



**Mobile Life VINN Excellence Centre
Operational Plan Stage 3
2012 – 2015**

Executive summary

The unique strength of the Mobile Life Centre lies in its combination of leading edge applied research and intense collaboration with industry. The research team develops novel mobile services, theory and methods. We design, implement and subsequently study novel, futuristic applications for real uses.

The Mobile Life VINN Excellence Centre provides a view into our future life with digital technology, an enjoyment society where happiness, pleasure and play are adopted into all aspects of our lives. Already, enjoyable activities and experiences are fundamental parts of our daily lives and we orient towards them during leisure time and when engaging with others. The quest for enjoyment is there when we look for things to do after a day at the office; when we discuss holiday plans with friends or kin, or when we browse the TV-menu. It is also there when we engage in meaningful activities that are pursued over longer times, and where the pleasure does not arrive momentarily, such as when training to improve skills in sports or when we organise enjoying practices for others. The orientation towards increased happiness has perhaps never been as apparent as with the emerging Internet culture, a culture that long ago left the desktop computing environment to be available on TV screens and mobiles.

At the Centre, we show how enjoyment will be pursued given a mobile technology of a somewhat new type. With the integration of more and more sensor and communication technology in phones as well as in the environment, we are rapidly entering a world in which there no longer is any difference between 'online' and 'physical' – the Internet is just there for us, all of the time, as an invisible aspect of our physical world.

In order for us to better understand the possibilities and challenges with such a society, we invent and investigate a number of *enjoyment services*. Such services, which depend on mobile devices and networks in combination with emergent sensor technology, give us better means to engage in the situation and location at hand. They are intended to fit with movement aspects of people's lives. They combine the potential of the web, with the activities that matters for people in their everyday mobile situations. We are no longer connected to the network through our devices; the network is just there, on location and in the situation at hand.

Visitors to the Centre get a peek preview of the future. They will see how computer games are present everywhere and transform everyday life into magic. We show how user-generated media expands into live video, and how user-generated live video and sensors can be utilized to provide enhanced experiences of nature. The increasing availability of sensors can also be used to make our relation to our body even more interesting. Peoples' interest in their own experiences, and their friends' and kin's experiences, will thrive on new means for self-description based on body data such as their skin's moisture levels, pulse or physical movements. Fashionable people will express themselves through digital material of various sorts. And people will not depend on experts to make this future happen, but can take active part in shaping their own apps and services through the tools and app mash-up environments we provide. We show how service development is increasingly rapid, pointing to a future where applications can be designed for a very specific purpose and specific user group, but used among people with similar needs all over the world.

In all, we believe that the role of a mobile phone, as a person's main digital device, is currently at its peak. In future society, with an increasing number of enjoyment services, as presented in Centre, it has to compete with many devices on and around a person to provide for a richer and more enjoyable life.

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1 Centre Objectives and Long-term Strategic Plan

1.1 Vision

We have a vision of an enjoyment society where happiness, pleasure and play are adopted into all aspects of life.

Enjoyment, pleasure and happiness are fundamental part of our lives. In almost all situations we orient towards these aspects of life, such as the activities we do during leisure time and when engaging with other people. The quest for enjoyment of various kinds is there when we look for things to do such as after a day at the office, when we discuss holiday plans with friends or kin, or when we browse through the TV guide. The struggle against boredom is an everyday and ubiquitous concern in the ways we strive to live a happy life.

We pursue this search in activities that are intended to give momentary pleasurable experiences, to those that require long term commitment and hardship in order to achieve happiness in the end. When we consider modern society, such as the mass media or consumer industries, it is hard to deny the importance of the quest for enjoyment. In terms of industry, enterprises based around enjoyment certainly dominate others - the media, tourism, hospitality, bars, restaurants. Indeed we would argue, assisted by documents as the classification of employment, that a majority of us are employed in one way or other in enterprises that are focused on the enjoyment of others. If we think about computing *per se*, enjoyment is perhaps the biggest application area. Games, films, music, file sharing, social networking, networking and so on – the applications of computer science are predominantly to do with enjoyment and its various manifestations. Research in the area of human computer interaction therefore has an important role to play to both understand how boredom is avoided and how happiness occurs.

We have a vision of a sustained and consistent research framework for designing technology for happiness, to ensure that new technology quickly become appropriated in meaningful and interesting ways.

