successfully meets the challenges of the next ten years and beyond, both in the Kista region, in Sweden as a whole, in the European Union, and throughout the world. The Centre's academic, industrial and public partnership will jointly work on strategically important projects that can provide a sustainable growth for Sweden.

In a ten years perspective, the vision would be that

- The Centre has contributed to the development of *an abundant marketplace* for mobile services. Usage of mobile services has become widespread and is understood by a general audience in terms of product categories.
- There is a real *incitement* for both commercial and private development of mobile services and service content. User-created content is a strong driving force in the adoption of information technology, and 'lead user innovation' is a key factor in shaping a truly novel model for mobile services. In the future mobile service ecosystem, we can foresee that the roles of 'producer' and 'consumer' will merge. The Centre contributes to this development through its focus on user-created content in several projects, both theme projects and domain projects such as 'Mobile 2.0'.
- Mobile services contribute to *an improved quality of life*: they shape and support my everyday activities to make them more fun, engaging, quicker, etc. The Centre activities make this possible through its focus on interaction models, methods and tools for user-centred design, and the creation of 'good examples' of mobile services and technology.

Mission

The Centre aims to change how mobile services are developed, distributed, and used. It will adopt a fundamentally user-oriented perspective on services for the future mobile life. It will provide a neutral arena where researchers and industrial partners together develop:

- New *interaction models and platforms* that provide a unified interface across different applications and terminals
- Efficient and user-oriented *methods* for developing mobile services
- A deepened *understanding* of the unique properties of the future mobile life
- A *future mobile service eco-system* where we explore alternative universes for infrastructure, business models and the industry's new roles
- A range of novel *mobile services* for mobile media creation, play, social interaction and bodily awareness

Goals (in a 5 years perspective)

According to the VINN Excellence criteria, the Mobile Life Excellence Centre should contribute to the Swedish innovation system in two main ways. First, it should become a *produc-*

tive, academic Centre of Excellence by actively involving a number of companies and research groups in joint research. The forms for industry involvement in the Mobile Life centre include collaborative projects, internships, and other measures, which are described later in this operational plan. We will ensure that the Centre's partners benefit from this involvement by organising seminars, hands-on workshops, brainstorming activities, and other research-related activities. The Centre will also actively contribute to the international mobile and ubiquitous computing research community, and act as an informer and mediator between international cutting-edge research and the Swedish industry.

Second, the Centre should promote the *introduction and implementation of new technology* and *strengthen the technical competence* in Swedish industry. In the Centre there is a natural flow of technology, design insights and infrastructure between all the partners when we build mobile services together in the more applied projects.

The general goal for the next five years is to establish the Mobile Life Centre as the natural partner for the Swedish mobile IT technology when it comes to seeking advanced competence in the area of mobile services.

Specific Goals

The Mobile Life Centre should have a major and long-time impact on research in mobile services, the related industry and society as a whole. In a five years perspective, we have the following goals:

- We will expand our research area to cover more ground in the mobile service area. To achieve this, we aim to double the size of the centre through applying for funding from European and national funding organisations in different constellations of partners. We will also participate in applications for national strategic funding and in European initiatives such as the European Institute of Technology. Finally, we aim to involve more researchers from the partners in the Centre. (The board will actively supervise the IPR-issues that will follow from being involved in different projects outside the centre agreement).
- Through individual and joint studies of experimental services, we will further our understanding of how mobile services shape our everyday life. This knowledge will be embodied both in research papers and in concrete service examples.
- We will design, realize and test entirely novel *interaction models* for mobile services.

The Centre will also develop many specific mobile services. These will address fundamental research questions in the Centre, including issues concerning technology, business models, and service domains. The services we have developed in five years time, will exemplify:

- *Interaction models* – questioning, changing, and improving current models
- *Business models* – experimenting with ‘prosumer’ models, exploring incitements for service development, and spreading incitements and knowledge for content production
- *True mobility* – we will mirror the mobile practices of people in our contemporary society in services that put the mobile user at core. This includes an understanding of and methodology for designing in a global mobile context.
- *Technological* possibilities, limitations, consequences, requirements
- *The ‘good’ mobile society* – making values such as privacy, autonomy or trust, but also living a good, rich life, explicitly part of our design processes and study methods, creating for a sustainable, human-friendly society

Strategies

The Mobile Life Centre should have a major and long-time impact on research in mobile services, the related industry and society as a whole. To ensure successful research results, the

Centre involves the most qualified Swedish researchers in mobile services and the most advanced research departments in some of the most important telecom companies. It is based at Stockholm University in the Kista area, where there already exist strong educational programs in many IT areas. This secures the inflow of well-educated master- and Ph.D. students. In Kista we also find KTH's School of Information and Communication Technology (ICT), the Swedish Institute of Computer Science (SICS), and Interactive Institute. Several of the industry partners have advanced research and development departments in Kista.

The Centre activities are based on a strong theoretical foundation (*embodied interaction*), a well-defined methodology (*user-centred development*) and an important domain with large societal importance and commercial potential (*mobile life*).

The Centre makes use of innovative ways for securing industrial relevance and participation in the research. A core issue is to go beyond the focus of each participating industry to develop their own business models, to look at the role of users as consumers of mobile services. The vision is a *mobile service ecosystem* where users experience, understand, and act within an abundant service market. In this, Mobile Life serves as a neutral arena for industry partners to meet, discuss, and identify core issues, and then collectively carry out practical and experimental research on these issues, in the domain projects as well as through collaboration in large initiatives such as Stockholm Living Labs.

The Centre employs a number of collaboration forms with industry, including 'design sprints' (intensive design weeks), workshops, writing joint papers, and seminars. Perhaps the most important knowledge transfer happens through *internships*. Researchers from the Centre will spend time in partner companies to get to know each other and to learn the business way of thinking about the problems, and conversely, partner researchers spend time in the Centre to learn about practical and theoretical research matters. This ensures a tight exchange of both ideas and people between the Centre and its partners. Another important component is the *roadmap* for projects, where research activities follow a clear path from inception to exploitation.

The Centre should have an impact on society and the innovation system as a whole. Here Stockholm City Municipality has a major role as they provide the Centre with natural use environments (see detailed project plans below for examples).

The Centre has secured integration with the local innovation system through including Stockholm Innovation and Growth (STING) and its member companies in combination with SU Holding, the university holding company.

To ensure that the Centre's result become known to a wider audience, including the general public, we convey our results both in open house events, brochures and on our web pages.

Centre Partners

The Centre is located at Stockholm University. The partners can be grouped into:

- *Research organizations:* SU, SICS and Interactive Institute
- *Industrial partners:* Sony Ericsson, Ericsson, Microsoft Research AB, TeliaSonera, Nokia Research
- *Organizations representing the public sector:* Stockholm City and Kista Science City
- *Organizations that support the innovation system:* STING

Research organisations

Stockholm University. Mobile Life is organized as a unit under the Department of Computer and Systems Sciences (DSV) in Kista. The Centre is physically located in the Kista campus in the Electrum building. Through Stockholm University, the research in the Centre is well con-

nected with undergraduate and graduate educations and the general social science faculty. Students employed the Centre will be enrolled in the masters and doctorate programs within the University, primarily in the Computer- and Systems department. Senior researchers will be actively involved in the formation of such programs, primarily in this department but also in other departments within Stockholm University and the Royal Institute of Technology (KTH).

SICS and Interactive Institute AB (II). The role of SICS¹ and Interactive Institute AB in Mobile Life Centre will be that of a co-executor of research together with Stockholm University. SICS and II have their main offices in Kista. During the upcoming period, SICS and Interactive Institute will get 50% of the VINNOVA funding (3.5 MSEK/year) and will co-fund the Centre with an equal amount. The funding and co-funding is equally divided between Interactive Institute and SICS.

Industry partners

Ericsson AB. Ericsson is a world-leading provider of telecommunications equipment and related services, to mobile and fixed network operators globally. Ericsson has deep knowledge in present and future telecommunications systems, including content and communication oriented services for mobile devices and the connected home. Ericsson Research will provide the Centre with concrete technology as well as deep knowledge in present and future telecommunications systems, including content and communication oriented services for mobile devices and the connected home.

TeliaSonera AB. TeliaSonera is the leading telecommunications company in the Nordic and Baltic region. TeliaSonera bring to the Centre its vast experience of service provisioning, both from a cultural and business technology but also on multiple platforms including both fixed and mobile telephony, hot spot wireless communication, portals and communities.

Sony Ericsson AB. Sony Ericsson Mobile Communications is a global provider of mobile multimedia devices, including feature-rich phones and accessories, PC cards and M2M solutions. Sony Ericsson brings to the Centre both the technical, practical, and business requirements associated to the development of novel and innovative mobile devices.

Microsoft Research Ltd. Microsoft Research Ltd has identified three key domains in which support from Microsoft will enable University researchers to achieve the greatest progress: the emerging computing environment, transformation of science through computing, and advancing computer science curriculum. Through its focus on social and mobile services, the Mobile Life Centre targets the first of these areas. The researchers of the Centre have a well-established collaboration with Microsoft Research Ltd in Cambridge, furthering in particular the deep understanding of information technology use in everyday life activities.

Nokia Research: Nokia is a world leader in mobility, driving the transformation and growth of the converging Internet and communications industries. They make a wide range of mobile devices with services and software that enable people experience music, navigation, video, television, imaging, games, business mobility and more. The Centre focus its research on similar areas, which allow high level articulation of design oriented research, addition to skills in Scandinavian design, commercialization of services and applications, as well as seniority in design oriented research on mobile applications.

Public sector representatives

City of Stockholm Municipality. Within Sweden as a whole, the Stockholm region and Kista play a crucial role in the establishment of a consumer-oriented service industry. This role

¹ One of the four research leaders, Lars Erik Holmquist, has his main activity at SICS (75%), but also upholds a professor's chair at Södertörn Högskola (25%).

has been recognized by the City of Stockholm that has chosen to establish and participate in several initiatives focused on this sector, the Kista Mobile Showcase, and to participate in the Mobile Life Centre. The City of Stockholm plays a natural central role in the Mobile Life Centre, through providing multiple channels for local collaboration, dissemination, and take-up with both small and large companies.

The City of Stockholm contributes to the Centre by being prepared to be test-users representing the public sector in several domain projects. Furthermore the City strives at coordinating and cooperating regarding the various mobile initiatives in the city.

Kista Science City AB. Kista Science City brings to the competence Centre its project ‘Kista Mobile Showcase’ as well as several contact networks for small- and medium sized service development companies in the Stockholm area. The Kista Mobile Showcase is a physical test- and demonstration platform for the concrete presentation and dissemination of results, where the industry partners have provided both hardware and software for demonstration purposes. Kista Science City will set up a framework which enables its showcase partners and network members to participate in the Mobile Life Centre activities, further strengthening the dissemination and take-up potential for the Centre.

Innovation system partner

STING. Stockholm Innovation & Growth (STING), founded 2001, is a support ‘system’ for technology start-ups. The ambition is to generate more technology start-ups through a well-designed extensive support system. STING provides support for entrepreneurs at a very early stage continuing throughout the growth process. The aim of STING is to commercialize ideas from the IT-university, research institutes and spin-offs from company employees. STING offers support for entrepreneurs in four sequential programs named Startup, Business Lab, Business Accelerator and Go Global. STING also offers pre-seed capital via Sting Capital, a new venture capital company for technology start-ups.

Centre Management and Organization

Board of Directors

The primary decision-making body of the Centre is the Board of Directors (BOD). The BOD is appointed collectively (through unanimous vote) by the partner organizations in the Partner Assembly. In addition, Stockholm University appoints one board member directly. The BOD in a voting procedure appoints the chair of the BOD. The Centre director is called as an adjunct member to the board and participates in its meetings.

The board of directors is responsible for the following issues:

- The strategic development and direction of the Centre, to ensure that the Centre continues to fulfil the VINNOVA evaluation requirements
- Collaboration with industry and society concerning the use of Centre results
- Centre budget and economical conditions
- Keep the partners informed about conditions that hazard the execution of the operational plan
- Supervise the execution of the operational plan and approve of new projects within the plan
- Approve of new partner additions and collaboration contracts with external partners

CEO

The CEO of the Centre is appointed by Stockholm University after consulting the partner organizations. The CEO is both the scientific and operative manager of the Centre. The CEO is assisted in this by the deputy CEO and the administrative office of the Centre.

Professor Kristina Höök will be the CEO of Mobile Life for the first year of phase 2. The deputy CEO will be Associate Professor Oskar Juhlin

The Research Management Group suggests the following succession order. Oskar Juhlin will be the CEO of Mobile Life for the second and third year of phase 2. Annika Waern will then act as new deputy CEO.