Lately, happiness has become a strong and emergent focus in many areas of science such as economy, psychology and philosophy. There is also a growing research area within computer science and especially within human-computer-interaction. Yet if we compare our everyday experiences of happiness with the newly awakened interest within research, we are struck with two challenges:

First, when we want to frame it as a strategic concern, or vision, in research, the risk is to become ridiculed and criticised for being unserious. The motives, for doing research in this area, are often challenged by requests to focus on seemingly more serious aspects such as health or employment. Second, happiness is itself an intricate notion, and we struggle to frame it using concepts such as pleasure, enjoyment, playfulness or “the good life”. The wide variety in notions of enjoyment presents a thorny challenge to our foundational research. We must have the research vision to imagine a situation where research provides a consistent and sustainable framework for thinking about happiness in design. Our goal then, at this stage, is to establish happiness and the good life as a long term topic on the research agenda and provide theoretical insights on how it should be achieved.

We envision a society where new technology increasingly enriches our pleasurable interactions with the environment whether it is social, urban life or nature, as well as enriching our interactions with our bodies and the clothes we wear.

The Centre has a strong concern for human experiences with technology, and our most fundamental goal is to increase quality of life and happiness in society. Indeed, if one looks at happiness or enjoyment one finds that a remarkable proliferation of technologies to support, enable and enhance enjoyment have been developed. Be it GPS systems used to track hill climbers, social networking websites used to keep in touch with friends, or laptops used to watch television shows, leisure is increasingly saturated with technology. The predominant use of technology worldwide is not war, or productivity, but enjoyment. Whole classes of leisure - such as sport or television - could not exist without technology in its many different forms.

And whereas mobile and ubiquitous technology has many utilitarian usages, it is the social, and enjoyment aspects that has become prominent among consumers. The recent success of social media, with its focus on play and socialising, is one proof of a strong user demand to reap the benefits of new digital technology, enrich ordinary life and make it more meaningful and enjoyable. The orientation towards the good life has perhaps never been as apparent as with the emerging Internet culture, a culture accessible not only on desktop computers but on TV screens and in mobile forms. Through social media, email, chat etc. we have access to our distant colleagues, friends and family. Yet we are now faced with another technical revolution where the dominant role of the mobile phone will be challenged and people instead will engage with a plethora of devices, networks and sensors, what we in combination call “enjoyment services.”

We have a vision of “enjoyment services” that support mobile devices and networks, in combination with emergent sensor technology, to give us better means of engaging in the situation at hand.

Such *enjoyment services* fit with physical movement aspects of people’s lives, which mean that the services account for contextual experiences of peoples’ situation at hand. They combine the potential of the web, with activities that matters for people in their everyday mobile situations. We are no longer connected to the network through our devices; the network is just there, on location and in the situation-at-hand.

This is in line with a broader technical trend. The mobile IT-revolution, the introduction and deployment of Internet and the World Wide Web on mobile handsets during the beginning of the new century, has already had a major impact on society. The internet has become completely integrated with our lives, nearly everywhere and anytime. Yet with the integration of more and more sensor and communication technology in phones as well as in the environment we are facing a second mobile IT-revolution. There is no longer any difference between “online” and “physical” – the Internet is just there for us, all of the time, as an invisible aspect of our physical world. This second mobile IT-revolution has many different names: ubiquitous computing, ambient computing, machine to machine just to name a few – here we use the term Internet of Things (IoT). By that term we refer to the combination of (1) many sensors and actuators, together with (2) the connection to the Internet enabling the collection of “big data”, that is huge amounts of data that can be harvested for novel forms of functionality based on the behaviors and interactions of millions of users.

We can already see emerging commercial examples of such services, including social media to “check-in” at locations, log and share exercises and social media for tourists and shoppers. There are also a number of “wellness” services that measure body data, such as pulse rates, number of steps, and temperature. There is a range of services related to shopping where digital data is associated with a physical product. However, we argue that the complexity of this area demands a more strategic approach supporting the industry in providing technology and applications for a widened market of services for the *mobile* good life.

This growing complexity derives from the attempt to fit digital functionality to the situation-at-hand. It is the matching between the digital world and what is at hand in the physical world that raises the stakes, but also the opportunities. Designing such enjoyment services is complex and demanding both from a user experience perspective, as well from a technical perspective. This complexity is double-sided since there are uncertainties both when it comes to understanding the situation-at-hand when integrating mobile and IoT-technology with enjoyment, as well as when it comes to finding the best appropriations of emergent technology.

Furthermore, in order to realise the potential of these enjoyment services, industry must develop sustainable business models and market ecologies, in a world where networks become invisible for consumers. Designers must learn to work with an entirely new landscape of materials, developing services that do not exist “in the cloud” or on devices, but exploit the tight and intricate connection between people and their activities, and places and things.