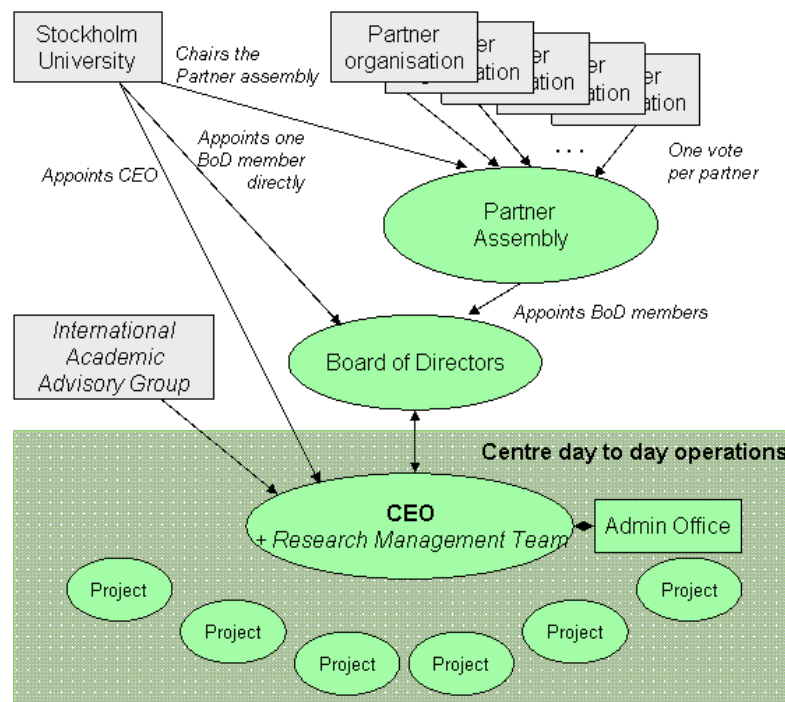


Figure 1 Centre organisation

Research Management Group

The research management group consists of the senior researchers that act as group leaders within the Centre. It is responsible for the day-to-day operations of the Centre. The group is also responsible for the recruitment of Centre employees and supervision of Ph.D. students. To enable the latter, all members of the research management group are employed as senior researchers/professors at Stockholm University. During phase two, this group will consist of the Centre CEO Kristina Höök and the three senior research leaders Lars-Erik Holmquist, Oskar Juhlin and Annika Waern. Our administrative coordinator, Maria Holm, also participate in the meetings. This group shares the responsibility for ensuring that the research program is realized through leading the individual research projects, supervising Centre researchers, and interacting with industry partners.

- The Research Management Group has bi-monthly meetings
- All major decisions regarding day-to-day operations are discussed and decided within this group. In case of disagreements, decisions are made by voting
- The CEO has a decisive vote

Scientific Advisory Board

The scientific advisory board (SAB) is recruited internationally and consists of a set of distinguished researchers active in the same research area or closely related research areas. The role

of the advisory board is to continuously monitor the scientific production and impact of Centre activities, as well as provide advice on organizational and educational issues. The BOD, on suggestion by the research management group, appoints the scientific advisory board. The members of the Scientific Advisory Board are listed in the section “Plan for measurement”.

Research projects

Research is carried out within a set of defined projects. Any project that is carried out by a group of Centre partners, and in full or in part is financed through the Centre budget is considered to be a Centre project.

The BOD is responsible for initiating new research projects and monitoring their execution. No project can start unless the BOD has approved of its plan and budget. In the case where external organizations are involved in a Centre project, the partners must also approve of the terms on which these participate. The procedure for this is regulated in the consortium agreement for the Centre.

Forms of Collaboration within the Centre

The Centre aims to actively contribute to the research frontier, but also related to and contribute to the international industrial technological frontier. It therefore needs clear mechanisms, beyond the influence by the Board of Directors, for how to work together with both the traditional industry but also together with, and sometimes even initiating, new industry for mobile and ubiquitous services.

Collaborative research projects Researchers and industrial partners will work together in collaborative research projects in various parts of the research process. These are further outlined below.

Internships To achieve a base level of the way partners ‘think’ within industry and academia, we employ a system of *internships*. All Ph.D. students employed within the Centre must do an internship (about 3 months) with one of the industrial partners. When possible, the senior researchers within the Centre are also encouraged to do internships. The internship will make the person understand the main problems that the company is attempting to solve both in the long and short perspective, the business model of the company, its products, priorities and company culture. Perhaps most importantly, the person will get to know people at the company. The positions will be selected to be relevant for their area of research but the work will typically not be research: interns will be placed in development, production or sales. Similarly, the Centre offers ‘guest research’ positions for persons from industry. The Centre also offers the more traditional model of industrial Ph.D. positions.

Roadmap for projects. The initiation of new projects and ongoing projects follows a roadmap that all industrial partners have ratified.

- When an idea for collaboration presents itself, either by a researcher or an industrial partner in Mobile Life, it is first explored in a short-term project for a time period of three to six months.
- In such projects, the parties are expected to supply in kind resources to explore the feasibility of the idea and discuss how collaboration should be set up.
- The only requirement is that a milestone is set up for when a decision is needed to go forward or stop the project. The BOD employs a simplified procedure for approving of such projects, primarily based on resource availability.
- At the time of that milestone, the full project plan is developed and potential external partners are recruited, and background information is regulated. The partner group then applies to the BOD to start the full research project. Alternatively, the partners may decide

to arrange the project outside of the Centre activities (the latter will primarily apply to commercialization initiatives.)

- Annually, projects will be reviewed by the BOD vis-à-vis background information and results.

Integrated research planning for Phase III. The formulation of the next research agenda for phase III will start already in month 18 (October 2010) of phase II. Each theme project will provide a vision document formed together with all partners. This material will be processed by the Research Management Board to form the Centre's new research agenda, to be ratified by the Board of Directors by the end of the second year of phase II (March 2010).

Plan for equality of opportunity

The gender balance can be measured in quantitative terms.² It was expected that the gender distribution of the personnel would be approximately 50% male and 50% female, and the Centre would thus be gender equal in this dimension. These figures still hold true. It is also important to discuss the gender balance in management since these levels of hierarchy strongly influence decisions on research topics and career possibilities of participants in the Centre. As in our initial proposal, the research management group will consist of two women and two men. The CEO will be a woman, and the deputy CEO will be a man. Thus, management will be gender neutral. Since these figures very well falls into the span of 60/40, we will not propose any specific programs to change the gender balance in the staff or the management board. The suggested Board of Directors will consist of only one woman and eight men. This situation has been identified as not gender balanced. It has been discussed in our planning phase without us being able to identify suitable female candidates. If the management will be renegotiated we will make effort to establish a better gender balance.

Overall, we will continuously monitor the balance and produce a formal revision in conjunction with VINNOVA's reviews. The report will be based on the Plan for Equality produced by DSV as well as the general policy documents of Stockholm University.³

The Centre in the University Organization

The Mobile Life Centre is organized as a unit within the Department of Computer and Systems Sciences (DSV) within the faculty of Social Sciences at Stockholm University (SU).

Stockholm University (SU) is a Centre for higher education and research, organized into four faculties: Natural Sciences, Humanities, Social Sciences and Law. Its 35,000 students and 6,000 employees make Stockholm University one of Sweden's largest educational establishments, as well as one of the largest employers in the Stockholm area.

One strategy of the university is to support cross-scientific research and interdisciplinary cooperation and to eliminate obstacles to such activities. The university encourages its researchers to cooperate not only between faculties but also with other higher education institutions. The university also carries on a process to strengthen its profile not only as an institution devoted to basic research, but also as an institution endowed with entrepreneurial potential. The university thus intends to show its determination to develop its commercialization and innovation potential.

² Genusperspektiv på innovationssystem, Daniel Hallencreutz, Per Lundequist & Katarina Petersson. Serienummer: VR 2003:12 Publikationer/VINNOVA Rapport/VR - 2003/

³ Jämställdhetsplan 2006, Institutionen för data- och systemvetenskap SU/KTH, 2006-03-07 and Stockholms universitets jämställdhetspolicy för åren 2004-2006, SU 601-0840-04

The Faculty of Social Sciences strives to combine excellence with diversity, in accordance with the research strategy at Stockholm University. The research conducted here changes continuously, adapting to progress in the social sciences and development in society. The faculty cooperates with other institutions of higher education, examples of which are found in work on the boundaries between medicine and psychology, social work and sociology, human geography and physical geography, and economic history and technology. The Faculty of Social Sciences at Stockholm University has identified a limited number of areas in which it is particularly strong. One of these areas is Computer and Systems Sciences. The Department of Computer and Systems Sciences is regarded as one of most vital departments at the faculty and the university, both regarding education on different levels, and research.

The Department of Computer and Systems Sciences is a joint department between Stockholm University and the Royal Institute of Technology's School for Information and Communication Technology. Research at DSV stands at the crossroads between social sciences, humanities and technology; and contacts with industry and private business are numerous. The department cooperates with several other departments within the Faculty of Social Sciences. DSV has since its start 1966, nourished the tradition of combining engineering and systems development with the critical analysis of technology and its use in society, applying a social science and human perspective in the design and engineering processes. The Mobile Life Centre will strengthen research at the department and also entail a significant contribution to the research field in Sweden and internationally.

Graduate students employed at the Centre will be enrolled in the doctorate programs, mainly at DSV/SU, under the supervision of the senior researchers in the Centre. They will also be actively involved in the formation of master programs related to the area of research in the Centre. A specific Mobile Life side track to DSV's master program is under planning for the autumn 2010, which will offer master students an excellent opportunity to draw on the experience of Centre research and collaborations.

DSV is physically located in at the Campus IT-University in Kista that is operated in cooperation between SU and KTH. The Mobile Life Centre office is in the Electrum-building where a range of other research centres and institutes are located, such as SICS, Interactive Institute and Wireless@KTH. The physical and organisational location forms a unique interdisciplinary home for a Centre that aims to create the next generation of designed interactive artefacts and systems, in an environment with engineering, design and social sciences.

Centre Communication Plan

Internal communication The Centre is located in the Electrum building in Kista, in close proximity to DSV at Stockholm University as well as research performing partners Interactive Institute and SICS. All researchers involved with the Centre, including those employed full time at Stockholm University, those with shared positions at SU and somewhere else (e.g. SICS and the Interactive Institute) and other relevant personnel, e.g. industry interns, are co-located in the same facilities.

A regular internal seminar series will be continued, which will be open to researchers and partners in Mobile Life as well as other Ph.D. students and researchers at Stockholm University with similar interests. This strengthens the awareness and discussion of current research within the Centre.

We will continue with the bi-monthly phone meetings with each partner. These talks are held between members of the research management board on a rotational basis, and representatives of our partners.

External communication The focus groups for Mobile Life VINN Excellence Centre are mobile companies, other researchers and research organisations, nationally and internationally, authorities and politicians.

The series of open houses, which has already occurred in August 2007 and March 2009, will be continued. This will be a day with scientific workshops, public demonstrations, invited speakers and many other events.

The **public seminar series** where prominent national and international researchers and practitioners give talks on topics relevant for the Centre will be continued. This series will continue throughout the Centre's lifetime and will be open to the public. In addition to this we will organize internal seminars and dialogs for industry partners. In collaboration with Kista Science City a series of seminars will be held at Kista Mobile Showcase. The seminar series will form a platform for discussions and interaction with small and medium sized enterprises (so called SME's) in Kista and Stockholm area.

	Full papers	Short papers	Events	Seminars	Exhibitions	Newsletters
Mobile Life Centre			2	16	8	2 (partners)
Conferences and journals	12	20-30				
Stockholm University						2
Partners			2	3		1
VINNOVA						1
Kista Mobile Show Case				8		
SICT Institute			2			
CHI 2009			1			

Table 1 Goals for communication of results annually

Public receptions at prominent conferences. We will host a reception for invited colleagues and partners at the CHI conference in Boston in April 2009. The purpose is to communicate the role of the Centre as an international focal point in our domain.

In addition to this the Centre will work to disseminate results through the usual channels to the scientific community, the mobile industry and the general public. For the upcoming period, this entails:

- A minimum of 36 publications at major conferences and journals (full papers), and at least another 60-90 lesser publications (short papers, posters, demonstrations, etc.).
- Popular science descriptions, accessible to the general public and media, presented on the web and in printed materials
- Press releases alerting the Swedish and international press of important project results
- A range of public exhibitions on mobile services and specific domain areas, for instance at the yearly conference for Swedish ICT Research (formerly the SITI conference) and industry exhibits such as Mobilgalan and Telekomdagarna

Learning activities for Centre progress including resources

The main learning activities will consist of learning about other similar centres and research initiatives in Sweden and around the world and communicating with our International Advisory Board. This includes a visit to Stanford University. The San Francisco Bay Area, including Berkeley, Palo Alto and the so-called "Silicon Valley", is currently home to some of the most advanced research in mobile services. Of the universities, both Stanford and Berkeley have a long tradition in human-computer interaction research, and has been the site of many start-ups, including Google and Yahoo!. Most major companies have research labs in the area, including Nokia, Google, Intel, Yahoo! and Xerox, all who do intense research and development in the mobile domain. It is also the site of some of the most innovative start-ups in the field, as well as gatherings and conferences such as the Mobile 2.0 event. Furthermore, the Silicon Valley culture is famous for its successful knowledge transfer between industry and academia. Mobile Life already has strong connections in the area through research collaboration and personal contacts. A visit to the Bay Area would be a perfect way to catch up on the most recent mobile service development, from academic research to the latest start-ups.

Proposed sites to visit: Stanford University, HCI Lab and D-School; Berkeley University, I-School; Intel Research Berkeley; Yahoo! Research; PARC (Xerox Palo Alto Research Centre); FX/PAL (Fuji Xerox Palo Alto Lab); Nokia Research; Google Research; Ericsson Research; Sony Ericsson; and Sun.

The Director and Assistant Director will continue their participation in VINNOVA's training program for Centre managers.

Research Programme

Centre Research Profile (strengths, weaknesses, ambitions)

By focusing on consumer-oriented mobile services spanning areas such as entertainment, socialization and work, the Mobile Life Centre will add to and strengthen the Swedish innovation system. Emergent technology within the mobile technology sector has the potential to support everyday activities and thus we need to complement the foundation for user research otherwise mainly focused at work settings.

The innovation of meaningful services with commercial potential does not follow automatically from the development of new technologies, and the uptake of mobile services has been slow in Europe. Despite extensive development of new infrastructure, in particular the 3G and upcoming 4G networks, the main use of mobile terminals continues to be voice communication. However, the recent years has seen many new initiatives from the industry. Nokia has come in as a service provider, which includes linking the customer to web services and providing support for third party developers. Apple's iPhone has recently provided a developer-friendly environment and distribution channel, and the Android handset alliance promises to provide something similar for open-source terminals, but these approaches are software-oriented and require full-scale programming teams and advanced application development. Similarly, Mobile Ajax and Google Gears for Mobile promise to bring some Web 2.0 capabilities to handhelds, but again are oriented towards software programmers. Ericsson, Sony Ericsson and TeliaSonera have recently opened web facilities for developers. Taken together, these initiatives point to a trend of industrial effort to open and expand the mobile service market (a process we have named 'Mobile Glasnost'). However, it is still the case that the actors on this market differ in their approaches to widening and opening the market and how they view the future eco-system.

In this new landscape, research on consumer applications and bringing creative tools to end-users is needed in order to establish a sustainable foundation for the next generation of appli-

cations and services. In particular, development must be based on studies and analysis of actual mobile life to achieve a better understanding of the specific opportunities of mobile services, and what makes such services successful. Mobile services are considerably more complex than stationary computing applications when it comes to context of use. This means traditional methods for evaluation might not be suitable. Instead, studies and evaluations must be done in real-world settings rather than in lab environments.

Future mobile and ubiquitous services will not be a unified set of systems that will replace Internet, PC-software, or game consoles. A range of solutions will co-exist: internet services and mobile services, mobile services interacting with special-made ubiquitous solutions built into artefacts of various kinds, and so on. We have to ensure that the whole digital landscape is well integrated with our lives. We must design services for a sustainable web of work, leisure and ubiquitous technology, that we can call the *mobile life*. We must also identify the domains where mobile services can have significant impact on peoples' lives, and where there is also a clear commercial potential in Europe (and the rest of the world).

Therefore, it is not enough to map out a design space that consists of individual prototypes, studies and evaluations. The Centre must also consider the entire mobile services landscape. Our research approach for this is outlined below.

Research approach

The research in the Centre is conducted in two major loops, see Figure 2. In the inner loop we produce concrete mobile and ubiquitous services in what we name *domain projects*. They are built from a thorough understanding of the specific domain selected, studies of real-life situations, and existing or invented technology. Once designed and implemented they are evaluated experimentally under real or realistic conditions against the research questions outlined for the specific mobile service. The concrete mobile services developed in the inner loop are research result in themselves, but they also serve as explorations of the whole domain, mapping out the territory before reaching the commercial market.

From the individual mobile services development we also gain deeper insights into what sorts of designs that work; what methods render good services, and how people's behaviour interact with and change through the use of these services. We catch these higher-level insights in a set of theme projects in the outer research loop, see Figure 2. Theme projects include:

- *Method projects* that provide feedback on and invent new user-centred design methods
- *Social science projects* that document and analyse people's behaviour as it unfolds in naturalistic settings
- *Mobile service eco-system projects* where we collect infrastructural demands, document end-user perspectives on new business models, and study the effects of integrating many mobile services into people's lives

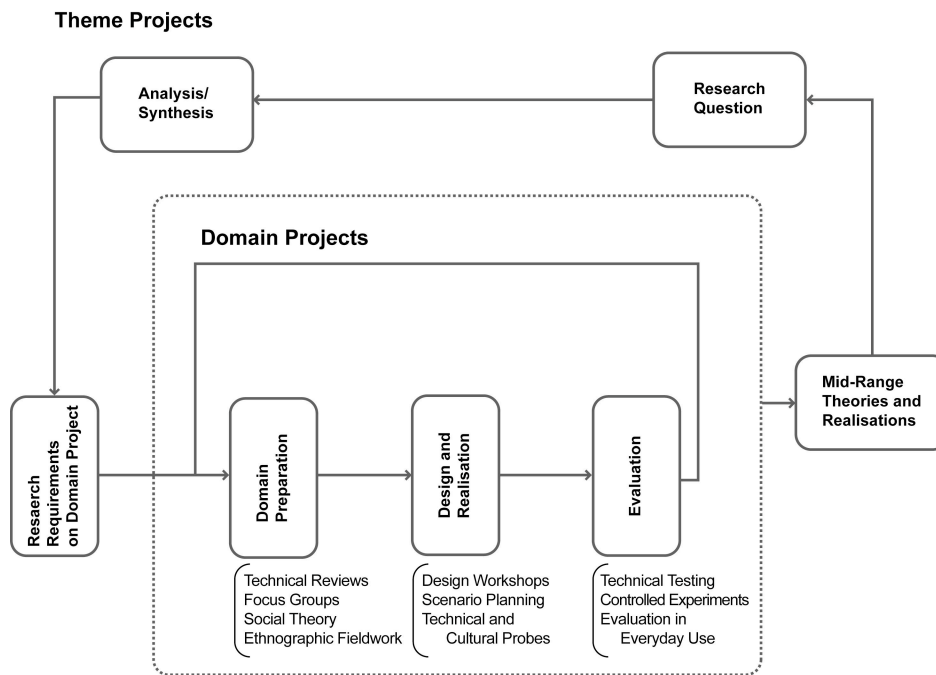


Figure 2 Research method

Theory: embodied computing

The Centre’s work will be guided by a set of theoretically oriented positions on the interactions between humans, technology and society. Our starting point is the study and understanding of everyday practices – social practices as well as our interaction with the various tools we are surrounded by, and the way we make use of our body and cognition in our interaction with the world. Our theoretical foundation therefore has its roots in the ideas of *ubiquitous computing* and *embodied interaction*. In the late 1980’s Mark Weiser⁴ introduced the notion of ubiquitous computing i.e. computers that are seamlessly integrated with the task that they perform. The term embodied interaction was coined by Paul Dourish⁵ and is used to describe a phenomenology-inspired basis for design that builds on tangible interaction and social computing to provide computing which “...moves beyond traditional confines of the desk and attempts to incorporate itself more richly into our daily experience of the physical and social world.” Any design we create should fit with, and expand, our bodily and socially based knowledge of how to act in the world. A particular interest in the centre lies in understanding our bodily practices and how movement can be a basis for creating meaning.

Our understanding of the ways in which social interaction occurs is also informed by Lucy Suchman’s studies of human-machine interaction⁶, and could be understood as *situated interaction*. In situated interaction, norms and social rules always have to be fitted to a contingent situation. In such situations, people continuously negotiate and make use of these negotiations to establish agreements and interact successfully even though the situation is both complex and their interpretation of it is uncertain.

⁴ Weiser, M., Some Computer Science Issues in Ubiquitous Computing. in *CACM* 36(7):74—83, 1993.

⁵ Dourish, P., *Where the action is. The Foundations of embodied Interaction*, MIT Press, 2001.

⁶ Suchman, L. A. (1987). *Plans and situated actions: The problem of human-machine communications*. Cambridge, UK: Cambridge University Press.

It follows from our understanding of the context of human-computer interaction that the design of technology should recognise that the context in which it will be used will vary significantly. Thus, technologies should not be designed with the intention to support a very specific and fixed way of interacting in everyday life.

With the above discussion the more generic theoretical foundation for the Centre is outlined, but the theories and assumptions presented above are highly abstracted descriptions of human computer interaction, and can only work to frame our research. In the Centre, our goal is to generate *mid-range theories of interaction*. Such theories are on the one hand design elements that have been proven to work and that other designers can pick up and base their designs on; and on the other hand empirically tested theories of how people in specific settings interact with technology and each other.

Our perhaps most ambitious project along these lines is a project that takes a generalized view of mobile interaction, with the goal to find what could be called a new “desktop metaphor” for mobile devices. This project will explore mobile interaction from a theoretical and social perspective on interaction as outlined above, to find general properties that hold across many types of mobile services. It will generate design examples that can be critiqued. Complementing this, additional projects will explore other aspects of mobile interaction, such as how studies of mobile life can inform and influence the design of mobile interaction models.

Method: user-centred design

The Centre’s aim is to do justice to the full complexity of actual human lived experience, where people *actively* and *individually* construct meaningful experiences around technology. We will work from a fundamentally *user-centred perspective*. This will frame our design approach, where we seek to involve users in the design process in a variety of ways, ranging from studying extreme user groups, using ethnography as design inspiration, to participatory design and similar methods.

Each mobile service is developed through a method that can be roughly divided into three phases: preparation, generation, and evaluation (see Figure 2). In the preparation phase, we acquire knowledge about user activities and needs through methods such as ethnographic fieldwork or focus groups. It is valuable to understand peoples’ behaviour as purposeful actions and intentions in a natural context. This requires a familiarity with ordinary life, which surpass a formal representation of behaviours and in many cases even the users’ own representations of what they are doing and what they need. Mobile services can be used by anyone and anywhere, which means we will mainly study services that support aspects of human life not normally catered for in the mainstream design practice of human-computer interaction (HCI). Traditionally, HCI has focused on work-oriented tasks that are to be solved as efficiently as possible. We are instead inspired by areas such as entertainment computing, social interaction, personal media, and travelling. We will therefore apply unorthodox research methods, and a major issue for the project will be to continuously refine and evaluate this research and service development methodology.

An important component in this process is how the analysis of current practice, such as social and ethnographic studies, can be used to form design hypothesis and inspire the service innovation process. There is a need for design methods that help structure a multitude of different sources of inspiration and fieldwork, and synthesize it into concrete requirements and concepts for mobile services. In previous work we have used a variety of such methods, such as *ethnography* as a basis for design, *Laban-notation* to analyse body behaviours, *paper prototyping* for quick sketching of mobile service interaction, *cultural probes* to understand emotional processes in people’s everyday lives, *body storming* for situating ideas in the real world, and the *experience clip* method for user self-evaluation to evaluate mobile services in their realistic setting. We have also developed our own methods, such as e.g. *user-driven in-*

novation, that is studying extreme or specialised user groups and then innovating services for other user groups based on those experiences or the *sensual evaluation instrument* that makes use of tangible objects to allow end-users to express their emotional experiences of a system while interacting with it. In the Centre we will need both to extend existing methods and develop entirely novel methods that are particularly suited to the Centre's goals.

Once a service is designed, it will be evaluated along various dimensions. Concept demonstrators can be tested with users before the service exists through methods such as Wizard of Oz or paper-based methods. Once the system is implemented, laboratory studies can help inform design and technological solutions, while more realistic testing in existing communities can provide input on the up-take of technology as well as the high-level research questions. Some services will also be designed to test a particular design hypothesis rather than to be just good services; these might be better tested in lab studies rather than in real usage. An important part of the entire process is finding the criteria by which these mobile services should be evaluated. To understand, e.g. what users react to emotionally in a position based game, requires methods that are vastly different from those used to evaluate whether one word processor is more efficient than another.

As discussed above, methods to support the design process of mobile services all the way from gathering information about the current practice, via brainstorming, early evaluation of ideas, to final evaluation of systems, need to be different from design methods for traditional office environments or stationary work practices. The research team has substantial practical experiences of designing and evaluating mobile services from a user-centred perspective. For example, we have addressed issue of how to meet the challenge of *baby interfaces* – small screen, small buttons; *context of use* – not in the office, noisy environments, out in the “wild”; and *realistic usage situations* – laboratory testing becomes meaningless, small bursts of usage throughout the day require new methods.

In order to transfer these methods from the research laboratories into industrial practice, additional requirements arise: methods need to be cost-efficient, ethically defensible, easy to pick up and make use of, etc. Researchers often work with ethnographic methods to elicit a better understanding of users, their practices, and how they interact with the world, each other, and the tools that surround them. But a proper ethnographic study takes too long time to be a feasible industrial production method. Similarly, research prototypes are often based on unreliable and untested technology, with high cost and limited infrastructure support. Industry, on the other hand, needs to be able to turn a prototype into a product within the very short time it takes to go from concept to commercial launch. Therefore, an important challenge for the Centre will be to develop new methods and adapt existing ones so that they meet the needs both of the dedicated researchers in the Centre and its partners.

Use context: mobile life and its social properties

A mobile service is often a portable window to some remote content, for instance e-mail or web pages. Other mobile applications are still based on data that is primarily stored and/or created on the mobile device, such as MP3 players and digital cameras. As networking becomes an integral part of mobile devices, we will see many more services that are based on always-on connectivity, where locally stored content and on-line activities mix. This is just the start. The next step in this evolution is what we can call *truly mobile* services – services that exploit intrinsic properties of mobility, for instance access variability, ad-hoc meetings with other devices, context awareness, access to information dependent on geographical location, and positioning relative to other users or resources. An important part of the Centre's research will be aimed at exploring the new opportunities that arise from this.

Mobile services map to a complex and rich everyday mobile life, as it occurs “in the wild”. It is embedded in the web of buildings, roads, people, nature, which is intertwined with invisible

wireless infrastructures and social practices. Mobile life occurs when people move between places where activities occur, such as the consultant who travels from one customer site to another or when student changes classrooms for each subject on the agenda. In addition, as travels and movement increases, mobile life tends to occur during journeys. These services thrive on these passing opportunities for interaction between users and the relationships between users and the changing environment they pass through.

We aim to study mobile life as it unfolds in the real world and build service that harmonize with and build upon properties as those outlined above.

Systems: a mobile service eco-system

The Centre will do justice to the users' role as customers of mobile services. We will study, and also do experimental research, on the organisational and economical landscape in which the service is placed. In our vision, there will be an abundant market for mobile services of various kinds to please different customers and different interests. From the user and consumer perspective, it is imperative that mobile services can be shared irrespective of mobile device, operator or country the users happen to be in. Furthermore, the industry must support rich and dynamic generation of services, even including the users themselves as service providers. We will specifically address the role of the future network operator and the necessary models to sustain and thrive on useful and meaningful services.

Our ambition is to approach the future mobile service market in the same innovative and experimental way as we approach the individual domains: by experiments with alternate market spaces for mobile services and ubiquitous technology. The key goal is to understand how a mobile service *eco-system* can be made to work. The term *eco-system* is used because it puts the service in both users' contexts and in business systems.

Since the centre was initiated, there have been several interesting steps towards a novel *eco-system* for mobile services. The initiative from Google to create a fully open phone environment Android appears almost simultaneously with the vertically integrated iPhone solution, where the phone, the application store, and the operator come in one package for the customers. While completely different, both approaches have the potential of creating working service ecosystems. In Mobile Life, we will both closely follow these developments, but also experiment with alternative solutions. It is critical for the industry to adapt to the new situation, but there are strong vested interests in the current system.

Through the experimental approach of the centre domain projects, its research provides tangible examples that can engender further forms of collaborations and realisations of *eco-systems*, as compared to more analytical approaches. Furthermore, the Centre involves critical partners from the mobile service value web. The Centre's research in this area will be specifically inclusive and open to new partners to reach the goals, and the strong focus on consumer and users interest, is a favourable environment to generate interesting concepts.

Below, we list issues of particular interest:

Alternative payment models. For innovative services, the prevailing models for payment are often inappropriate. There are also direct usability problems with many models for payment. For example, it is very difficult for the user of a service to know its bandwidth requirements, or to estimate the price that a certain access quality is worth. However, he or she is perfectly able to judge the quality of a service and negotiate an adequate price for it.

Novel service infrastructures. The rapid development of service access technology and peer-to-peer technology has still not been adequately reflected in device technology or market structure.

Rapid service creation. Rapid service creation is an essential part of the future *eco-system*. Development and deployment of mobile services is very time consuming. In the future, this

time has to be decreased. Ultimately, skilled users should be able themselves to develop and deploy some sort of services.

Novel and ethically acceptable approaches to digital rights. The rapid development of digital media has had a profound impact on the usage and distribution models for media resources such as film, music, and games. This has led to a legal and ethical conflict between the media industry (and its 'pay-per-use' model) and the 'file-sharing community' which advocates that media resources should be freely available. None of these extremes will in the long run provide for a sustainable service eco-system.

Disconnecting services from technology. The development of IP telephony is a very clear example of how services that previously were tied to particular technology infrastructures are becoming available in entirely new service and payment models that are not connected to a particular technology.

Trust, credibility and security. Unless users trust a particular service, the overall infrastructure or the payment model, they will not perform sensitive operations, such as buying and paying for goods. Some even advocate solutions where operators provide special networks to companies or groups of users where safety and service provisioning is ensured.

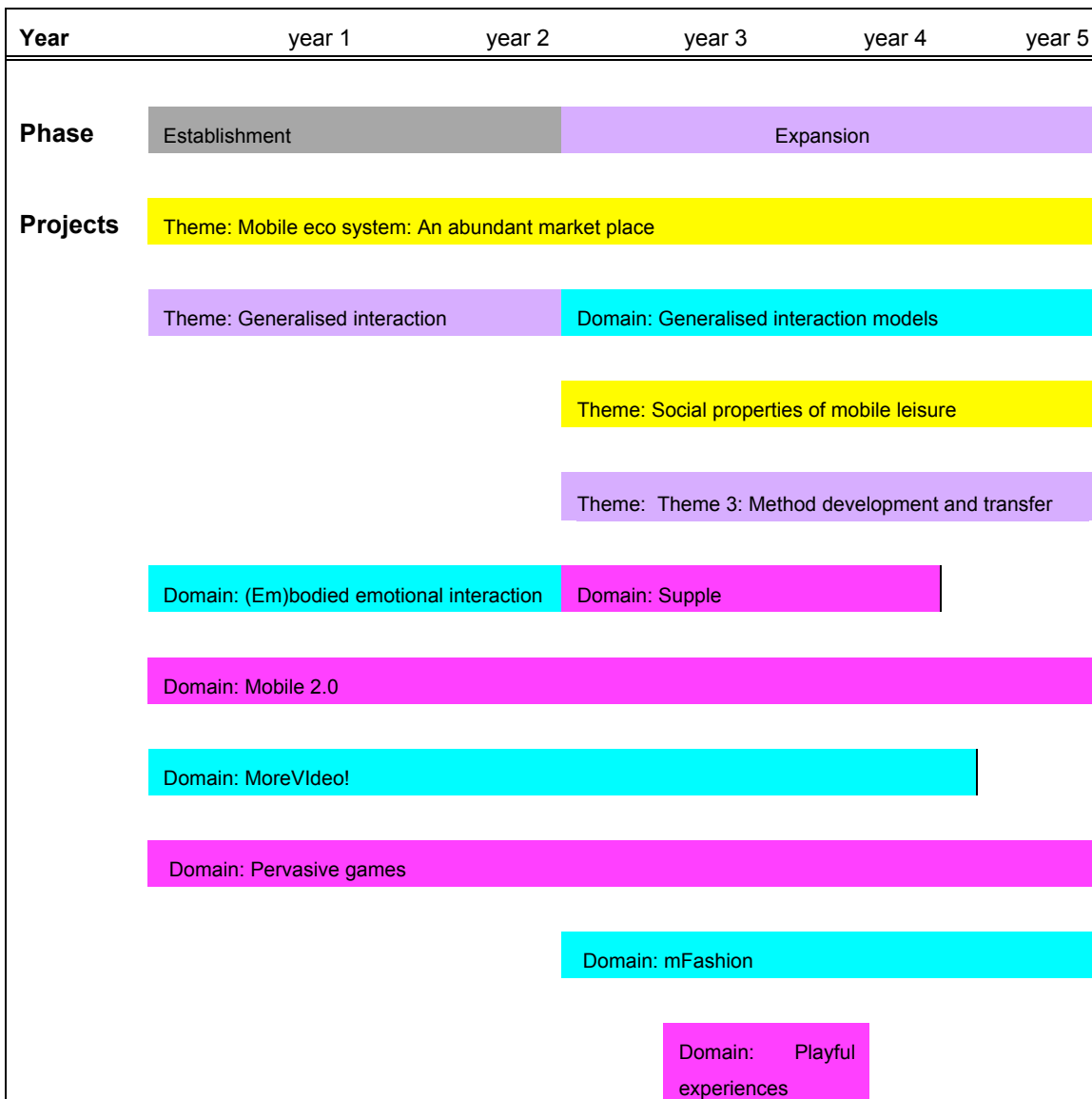


Figure 4: Time plan for the Centre’s stage 2

The Centre’s research in a 5-year Perspective

Stage 2 (Year 3-5)

Research Programme

As explained earlier, there are two types of projects in the Centre: *theme projects* and *domain projects*. In the second phase we will work in three theme projects and six domain projects. Some of these projects will end within this period and we have also allocated money to start new projects.

Specific projects

Theme project: Social properties of mobile leisure

Partners: All partners

Project leader: Oskar Juhlin

Time period: 20090401 – 20120331

Description: We suggest that the study of mobile social practices is of importance since it can spark design of applications supporting new types of experiences, or provide demanded experiences, which fits somehow with people's mobile life and therefore has a chance to be accepted and used. In order to do so, this project will generalise on available research that is done within the Centre as well as outside of the Centre. It will synthesize on a research area which is normally very scattered. An important part of the Centre's research will be aimed at exploring on the one hand leisure, and on the other hand new opportunities that arise from mobile services that exploit intrinsic properties of mobility, for instance access variability, ad-hoc meetings with other devices, context awareness, access to information dependent on geographical location, and positioning relative to other users or resources.

One of the key strategic areas in the Centre is to understand and design for leisure activities. Leisure activities occur for example as forms of play, relaxation, entertainment, sociable conversation or sensor stimulation. Already, such activities are supported by mobile technology. The mobile device can be used for socialization in communities, game play or for entertainment such as mobile TV. And we expect that more "truly mobile" or context dependent services for leisure will occur in the future. However, the research foundation on leisure is weak and immature. Here, we need more knowledge on leisure as detailed activities, as well as the experiences of leisure, to influence design. Moreover, the range of theoretical resources to choose is currently poor. While the sociology of leisure has developed some innovative approaches, most of these pay very little attention to the practice of leisure, an essential component for the design of new technology. This provides a real opportunity to move the focus of technology from its historic focus on work oriented activities, as well as socially motivated topics. A salient difference between designing for work and leisure is *gaming*. Here the best game is not the application that is easiest and most efficient to use. In game design, it is rather the opposite where the provision of problems and challenges is the topic per se.

Mobile services map to a complex and rich everyday mobile life, as it occurs "in the wild". On a general level, these everyday situations share some properties. First, when people move about they have to attend to several things at the same time. For example, when people engage in face-to-face interaction in public settings they are also engaged in looking at where they are walking or driving. They read books or arrange their clothes in conjunction with other activities such as talking on the mobile phone. On a very general level, the changing settings increase the need for mobile people to *divide their attention* between various activities. Second, in mobile life, we constantly *shift social roles* as we move between one place and another. Every role means shifting responsibilities and allegiances vis-à-vis other people, and thus fundamentally affects how people behave and set priorities. Movement between different places makes the shifts between roles more complex. Third, the way we use our lived *space* to organise life also becomes visible in a more detailed level. We put things on the shelf near the exit door to remember to take them to another place. We post messages at a selected location and direction to add to its meaning. In mobile life, the places where people are engaged are wider, and the use of location is different. Fourth, when people increase their travel and movements they are more likely to *meet* each other. Meetings in mobile life range from sustained encounters with familiar persons to abundant but brief interaction with non-

acquaintances. We can expect such meetings to take place in a variety of environments such as workplace corridors, public spaces, or on the road. Establishing and managing such meetings requires various negotiations – who is allowed into the meeting and why, what information am I willing to share and with whom, are outsiders allowed to interrupt the meeting, etc. Fifth, the *temporal* structure of social life becomes more and more important since a mobile person has to divide their attention to several activities; they attend to several roles and often engage in brief meetings. Thus, a mobile person pays attention to the timing of the activities as they occur.

Question: The project will investigate social practices of relevance for design oriented mobile applications research. Specifically it will study selection principles for topics, as well as discuss appropriate methods to inform design. Based on the studies, the project will also address the role of mobile applications in shaping a desired society.

Method: The work will be organized as a mixture of workshop with all partners, more basic investigations into social studies related to mobile life.

The project will be coordinated with the SSF funded project to recruit Associate Professor Barry Brown to the Centre.

Results: The project will result in identification of new topics; increased understanding of how to move from social studies to design as well as identification of interesting social properties through new studies of mobile social practices.

The project will provide a deliverable providing input to the next Centre research plan at M22. The deliverable includes input from all partners on topics related to the theme project above.

Deliverables:

- Report which summarizes the work
- Proceedings from some of the workshops (see below)

Detailed plans for the period April 2009 – March 2010

May: A workshop will be organized to identify the various ways in which we research leisure and playfulness. That workshop will then provide to the various domain projects that is touching these issues. It will also influence the set up of a new domain project based on unallocated money. This workshop will occur in Tampere.

April – September: A key goal will be collecting together materials at the end of 2009 for a book that draws together research within the leisure/hedonic field. This book will bring together the work of Prof. Brown with that of Oskar Juhlin, presenting on an international stage this joint work

On-going: A second deliverable of the project will be two workshops in Stockholm, which will follow from the successful workshops run in Stockholm and Göteborg by Oskar Juhlin, Barry Brown and Dr. Eric Laurier (University of Edinburgh) in 2002, 2003 and 2008. The workshops will collect together researchers focusing on data collection around leisure technology, analysing that data and developing innovative designs from that fieldwork. As with the previous workshops the focus will be on developing further the groups' skills in data analysis and engaging with data in new ways.

Budget:

Year 3: 935 KSEK (329 KSEK cash, 605 KSEK in-kind)

Year 4: 965 KEK (360 KSEK cash, 604 KSEK in-kind)

Year 5: 965 KSEK (362 KSEK cash, 603 KSEK in-kind)

Involved personnel:

Oskar Juhlin 20% - project management

Theme project: Method development and transfer

Partners: All partners

Project leader: Lars Erik Holmquist

Time period: 20090401 – 20120331

Description: When developing mobile services, methods are important in many stages of the process: idea generation, implementation, evaluation and so on. This theme project will act as an interface between the methods used by researchers in Mobile Life and the partners.

Researchers and industry work under different conditions. In research, there is often plenty of time to perform and analyse studies, with few set deadlines and little regard for external factors, such as changes in the marketplace. Industry, on the other hand, needs to ship products, are limited by time constraints and resources to what they can spend on development and studies, and ultimately have to adapt to what the market wants. At the same time, there is benefit from learning from both sides. Industry can pick up methods from research to make their products more innovative and better adapted to users. Research can learn from industry how to work with restricted time and resources, and to adapt their results to real consumers.

In this project researchers and partners will work together to learn about methods from each other. The most obvious way is through workshops, where different types of methods can be tested. We have already done this in for instance the Mobile 2.0 project, where a brainstorm generated a lot of useful application ideas. The difference in the theme project is that we will also work on a meta-level to reflect on the usefulness of methods and how we can adapt them to different conditions. Furthermore, we will continue to work on sharing methods through people exchange. All internships should result in a reflection on the methods used at the corresponding hosts – for instance, a Mobile Life intern could reflect on software development processes at industry, whereas an industrial Ph.D. student might share user study methods developed in research.

Questions: How can we develop new methods that better support design oriented research? Here we will discuss improve the validity of methods as well as their potential to inspire design.

How can we transfer methods between research and industry? How can we adapt methods that are commonly used in research – e.g. ethnographic studies – to make them feasible for industry use? How does research benefit from picking up processes and methods from industry?

Method: The work will be organized as a series of workshop with all partners, as well as exchanges and internships to facilitate knowledge transfer.

Results: The project will lead to adaptation of existing methods for new conditions and uses, as well as transfer of methods between partners. There will also be new theoretical insights about methods and method development.

The project will provide a deliverable providing input to the next Centre research plan at M22. The deliverable includes input from all partners on topics related to the theme project above.

Deliverables:

- A methods document, that can be used as a basis to produce a book or other large-scale publication on methods at the end of the project
- Reports from internships with specific focus on method transfer and development

Detailed plans for the period April 2009 – March 2010

- Perform two workshops with all partners, one in spring 2009 and one in the fall, using two different classes of methods, e.g. idea generation, user studies
- Work on method transfer through internships and seminars, both at partners and at Mobile Life
- Document existing practices in research and industry

Budget:

Year 3: 755 KSEK (75 KSEK cash, 680 KSEK in-kind)

Year 4: 754 KSEK (75 KSEK cash, 679 KSEK in-kind)

Year 5: 753 KSEK (75 KSEK cash, 678 KSEK in-kind)

Involved personnel first year:

Lars Erik Holmquist, 20% - project management

All Centre personnel will be contributing to the project, but particularly those doing internships at the Centre or with partners.

Theme project: Mobile Ecosystems: An Abundant Marketplace

Project leader: Annika Waern

Partners: TeliaSonera, Ericsson, Microsoft Research, Sony Ericsson, Nokia, Stockholm Stad, STING, Kista Science City

External partners: ---

Time period: 20090401 - 20120331

Description: A goal for Mobile Life is to envision a marketplace in which a rich and diverse array of mobile services exists. These services will be tightly integrated with daily life, evolving existing and enabling wholly new user experiences.

During the first two years of the project, the project identified some of the major societal and technological changes that bring about the changes in the mobile ecosystem, and identified major obstacles on the route to an abundant marketplace. In the second period, this work will continue, but the project will also develop methods to support the domain projects in studying their services in the context of a future ecosystem.

Questions: The focus of the Mobile Ecosystems project is to investigate how, in future mobile markets, users' experiences will be tied to societal developments, technological innovations, market structures, regulatory requirements, and standards.

Method: The project is planned to run for three years and will consist of three activities:

- **Experimental test platforms**

Mobile Life turns to external resources for test-beds and trial communities. In collaboration with partners and external initiatives, the ecosystem project provides access to experimental communities and services environments where services developed within the domain projects can be trialed. The main contacts today are Innovation World (Telia), Labs.ericsson.net and the Stockholm Living Labs initiative – the set of contacts is likely to change over time.

- **Guidelines**

The project will aim to develop some guidelines for how the domain projects can research ecosystems issues as part of their activities. An important part of the guidelines is to encourage the use of external platforms through providing guidance on the scope and purpose of each platform or community. The guidelines are developed by the researchers in mobile life and iterated with industry and collaboration contacts.

- **Workshops**

The project organizes two types of workshops. The explorative workshops constitute an arena where critical issues and obstacles are identified and discussed in a cross-industrial arena. These, in turn, influence both the development of the domain project research, the selection of test platforms, and the guidelines. The *feedback* workshops collect experiences from the domain projects. The outcome of explorative workshops is primarily input to the domain project activities and the guidelines. The outcome of feedback workshops is white papers and/or articles for publication. The project organizes approximately two workshops per year.

Deliverables:

- At least three white papers or academic publications. (One year 1)
- At least five workshops (One or two year 1)
- An internal guidelines document describing issues, methods and goals for addressing ecosystem issues in domain projects. (First version end of year 1 and iterated every year)
- The project will provide a white paper providing input to the next Centre research plan. The deliverable includes input from all partners on topics related to the theme project above.

Detailed plans for the period April 2009 – March 2010

May- June: *Workshop on the user experience of business models:* Explorative workshop planned for late spring 2009.

Autumn: *Workshop on designing the service developer experience:* Feedback workshop from in particular Mobile 2.0, labs.ericsson.com and similar activities. Estimated to be held autumn of 2009.

Spring: *Designing the device experience:* feedback workshop from the “generalised interaction” models project in particular, estimated spring 2010.

On-going: A set of internal workshops will be organized, with the goal of developing internal guidelines for addressing ecosystem issues in domain projects. The first workshop will be held in August 2009. The first version of these guidelines will be available November 2009, and evaluated in practice during the spring of 2010.

Budget:

Year 3: 934 KSEK (255 KSEK cash, 679 KSEK in-kind)

Year 4: 964 KEK (287 KSEK cash, 677 KSEK in-kind)

Involved personnel first year:

Annika Waern 20% - project manager

Contributions from all involved researchers and partners.

Domain Project: Designing systems for supple interaction

Project leader: Jarmo Laaksolahti

Partners: Ericsson, Sony Ericsson, Stockholm City Municipality, TeliaSonera, Nokia

External Partners: KTH (Wireless@KTH)

Time Period: 2009-04-01 – 2011-03-31

Description: The project will explore the concept of supple systems and how to design them. A supple system is a device that combines custom-built hardware, sensor technology, and wireless communication, to interact with end-users and create a physical, emotional, and highly involving interaction. Supple systems rely on subtle signals; rich human communication and interpretation strategies such as emotion, social ritual, nonverbal communication, and

kinaesthetic engagement; and emergent dynamics, to provide engaging moment-to-moment experiences. There are two main factors driving the evolution of supple systems. One is the rapid growth of leisure and entertainment use of technologies and the other is the commercial availability of sensor technology for tracking human expression which has led to an increasing number of systems attempting to use such technology to provide compelling experiences. Successful examples of existing supple systems include the Nintendo Wii and Apples iPhone. Designing and building supple systems is challenging because it is an unfamiliar “material” for interaction designers but also because it requires a wide range of competencies. The quality of an experience arises in interaction between users and systems. This interaction is in turn affected by both a systems hardware and software, and how well they work together. Even seemingly simple artefacts, such as pulse-meters, require holistic design of specialized hardware, specialized software, and specialized user interfaces to be successful. Each factor is equally important: a problem concerning any one of them can ruin an otherwise great experience.

In this project, we wish to develop a process for rapid, integrated, development of supple systems. We will focus our efforts on building so-called life-style applications, mobile systems that are tightly integrated into our every-day lives, because their advanced use of technology highlights the challenges for future applications of supple systems – be it in factories, vehicles, or work applications on our mobile phones. The systems developed within the project will explore new materials, such as fabric or paper, integrated with sensors and wireless technologies.

The project’s sub goals are:

- To enable interaction designers and other non-expert programmers to handle rapid prototyping of embedded software for high-quality interaction
- To let end users guide the design process towards good user experiences by involving them in an early design stage in the hardware-software design process.
- To provide technical platforms that speed up the design process by extending existing software platforms such as Ericsson’s IMS and EMP to deal with a tighter integration with new materials and sensors
- To define and formulate the use qualities we strive for, so that future interdisciplinary design teams can set up joint design goals.

The project also represents a step towards closer collaboration between academic and industry partners within Mobile Life. Within the project we are actively looking to pick up on prototype ideas that originate from our industry partners. As a result the project aims to bring added value to industry partners but also give them a more active role within the project. The research will be conducted in cooperation with the newly formed SSF funded project “Designing Supple Systems” over the next 2.5 years. Ericsson, Sony Ericsson, and KTH are partners in that project, which ensures that it will have access to the wide range of expertise that is necessary for successful completion.

Questions: Our vision of supple systems that provide high quality end-user experiences addresses three disciplinary challenges. First, we need to work in a user-centred design cycle, but existing user-centred methods are not developed for applications that involve sensors and wireless technologies. Second, we need to be able to rapidly develop custom embedded software, but existing embedded software platforms are not designed for interaction-intensive systems. Third, we need to rapidly develop custom hardware, but existing hardware design and construction methods are not designed for rapid prototyping and early user interaction.

On a slightly more detailed level the disciplinary challenges can be broken down to at least the topics listed below:

Interaction Design:

- How to put qualities of ‘feel’ into a shareable form.
- Understand the supple material.
- Develop evaluation methods.

Sensor Software Technology:

- Energy consumption algorithms to minimize power consumption.
- Rapid prototyping and programming abstractions.
- Mobility aware communication protocols.

Hardware Construction:

- New materials and form factors for interaction, such as cloth.
- Actuators for mobile settings possibly using new materials.
- Novel prototyping methods. With the use of 3D printing technology the project will have a unique opportunity to quickly test different hardware/form factor constellations.

Method: The project is structured around a set of demonstrators, some of which will come from industry partners. As part of building the demonstrators we iteratively evaluate our method and gain useful understanding of how to build supple systems. For each development cycle we will refine the development process to make it faster, more structured and less error prone than the previous cycle. As a result we will be able to go through more iterations, have more extensive user involvement in the development process, and ultimately arrive at better supple systems. As a starting point we will work on two demonstrators that are already under development at the Mobile Life centre: *FriendSense* and *Affective Health*. It is from our initial experiences of those systems that we have come to understand how extensive the problem of designing supple systems is. Later on the project will develop new prototype ideas or pick-up on existing ideas from our industry partners.

Deliverables:

- Progress report on development of a design method that successfully unifies hardware and software development efforts to create supple systems.
- A completed version of the Affective Health prototype developed using the method.
- Design documentation and a first iteration of the second prototype.
- A user study of the first prototype performed in-situ where it is intended to be used, delivered as a report or publication.
- Progress report on evaluation of supple systems suggesting methods and strategies for getting at the lived experience of using such systems.
- At least one high-profile academic publication.

Detailed plans for the period April 2009 – March 2010

April – May: Set up a lab structure for performing the proposed research. This includes the actual hardware lab as well as the virtual lab interconnecting the different organizations. A public web site and an internal site for collaboration is included in this work.

April – December: Develop interdisciplinary understanding of the problem space through workshops, lectures, and joint work.

April- June: Complete development of the Affective Health prototype.

April – August: Perform design/user studies of the Affective Health prototype in cooperation with Stockholm City Municipality.

August – March: Continue and complete development of the Friend Sense prototype

April – August: Gather ideas from industry partners, and brainstorm, about the next prototype (prototype three) that the project will develop. The decision will be made in August 2009.

September – March: First implementation of prototype three. The process will be highly iterative meaning several intermediate versions will be developed and evaluated along the way.

Ongoing: Dissemination of results and demonstrators through other channels than academic conferences and publications. For instance through participation in industry conferences, expos, fairs, and showcases.

Budget:

Year 3: 2 355 KSEK (875 KSEK cash, 1 480 KSEK in-kind)

Year 4: 2 354 KEK (875 KSEK cash, 1 479 KSEK in-kind)

Involved personnel first year:

Jarmo Laaksolahti (Project Manager) – 25%

Kristina Höök (Design and evaluation) – 25%

Anna Ståhl (Interaction Design) – 25%

NN (Software development) – 25%

Petra Sundström (Software development and evaluation) – 15%

Jakob Tholander (Evaluation)– 10%

Tove Jaensson (Design and evaluation)

Annelie Schwanecke (MSc student, Software development)

Domain project: Generalised interaction models

Project leader: Jakob Tholander

Partner: Ericsson, SonyEricsson, TeliaSonera, Stockholm City Municipality, Microsoft Research Ltd., Nokia

Time period: 20090401 – 20120331

Description: This theme project explores future interaction models of mobile phones and mobile devices, with the long-term ambition of developing “the desktop metaphor for the mobile phone” but not imitate the models invented for stationary workstations, so that mobile services find their own shape and nature. This is especially important due to the fundamentally social character of mobile technology use where communicative action rather than information handling is at the core. User-interfaces to mobile technologies today differ across devices and applications which set users in situations where they have to frequently adapt to these shifting circumstances leading to processes that are potentially costly both for users and actors of the mobile industry. To address this situation, the project will attempt develop models for how users can interact efficiently and intuitively with a wide range of mobile services, applications and devices without having to learn new interfaces, actions, and metaphors for each one. However, we would like to emphasize that this does not necessarily mean that we will adopt a standardization approach to these issues. Rather, we will focus on understanding the basic actions and the basic usages that people take with mobile technologies and how these can be generalized to a set of properties that are generally applicable across devices and application.

In line with current developments towards embodied and experience-oriented forms of interaction where an expanded range of human qualities get involved in engagement with mobile technology, we will particularly address interaction models that involve physical, bodily, emotional, and affective aspects in interaction with and around mobile devices. Especially,

since mobile applications are increasingly moving towards social and leisure-oriented settings these experience-oriented qualities will be particularly important to explore.

Questions:

- What kind of actions and interactions are supported by mobile devices?
- What kind of actions and interactions are people expecting from mobile devices?
- What new kinds of interactions and experiences can we integrate with mobile devices?
- How can we integrate subjective experiences and bodily engagement and communicative action, with new forms of input, output and sensor technologies?

Method: To address the general issues of mobile interaction we will adopt a broad approach that allows us to take the factors such as social context, other devices, other people, and physical settings into account in the development of such interaction models. Any new interaction model will not stand a chance unless it becomes accepted in the commercial world. In parallel to exploring different ways of interacting with mobile technology, we will collaborate closely with our partners to find the routes to reaching out with results. TeliaSonera's Innovation World is one such venue, but we will also look into the work done in standardization bodies.

- Analysis of the forms of interaction used in the applications developed within the different domain projects of the Mobile Life Centre, for instance through brainstorming with the partners.
- Analysis of key interaction properties of state of the art research and industry technologies, for instance through repertory grid studies.
- Analysis existing interaction patterns of mobile use within specific physical and social contexts in order to understand how these can be generalized into basic actions and usages of mobile devices, for instance through ethnographic field studies.
- Investigation of the role played by bodily-engaging aspects in interaction can be taken into account in interaction models, for instance through development and application of techniques for analysing the role of bodily movement and bodily action in human sense-making and human experience.
- Design and implementation of novel interaction models that picks up on the qualities identified in the previous four steps. These implemented systems will in turn be tried out with users, initially in long-term qualitative studies to determine how their dynamic gestalt arises over time, and later in larger scale experiments.

Deliverables: The project will deliver two main kinds of results: studies of existing practices and designs of potentially new ways of interacting with mobile devices.

- A product semantics grid outlining mobile phone interaction qualities.
- A framework outlining a set of dimensions of mobile phone interaction
- At least four novel design concepts for mobile phone interaction
- 2-3 mock-ups of design concepts
- A set of design concepts from participatory design study
- At least two papers at international conferences

Detailed plans for the period April 2009 – March 2010

April-June: A study to determine the product semantics of mobiles as they are commonly seen today. The study will use the so-called Repertory Grid Technique (RGT) but modified according to Jarmo Laaksolahti's prior work. (Jarmo Laaksolahti)

April-June: Micro-studies of how mobiles are used in everyday situations today (Tove Jaenson, Elsa Vaara)

April-May: An analysis of what we really mean by Interaction Models written up as a paper to be submitted to a relevant conference. (Jakob Tholander)

April and June: Design workshops where we bring out a range of design concepts (Jakob Tholander responsible – all partners present)

July-November: Mock-up implementations of two – three of the design concepts to such a level that we can “feel” the interaction (Pedro Ferreira, Anna Karlsson)

September – December 09: Participatory Design work at Vanuatu (Pedro Ferreira)

December: Exhibition of design ideas and mock-up implementation. This will serve as a milestone in the project where we decide how to best proceed. (demo to all partners)

Jan-March: Depending on the outcome of the milestone evaluation, we will then proceed to create an interactive demo that we can test with end-users. (Pedro Ferreira)

Ongoing: Regular meetings with a steering group of the project consisting of representatives of the partners.

Spring 2010: Implementation work and field studies

Budget:

Year 3: 2 892 KSEK (1 089 KSEK cash, 1 803 KSEK in-kind)

Year 4: 3 637 KEK (1 092 KSEK cash, 2 544 KSEK in-kind)

Year 5: 3 637 KSEK (1 095 KSEK cash, 2 543 KSEK in-kind)

Involved personnel:

Jakob Tholander 80% - project management

Pedro Ferreira 80% - participatory design, mock up design, implementation

Jarmo Laaksolahti 10% - user studies

Marie Sjölander 10% - user studies

Anna Karlsson 25 % - design

Domain project: mFashion

Project leader: Oskar Juhlin

Partners: Sony Ericsson, Ericsson, Nokia, Microsoft

Time period: 20090401 – 20120331

Description: The increasing importance on experiences within mobile interaction design has put the selection of colours, materials and form to the fore. However, the discussion of such aspects in design research has not yet accounted for how users themselves, and industry, pays attention to those aspects e.g. as forms of fashion and in relation to peoples’ complete outfits. Thus, we argue that fashion logics is part of users’ context in which they select colour and material. A neglect of understanding, and relating to, fashion dynamics might lead both to missed opportunities, as well as a decrease in the take up of new applications.

The emerging research on fashion delineates between fashion consumption and fashion production. Fashion is defined as public consumption through which individuals communicates the image they want to project to others. Fashion consumption is intimately linked to an ideology that favours change. It has strong inclination for what is new, i.e. neophilia. At the same time, it is inherently ambivalent. It balances between decency and decoration, as well as between a passion or repulsion for consumption. But fashion is also a production system. Previously, it was argued that fashion grew out of the dress styles of the rich and trickled down to the masses when industrial production made clothes cheap to manufacture. Today fashion theoreticians argue that the process through which fashion emerges is much more complex. It is argued that there exists a fashion system that early acts on various groups’ emerging tastes and styles. It uses these influences in its design and legitimates it through its institutions and

mechanisms. The fashion system consists of its designer names, design houses, journalists, editors etc. It has its exhibitions, shows and journals. In all, this process turns clothes into fashion.

Mobile handset consumption and production share some of these features. On the consumption side we have seen how teenagers' refers to their handset as being "in" our "out." They recognize that the value of a mobile phone is given by the owner and her social network, and that it varies over time. We have also seen how first teenagers in Japan, and then at other places, decorate their devices in various ways. Mobile handset production does also explicit link itself with the fashion system. We have seen how several manufacturers release series of phones which are branded with fashion brands, such as Prada or Gucci. Other manufacturers release specific designer series, although refraining from using fashion brands. In general those series draw upon the fashion systems classic method of creating desire through evoking imagery of luxury and upper class life. There are also more marginal design series such as Motorola's mobile phone which draws upon street style tattoo art. However, the industry has also come to recognize the importance of aesthetics in general, which is visible not least through the recent release of Apple's iPhone.

Thus, we can suggest that at least some of the consumption of mobile hand-sets is a form of fashion consumption. The consumers buy change and news value, as well as orient to the form and aesthetics of the mobile phones as a way to publicly communicate an image they want to display to their social network. In that sense, they orient to the symbolic value of the phone rather than its potential inherent value. This is for example obvious in situation where the technical quality does not live up to promises, such as early camera phones, whereas the phone themselves still were sold to content consumers. This might be explained as fashion consumption. People buy the symbolic value of a camera phone. It brings them something new, which could be publicly consumed and gives them a specific image.

But there are also important differences between the fashion industry and the telecoms sector. The most obvious is the difference in the plasticity of their respective "design material." The most remarkable feature of the fashion system is its possibility to create change and news value in a situation where there is very little innovation in neither the clothes nor its functionality. Mobile handsets are in constant change also in its functionality and in the technology per se. It is an industry that is changing in a more profound sense than fashion.

We suggest that teasing out the difference between consumption of mobile experiences as some sort of de facto products and symbolic fashion oriented experiences is of critical importance for the design oriented research in the mobile area.

Questions:

- In which ways do we need to account for fashion logics in mobile interaction design?
- In which ways can we understand purchase and use of mobile technology as a form of fashion consumption?
- Where and when do mobile design overlap with fashion design and fashion industry?
- What are the unexplored fashion areas that would be interesting to combine with mobile design and where do they come from?

Method:

Phase 1: The project will start with an analytical phase where we will tease out similarities and differences between the fashion industry and the mobile industry. The methods consist of interview studies with e.g. handset designers within the telecom sector. We will also study how the mobile phone is discussed within the fashion texts, such as blogs and magazines.

Phase 2: In a second phase, the project will then exploit fashion mechanisms in the design of mobile applications.

Deliverables:

- One full paper
- Proceedings from the workshop
- A panel at international conference
- White paper (in collaboration with theme projects on Mobile Life and Eco System)

Detailed plans for the period April 2009 – March 2010

April – June: We will conduct an interview study with “colour and material” designers within the mobile industry.

July – December: We will conduct a fashion blog study in a Western country as well as in China, with follow up interviews

April – August: Yanqing Zhang, who is a student at the Centre for Fashion, Stockholm University, will write a thesis on the representation of mobile technology on fashion blogs.

On-going: We will conduct workshops with Centre partners.

On-going: A collaboration with the Centre of Fashion studies at Stockholm University will be established which might lead to joint research proposals.

Budget:

Year 3: 1 072 KSEK (554 KSEK cash, 519 KSEK in-kind)

Year 4: 1 235 KEK (731 KSEK cash, 504 KSEK in-kind)

Year 5: 1 235 KSEK (732 KSEK cash, 503 KSEK in-kind)

Involved Personnel:

Oskar Juhlin 40%

Domain project: Mobile 2.0: Mobile-in-the-world

Project leader: Lars Erik Holmquist

Partners: Ericsson Research, Sony Ericsson, TeliaSonera, Nokia, Microsoft Research Ltd., Stockholm City, STING, Kista Mobile Showcase

External partners: Potentially media partners for distribution, e.g. Aftonbladet

Time period: 20090401 – 20120331

Description: The market for mobile devices is fragmented and there are many barriers to development and deployment. At present, it is difficult to create efficient and attractive mobile services that make use of advanced capabilities of modern terminals and servers, such as absolute location, near-field communication, proximity of other users or services, etc. At the same time, we are seeing how the phone becomes much more than an isolated terminal. Every phone is part of a complex social and technical network, made up of the owner and other users, the data on the phone and in the cloud, the information available through the phone’s sensors, and the network infrastructure that supports it. This means that creating truly mobile services requires a completely different approach than just moving existing stationary Internet services to the mobile platforms.

We call services that take into account the unique properties of the mobile setting *Mobile 2.0 services*. We can draw a parallel to what has been happening on the Internet, where web services have moved from being simple information repositories to being interactive applications, so called Web 2.0. But while a multitude of tools and standards now make it easy to create interactive web services, the mobile domain is still far behind. Apple’s iPhone has recently provided a developer-friendly environment and distribution channel, and the Android handset alliance promises to provide something similar for open-source terminals, but these approaches are software-oriented and require full-scale programming teams and advanced

application development. Similarly, Mobile Ajax and Google Gears for Mobile promises to bring some Web 2.0 capabilities to handhelds, but again are oriented towards software programmers. Instead, we would like to see an environment where it is as easy to put together an advanced Mobile 2.0 service as it today is to create an advanced web service. If this was possible, the market and utility of mobile services would expand rapidly.

To this end, we propose to create a new environment to let development of Mobile 2.0 services come within the reach of new other creative actors. It should make it as easy to develop advanced mobile services as it already is to create advanced web services. Therefore, it should not be oriented towards full-scale software developers but instead build on the expertise of web developers and interaction designers. This requires a standard that is closer to HTML and existing Web development tools such as Flash, Javascript and Ruby, than the advanced development environments of iPhone and Android. If this environment was sufficiently standardized and open, and free browser software was created that ran on a large number of handsets, it would have the potential to bring both the creativity and high number of users of Web 2.0 to the mobile domain.

Additionally, we are interested in the distribution and evaluation of Mobile 2.0 services on a large scale. The Apple Appstore offers the de-facto model for mobile software distribution, and several similar stores have been launched recently, but this is still a limited market compared to the proliferation of Java-compatible phones. However, Java lacks a clear distribution model and customers may not be comfortable buying mobile software due to compatibility issues, lack of support, difficulty of finding software, and worry of fraud. Therefore, we will experiment with new distribution models that are potentially capable of reaching a large number of users – ranging in the thousands. This may require collaborating with a partner that has experience in distributing mobile software. One possibility would be Aftonbladet, a Swedish newspaper that recently launched a tag-reading software for mobiles.

Collaboration with industry and public sector partners

This project will involve a number of Mobile Life partners. Sony Ericsson Research has already developed a number of relevant services, including the advanced communication application *Hanashi*. We will integrate this into the Mobile 2.0 project, e.g. by running evaluations of both software and distribution models. Ericsson Research has several related efforts in mobile community platforms, web-based interfaces, and IMS (Internet Protocol (IP) Multimedia Subsystem) which are all highly relevant in enabling Mobile 2.0 services. Telia Sonera has started the portal *Innovation World* as a way to reach out to software developers. We plan to use this as a distribution channel for Mobile 2.0 software and to hook into the development community. Nokia have developed a mobile run-time for some of their smart phones, which lets a web browser hook into hardware capabilities of the phones and make them an excellent test case and prototyping platform. Stockholm City can provide test environments, such as schools and home health care, and finally STING and Kista Mobile Showcase are our interface to the start-up community, where a lot of the latest developments can be found. We may also seek outside partners for distribution, e.g. newspapers.

Questions: In order to move from single isolated services to a more general approach to Mobile 2.0, we need to answer several questions. We must better understand the role of sensors and context information in mobile services, and in particular find ways to make practical and useful abstractions of this information. We need to integrate this work with existing effort in Web runtimes (Google Gears, Nokia S60 runtime, etc.) and HTML standardization efforts.

We also need to explore methods for distributing and evaluating mobile services on a large scale. Previously, testing of mobile software in research was typically done in a small scale limited by the number of available compatible devices. Here we wish to offer easily downloadable services that are compatible and used over a large range of phones. This will make it

necessary to adapt the way that services are distributed and test subjects recruited. Furthermore, we need to develop new user evaluation methods, which can facilitate testing in groups of several thousand people – without compromising personal integrity or overly straining the resources of the researchers.

Method: In the first period of Mobile Life, we developed and tested a number of example services which illustrate the concept of Mobile 2.0. We have also tried to move from small-scale testing with a small number of specific terminals, to large-scale tests where software is compatible with most advanced phones. The next step is to generalize these experiences and create an integrated development and testing environment for Mobile 2.0 services.

We believe such an environment requires three components:

- A *Mobile Markup Language*, which takes the form of an HTML extension that expands standard HTML to include mobile hardware and sensors, such as location, camera, accelerometers, and near-field communication
- A *Browser*, which runs on a large number of terminals and is capable of interpreting the markup language extension
- A *Server*, which would off-load important work from the mobile terminal, such as relative location finding, push messaging, etc.

We propose to develop the above components using a bottom-up process, starting from simple service examples and working up towards more complex cases. We will develop demonstration environments in the form of extensions to an existing open-source mobile browser platform, e.g. Webkit. We will aim at making the results available for mass market testing through various means, e.g. Telia's Innovation World community, Stockholm City's employees in various domains, etc.

Expected Results: The project will result in an implementation of a proposed Mobile Markup Language, as discussed above. This includes a browser that runs on a range of phone OSs, e.g. Windows Mobile and Symbian. A range of services based on our markup language will be implemented, some of which may be re-implementations of services from previous Mobile Life projects.

Deploying these services will be much easier than traditional applications, since they require only one new software installation (the browser) rather one procedure for each new service. We will perform large-scale testing of both our own markup-language-based services, and other services such as Sony Ericsson's Hanashi. This will lead to new insights in the distribution of mobile services, and new methods for evaluation with a large number of users.

Finally, the aim of this project is to also go outside the research environment. We would hope that all or part of our specification is useful enough to be implemented in other browsers, from other developers. If the work is successful it might even eventually be incorporated into the standardization work of W3.

Deliverables:

- Evaluations of 2-3 services developed in Mobile Life and by partners, with emphasis on lessons learned for large-scale deployment of mobile software
- New software and specifications for creating Mobile 2.0 services over a large number of platforms
- Academic publications documenting the above: 2 full papers, 3-4 demonstrations and short papers/posters

Detailed plans for the period April 2009 – March 2010

April-June: Preliminary evaluation of services developed earlier with user groups facilitated with the City of Stockholm, e.g. Portrait Catalogue in schools; Open Geo Chat for home healthcare (Nicolas Belloni, Zeynep Ahmet)

July-December: Start large-scale software evaluation using experiences from first trials. This is also including partner software such as Sony Ericsson Hanashi (Mattias Rost, Nicolas Belloni, Zeynep Ahmet)

April-June: Specification of a proposed markup language specification, covering a subset of functions, is presented and discussed with partners in workshop form (Lars Erik Holmquist)

July-December: First implementation of a proposed capable browser. At this stage we plan to use rapid prototyping by implementing it e.g. as a Firefox extension for ultra-portable PCs. (Mattias Rost)

January-March: First implementation of markup language on an actual mobile platform, e.g. Nokia S60

March 2010: Deploy first generation of public markup language services

Ongoing: Organize outreach to start-ups facilitated by STING and Kista Mobile Showcase

Ongoing: Engagement with standard development bodies, e.g. the W3 Consortium

Ongoing: Release software and engage with developer community on Telia Innovation World

Budget:

Year 3: 3 295 KSEK (1 889 KSEK cash, 1 405 KSEK in-kind)

Year 4: 3 296 KEK (1 892 KSEK cash, 1 404 KSEK in-kind)

Year 5: 3 298 KSEK (1 895 KSEK cash, 1 403 KSEK in-kind)

Involved personnel first year:

Lars Erik Holmquist - project management

Mattias Rost - development

Nicolas Belloni - development, user studies

Zeynep Ahmet - user studies

Domain project: MoreVideo! - Mobile Collaborative Video Production

Project leader: Oskar Juhlin

Partners: Ericsson, SonyEricsson, TeliaSonera, Stockholm City Municipality, Microsoft Research Ltd., Nokia

Time period: 20090401 – 20120331

Description: The domain project focuses on collaborative mobile video production. It focus on the generation of new and innovative services supporting the local and collaborative production, distribution and consumption of mobile media, and especially video. The design will be informed by ethnographic studies on current media usage in mobile situations as well as ethnographic studies of professional TV production.

Questions: Motivated by a number of contemporary trends of media production and media sharing on the Internet in the area of user content creation, such as blogging, podcasting, and wikis, and by similar attempts made by mobile phone manufacturers to incorporate mobile blogging and high quality video recording functionality, we argue that the scope of research and development efforts around mobile media should be extended. It is possible to envision mobile, collaborative and mundane user content creation, which may result in local production, distribution and consumption of mobile video on the spot. The domain project aims at exploring the future of mobile video, investigating the challenges for research as well as industry. This will include a number of issues ranging from: (1) gaining an understanding of today's mobile media usage, (2) based on this knowledge we will formulate, design and ev-

evaluate new services, as well as (3) develop business models for the proposed future services for mobile TV.

Method: In order to realize the vision, we will inform the research with studies of salient case studies containing critical characteristics of importance for the generation of new applications. The project method incorporates ethnographic field and technical reviews in settings where people are involved in collaborative and mundane socializing at geographically distributed locations. By combining empirical findings with our knowledge on technology, and by seeking inspiration from professional TV-production, we argue that such research may uncover interesting findings that inform the design, and by that broadening the scope, complementing current initiatives on mobile media/mobile video. The result will inform the design process in which new application will emerge, become implemented and then evaluated.

Deliverables:

- Application: Finalisation and public release of Swarmcam prototype
- Two full papers presented at international peer reviewed conferences
- One demonstration at an international peer reviewed conference
- Three public demonstration of the application
- Broadcast productions: Nationaldagen 6/6 and the youth festival UNG08

Detailed plans for the period April 2009 – March 2010

April – August: Finalization of Swarmcam

April – July: Freddie Ekblom finishes his master thesis on loop functionality in Swarmcam

May – August: Collaboration with City of Stockholm, Simon Strömberg at Unga berättar, which includes transferring of technologies as well as support for broadcasting of festivals etc.

Autumn: We have planned to return to the TV broadcast bus to take a close look at replay production. The analyses will be done in collaboration with Matthias Broth and Mark Perry, and the Video-on-Video research community.

Autumn: Initiation of master thesis on content analysis of mobile video streaming on the net.

On-going: Parallel project initiated with Bambuser, and funded by Vinnova, to develop and test a video mixer on a mobile phone.

Autumn: Content analysis study of streaming video applications initiated

Budget:

Year 3: 2 547 KSEK (1 082 KSEK cash, 1 466 KSEK in-kind)

Year 4: 2 353 KEK (875 KSEK cash, 1 479 KSEK in-kind)

Involved personnel:

Oskar Juhlin 30 % - project manager

Arvid Engström 100% - junior researcher;

Liselott Brunnberg 100% - senior researcher;

New employee 100%

Domain project: Pervasive Games

Project leader: Annika Waern

Partners (tentative): TeliaSonera, Stockholm City, Nokia

External partners: The Company P

Time period: 20090401 - 20120331

Description: Pervasive games are games that are played in the world around us, rather than on a computer or mobile screen. The main attraction of pervasive games is that they are reality-based, drawing upon a real world which is richer, more varied, and emotionally and historically more interesting than any made-up game world can be. Pervasive games draw upon modern Internet, mobile and pervasive technology to create rich playful experiences in the everyday world. Some forms of pervasive games, especially location-aware mobile games and cross-medial productions with TV and Internet parts, form very rapidly growing forms of entertainment.

Pervasive games are a curious form of culture. They exist in the intersection of phenomena such as city culture, mobile technology, network communication, reality fiction and performing arts, combining bits and pieces from various contexts to produce new play experiences. The family of pervasive games is diverse, including individual games ranging from simple single-player mobile phone games to artistically and politically ambitious mixed reality events. Some of these games seek to pass time for a few minutes while waiting for a bus, whereas others create persistent worlds that go on for months and where players can adopt alternate identities and engage in intricate gameplay. Some games use high-end technology, while others can be realized with no technology at all.

Questions: *Visibility and Social Expansion.* Pervasive games are always played among people that are not themselves playing, and players will often interact with other players as well as with bystanders. This can be potentially problematic when bystanders are scared or confused by the game, but it is also an excellent introduction route to participation. Also, the public visibility of pervasive games offer opportunities for artistic and political expression offering opportunities for exploring pervasive games as public and performance art. We explore *play in public space*, deliberately emphasizing play activities that are publicly visible and leave public traces. We also explore *play in mass media*, studying the emergent interaction between pervasive games and TV, film, books and daily newspapers.

Deep engagement. Previous research in the group has shown the critical potential that pervasive games offer from creating deep player engagement. Games that rely on indexical activity (doing things for real) and immersive role-play create deeply emotional and memorable experiences. This offers opportunities for engaging learning experiences that are rare in other game forms. One goal for our research is to create example games that provide opportunities for deep player engagement in difficult issues; these are arenas for learning and reflection.

Tools for development and game-mastering. Game mastering has proven invaluable in pervasive games. The goal of successful game mastering is to strike a balance, where the game can respond to player improvisations and (in the case of pervasive games) real-world interventions without becoming just an open playground where anything goes. However, a huge challenge with game-mastering is to mix automated and manually controlled gameplay in ways that allow for large-scale games without losing the human touch that game-mastering allows. This, we address primarily through the development of tools that support authoring as well as orchestration of pervasive games.

Method: The project is planned to run for three years and will consist of three activities.

- **A cross-medial production.** The project will engage in at least one large-scale cross-medial production with its partners. Through this collaboration, Mobile Life will get an opportunity to test its technology tools in a sharp setting, and given opportunities to study a large-scale production.
- **Game experiments.** We will also undertake small-scale experiments with games that have been designed to study the core design issues. These experiments will focus on public play and deep engagement.

- **Technology development.** Technology development will focus on the development of support tools for authoring and orchestration over a number of platforms and devices. The project's main target devices are high-end phones with built-in sensor and positioning technology, but we will also explore the use of custom-built technological game artefacts and installations in the real world.

Deliverables:

- At least one pervasive game will be staged and studied within the project
- A support system for designing, running and studying pervasive games (Year 1)
- At least two technical demonstrators that support semi-generic game functionalities in pervasive games (One year 1)
- At least five master thesis, one licentiate thesis (Two year 1)
- About ten scientific publications (One Year 1)
- The book 'Pervasive Games: Theory and Design' was concluded during the previous period and is published by Focal Press during 2009.

Detailed plans for the period April 2009 – March 2010

April – October: *Staffan Jonsson* continues to work with the development environment TheCreator. The prototype will be put to test in a collaboration project with Lava, a youth culture centre at Stockholm Municipality. The tool will also be offered to larp organisers through SVEROK.

April – June: *Zeynep Ahmet* finishes her master thesis in June 2009, on the design and evaluation of tools for studying pervasive games. The thesis is partly based on data acquired from restaging the game Interference in February 2009.

April – June: During the spring of 2009, *Annika Waern* continues to analyse data from the Interference restaging in February.

April – May: *Satish Kumar* and *Mehdi Eladhi* finish their master thesis in May 2009, on a prototype for a mobile peer to peer recommender system.

April – September: A new master student *Anna Westerling* has been recruited to study the economic and social incitements in larp organisations. The project is expected to finish September 2009.

September - March: The group plans to recruit a *new Post Doc student* to work with a new game project. This project will be initiated September 2009 and run in collaboration with several Mobile Life partners, and to some extent involve everyone working in the Game studio.

On-going: In collaboration with P, we also hope to conduct a study of a large-scale commercial pervasive game during the year. The timing and scope of this project is unclear as it depends on external contacts at P. The project will recruit a guest researcher for this project.

Budget:

Year 3: 3 115 KSEK (1 635 KSEK cash, 1 480 KSEK in-kind)

Year 4: 3 085 KEK (1 606 KSEK cash, 1 479 KSEK in-kind)

Year 5: 3 085 KSEK (1 607 KSEK cash, 1 477 KSEK in-kind)

Involved personnel:

Annika Waern – project management

Staffan Jonsson – software development and user studies

NN – post-doc

Domain project: Playful experiences – new project!

Partners: Nokia et al

Project leader: Undecided

Time period: 20090901- 20100901

Description: The main purpose of the project playful experience is to understand what constitutes enjoyment of using a product; what kinds of experiences the product can elicit, and how to design something that evokes certain kind of experience. Attributes such as fun and pleasure are currently abstract and there are uncertainties as how the different possibilities for supporting playful experiences can be addressed in design. Furthermore, there are huge variations between users in what they find pleasurable or fun. For some users, fun constitute of hard challenges that stretch their abilities to the extreme, while for others pleasurable experience constitutes casual social interaction, aesthetics and beauty.

Question: For the reason above, more specific categorizations of what kinds of experiences the designers are about to address in the design are needed.

Methods: The project will in its initial phase be coordinated with the theme project on “social properties of mobile leisure”. It will draw upon the result of a workshop, held in that theme project, which identifies the various ways in which we research leisure and playfulness, and domains in which playfulness can be studied.. This workshop will influence the set up of the playful experience project. The project will consist of design exercises to develop a concept by which the topic can be addressed.

Results: A set of design concept and an implemented version of one of those.

Detailed plans for the period April 2009 – March 2010

Design workshop to be held in September 2009

Budget: Not yet decided

Involved personnel: Not yet decided.

Gender perspective in the research programme

The gender dimension is of relevance for the topic of research, in this case development of mobile services. For example, the issue of a gender divide has been discussed by researchers within the Centre with reference to gaming and to personal integrity. Furthermore, gender is a relevant concern in this area where there is a clear male dominance among early adopters of mobile services and mobile technology. A design approach that unreflectively focuses on users with strong positive expectations on new applications runs the risk of becoming less valuable for other user groups. Here the user-centric approach is an important resource, which will provide us with methods to make all forms of mobile life inform the design of new services. For example, ethnographic studies of women-dominated areas in computer games could sensitise research to make their needs influence new and more interesting applications.

We will also apply other mechanisms to ensure that marginal voices inform design. In studies, experiments, demonstrations, and field trials, care will be taken to focus both on women and men. Some applications will be developed to target women or girls in particular, for example by using a female focus group in participatory design activities. Some mobile services developed within the project, in particular games, will be evaluated for gender bias by external experts or project researchers with expertise in the subject.

Plan for measurement and evaluation of research and results in relation to the general and specific Centre goals

Self evaluation including indicators

The Research Management group is responsible for internal self-evaluation of the Centre. This entails:

- the quality of project outcomes will be evaluated through:
 - on the one hand the normal academic publishing system (where the academic standard of the publication will be an important metric)
 - and on the other hand, the relevance of the results to the uptake by industry (for industrial partners) or its relevance to users (for public sector partners)
- making sure that results are communicated to all our partners (which will be evaluated through feedback in regular meetings with all partners)
- closely monitoring the progress of PhD-students, including having all students create and continually revise doctoral plans, encouraging them to attend doctoral colloquiums at relevant conferences, making sure that they publish, etc.
- each project will define a project plan and a set of milestones and goals, and the progress vis-à-vis those milestones and goals will be closely monitored by the Centre management team
- regular reports for each of the issues above will be produced for the board meetings (twice a year)

The internal evaluation process also includes internal and external seminars on specific topics and projects where Mobile Life research is presented and scrutinized.

As described under Learning Activities, the Centre will have an International Advisory Board. In addition to advising the Centre on how to run a large research operation, the advisory board will also evaluate the Centre's research results and methods. The following are the current members of the Advisory Board:

Name	Position	University	Location
Paul Dourish	Professor	Donald Bren School of Information and Computer Sciences University of California Irvine	USA
William Gaver	Professor	Department of Design, Goldsmith University of London	UK
Masa Inakage	Dean	Graduate School of Media Design, Keio University	Japan
Katherine Isbister	Associate Professor	Polytechnic University of NYU	USA
Tom Rodden	Professor	School of Computer Science and IT, Nottingham University	UK

The goal is to have the whole advisory board meet physically once a year, and be in continuous contact with them in the periods between meetings. The first meeting of the Advisory Board will take place on March 4, 2009.

Finally, an annual report will be produced which summarizes all of the Centre's scientific results, including comments from the international Advisory Board. This will be used by the Research Management Group and Board of Directors as a basis to assess the success of the Centre.

Systematic evaluation of technical and scientific outcome

The scientific results of the Centre will be evaluated according to number of:

- publications in refereed journals and books/book chapters
- manuscripts under review at well respected scientific journals

- papers in conference proceedings, national reports, reports in non-refereed national journals, trade journals, working papers and other unpublished reports
- conference presentations

The impact of the Scientific Results of the Centre will be evaluated according to number of:

- citations by other researchers (in journal articles, books, published conference proceedings, and PhD theses) from citations indexes
- invited and plenary presentations at international conferences
- foreign co-authors in journal articles
- actually implemented research findings

The amount of collaboration within the Centre will be evaluated according to number of:

- involved companies
- involved researchers
- workshops and participants
- seminars and participants
- co-authored publications

The activity of Educating Young Scientists will be evaluated according to number of:

- doctoral degrees completed
- licentiate degrees completed
- master theses completed
- doctoral students supervised
- master theses students supervised
- teaching cases written and used in courses

Evaluation of the industry – university collaboration

Collaboration with industry is essential for the Centre, but the metrics for measuring success are notoriously difficult to find. We hope to document the transfer of technologies developed, knowledge produced, design for solving specific user interaction problems and results from studies to industry but in an open-ended, non-standardized form. Often, the Centre will be producing alternative solutions to the ones prevailing in industry and will contribute to opening up the design space in new direction. Evaluating the effects of such research work that challenges existing concepts is notoriously difficult, and we will work together with our partners to create suitable measures.

To ensure good collaboration the Centre has set up a range of collaboration forms. One is in the form of internships where researchers in the Centre will spend shorter or longer periods working at the industrial partner sites. These internships will be evaluated in terms of how they in turn lead to new collaborations, joint projects, joint publications or transfer of results from one partner to another.

Our general goals for collaboration with industry include:

- Actively involve every major partner directly in at least three domain research projects
- Actively involve all partners in all theme projects
- Have at least one Mobile Life intern at every major partner per year

Preparation for the VINNOVA evaluation

The output from the evaluation processes described above will be used as an input to the VINNOVA evaluation.

Actions taken on recommendations in the Evaluation of Stage 1

The evaluation report on Stage 1 identified 16 issues that the centre should deal with:

1. That the Management Team and the Board create together a ten-year strategic research vision and a three-year implementation plan and present these documents for comment to the SAB

During the first phase of the centre, we have initiated a dialogue with all our partners of what the future mobile life could and should be. In March 2009, we had our first meeting with SAB at which we presented our vision for a future mobile life and how the centre will do research contributing to its realization. The SAB members were all keen to be involved with the centre and contribute to our research foci. They also suggested a working vision document that we continuously work on and update in discussions with them.

The evaluators expressed worries that tools allowing end-users to be creative, have fun and get empowered is not sustainable or operational in a ten-year perspective. However, we believe that making mobile media and mobile materials accessible to end-users in their creative processes, and creating mobile services that empowers users to deal with their own health, social interactions with others, playful activities, media production etc. will be a key in the future success of mobile technologies. Financially, leisure activities are what is carrying a large part of the industry already. By making these processes clearer in the “working vision document”, we hope to alleviate these concerns and point to the business processes that follow from our vision.

The evaluators also claimed that the centre is not dealing with privacy issues that follow from our vision. Actually, privacy and issues of autonomy are key values in all our design processes – as a substantial amount of publications from the centre in this area shows (see e.g. Höök et al, 2008). Likewise, in our dealings with how to make our research results viable, we have included economical issues as part of how we evaluate and understand users experiences.

To ensure that our vision is indeed sustainable and operationalisable, we are planning for a major evaluation milestone in the middle of the upcoming period where we will critically examine the 10-years vision as it is formulated now in the light of the commercial and academic developments.

2. That the Centre increase its core competence by creating strategic alliances and partnerships with experts in HCI and mobile technologies in the local academic community, e.g. KTH, other departments in SU

We agree with the evaluators on this point, and we have already initiated several contacts to increase our strategic alliance with local researcher. Our aim is that the centre should grow to twice its size and become a focal point in Sweden for research on mobile services. It is vital that we are seen as an attractive and able partner for not only our local academic colleagues at SU and KTH, but internationally both for academic and industrial partners.

For instance, we have collaborated with KTH on a government funded strategic resources proposal. KTH has also invited us to their European Institute of Technology KIC-proposal. Since the evaluation was done, Kristina Höök has obtained a 13 MSEK grant from SSF (a Swedish funding organization) for a project in collaboration with researchers at the centre Wireless@KTH.

3. That the Centre consider creating a partnership with an academic ethicist to provide an explicit ethics component for their work

As discussed above, ethics is and has been a major part of the considerations in the research we do right from the start. Following the recommendation, we have contacted an ethicist at the department of Philosophy at SU.

4. That the Centre Director, in consultation with the Board Chair and Management Team undertake to establish a set of criteria and mechanisms for selection and review of projects and that the first round of this process be completed before the March 2009 meeting of the SAB

We have not had time to do this before our meeting with the SAB in March. But our process for deciding on projects has undergone the following steps that we believe reflect the seriousness by which we involve our industrial partners in the development of projects:

- In August 2008, we involved all partners in a brainstorming session, out of which several project ideas arose that either stayed in the centre or became research proposals sent to different funding organizations
- We met with each partner to further discuss the project proposals that either came from the brainstorming session, or from our previous joint work
- During two phone conferences with each partner we discussed draft versions of those projects
- This was all put together into a full operational plan, sent to the partners by the beginning of February, asking for feedback

On top of this, we have bi-monthly meetings with each partner to establish the status of already ongoing project and collect feedback on their progress and how to make sure that everyone is involved. The board receives a status report at each board meeting describing the progress of the projects. And finally, similar to how the Mobile Eco-System-project has had a steering board, led by Martin Körling from Ericsson, we aim to provide each project with a similar steering board (different project might employ different solutions depending on the nature of the project).

We presented and discussed this whole process with SAB in March.

5. That the Centre Director, in consultation with the Board Chair and Management Team undertake to establish a set of criteria and mechanisms for identification and articulation of partner needs and introducing these findings into the project review process

See above for new mechanism on “integrated research planning” that will be implemented during the next period.

6. That the partners take a more active role in ongoing research projects

To ensure that each partner has a strong and important role in our projects, a steering board for each project will be created, incorporating representatives from each partner.

7. That the Board undertake to identify and recruit appropriate additional partners including SMEs

The board has been highly active in helping us to recruit relevant new partners to the centre. Through this process, Nokia has been recruited to the centre.

As discussed at evaluation meeting, we have a mechanism in place for including SMEs. They can sign an agreement that gives them access to the IPR for a particular project. During the first period, we collaborated, for example, with the company P. During the upcoming period we will continue to collaborate with P and with the company Bambuser. We also have ongoing contacts with a large set of SMEs through Kista Science City’s programme Kista Mobile Showcase. We are also involved in their activity Mobilgalan each year.

8. That the Chair of the Board be from one of the industry partners and be expected to act proactively on behalf of the Centre

In the new board, Martin Körling from Ericsson is suggested as a new chair.

9. That the Centre have a full-time executive assistant in place as soon as possible

As discussed during the evaluation meeting, we have employed Maria Holm from August 2008.

10. That the Management Team be signatories of report of the Centre and that the report be approved by the Board

The report was written by all four senior researchers in the centre. The board was given several opportunities to both read and comment on the report. Next time, the management team will formally sign the report together.

11. That SAB meet more frequently members of the SAB be consulted between meetings using remote conferencing

This is a good idea, and we will follow this advice.

12. That the Department Chair undertake to meet regularly with the Centre Director to empower the Director with respect to growth and development of the Centre and new academic linkages

Several such meetings have already taken place, and we expect to continue the discussion. For now, we have offered researchers and lecturers from other groups with Department of Computer and Systems Sciences to spend time in the centre.

Discussion with the social anthropology department, Paula Uimonen, has been initiated, but we will seek to broaden our contacts with the social sciences faculty.

We are also collaborating with the Stress Research Institute of Stockholm University, through Torbjörn Åkerstedt in one of our projects.

13. That the senior leadership of SU consider the needs for permanent academic staff necessary to sustain the Centre.

Oskar Juhlin has been offered an adjunct professor's position. The Department Chair is also investigating ways by which Annika Waern can become merited enough to obtain adjunct professor's chairs at the department. (Lars Erik Holmquist has been offered a professor's chair at Södertörn Högskola that he has accepted on 25% of his time. The rest of his time, he will spend in Mobile Life, working at SICS.)

The department has appointed a new professor in IT & Society. We hope to collaborate with this new professor.

14. That SU reviews its policies with respect to adjunct professors to permit the appointment of industry specialists who would be of assistance to the Centre and to foster the career development of research staff in the Centre

The regulations of SU can be found at:

http://www.regelboken.su.se/content/1/c4/29/33/AOSU_rev_080416.pdf

Within the limitations of these regulations, SU is highly willing to make it possible for adjunct professors to be appointed within the Mobile Life centre.

15. That the Centre establish a distinctive visual identity

The new visual identity, including web site, business cards, etc. has been created and was launched at the Mobile Life Open House event 4th of March 2009 (see www.mobilelifecentre.org)

16. That the Centre take steps to recruit outstanding students nationally and internationally for the PhD level and to recruit Masters theses project students from among SU undergraduates

This process is already in place as researchers at Mobile Life are teaching at International MSc-programmes at DSV. This is where we recruit most of our MSc-students. Any open PhD-student position is internationally advertised.

We are currently recruiting two international ERCIM-postdocs to the centre.

Financing Plan and Budget for Stage 2 (see appendix) Contributions (cash, in kind) from Industrial and Public Partners

See separate Excel-document.