1.2 Mission

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

- Develop the Centre's principal mission to evoke industrial interest in consumer oriented use, such as in enjoyment, of emerging technology.
- Create a deepened understanding of the unique properties of enjoyment in mobile life.
- Investigate business models and service eco-systems for future enjoyment services where we explore alternative universes for infrastructure, business models and the industry's new roles.
- Provide a range of novel sensor and context-dependent enjoyment services for mobile media creation, play, social interaction and bodily awareness.
- Develop efficient and user-oriented methods for developing such services.
- Establish the Mobile Life Centre as the natural partner for the Swedish mobile IT industry, when it comes to seeking advanced competence in the area of "consumer-oriented Internet of Things".

1.3 Results in phase III

1.3.1 Specific results

The Mobile Life Centre has a major and long-term impact on research in mobile services, related industry, and society as a whole. In a three years perspective, we have the following results:

- Our new research partnerships, complementing our competence in applications design, will focus on sensor networking and large data set analysis, technical competencies that reflect our shifted focus towards enjoyment services.
- The extended collaboration with researchers in our partner organisations will allow more researchers to work (physically) in the Centre locale, particularly when working on project that are not part of the formal Mobile Life collaboration. (The board will actively supervise the IPR-issues that will follow from being involved in different projects outside the centre agreement).
- Individual and joint studies of experimental services will improve our understanding of how mobile services shape our everyday life. This knowledge will be embodied both in research papers and in concrete application examples.
- In expanding the Centre's network we will combine its excellence in human computer interaction with competence in big data handling and networking.

1.3.2 Specific results for the partners

The Mobile Life Centre should have a *major and long-term* impact on research in mobile services, the related industry and society as a whole. The Centre is set up to provide strategic innovation in a three to five years perspective to our industrial partners. The specific results for the partners as well as implemented results are tightly connected with the communication plan with its yearly goals (see table 1), and associated with a milestone of the yearly report which is presented to the Board at the first meeting during each year.

- A new organisation will facilitate exploitation of service innovation within the Centre, the organisation provides the first steps on the service innovation route, primarily directed towards the creation of spin-off companies but also for partners to exploit.
- An improved commercial innovation system will support and accounts for short term, medium term and long term innovation activities.

1.3.3 Implemented results

The Centre are anticipating the following successes in the upcoming phase.

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- Concrete application ideas has been developed and commercialised through our partners, so called “spin-ins.”
- The Centre has generated two new SME’s.
- A network of companies, doing consumer oriented enjoyment services, has emerged with the Centre as a partner.
- Consumer values are increasingly focused on, as a common problem, which is visible in at least two state policy documents.
- The focus on strategic innovation will lead to 2-3 success stories among the Centre partner.
- The Centre has generated four new patents.

1.4 Goals

1.4.1 General goals

According to the VINN Excellence criteria, an Excellence Centre should contribute to the Swedish innovation system in two main ways. First, it should sustain its role as a *productive, academic Centre of Excellence* by actively involving a number of companies and research groups in joint research as well as contribute to the international research community. Second, the Centre should promote the *introduction and implementation of new technology* and *strengthen the technical competence* in Swedish industry, and finally have long-term impact on industry (for a more extended discussion on industrial and societal goals see section (1.5.4). The Mobile Life Centre should have a *major and long-term* impact on research in mobile services, the related industry and society as a whole. The Centre is set up to provide strategic innovation in a three to five years perspective to our industrial partners.

The forms for industry involvement in the Mobile Life VINN Excellence centre include multiple measures, most importantly collaborative projects and internships. In addition, centre partners benefit from their involvement in seminars, hands-on workshops, brainstorming activities, and concrete project work together.

Industry partners are given the first-hand option on commercialising centre results, an opportunity that has been taken by a number of partners. In the Centre there is a natural flow of technology, design insights and infrastructure between all the partners as we build mobile services together in concrete, applied projects. An additional advantage is the close connection between the Centre and the international mobile and ubiquitous computing research community, which allows the Centre to act as an informer and mediator between international cutting-edge research and the Swedish industry.

The Mobile Life Centre will continue to be a vital strategic component in ensuring that the IT and telecom industry successfully meets the challenges of the next five 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 five years perspective our goals are that:

- The Centre has contributed to a society in which mobile services fit with the physical motion aspects of people’s lives, which means that the services account for the contextual experiences of peoples’ varied experiences of the situation-at-hand. Taking this further enjoyment services combine the potential of the web, with the practices that matters for people in their everyday mobile situations.
- Enjoyment services contribute to an improved quality of life: they shape and support everyday activities to make them fun, engaging and meaningful. Even though both the existing market and research actors are increasingly interested in this area, there is an ongoing struggle to make this area prominent as a topic of technology development. Specifically, the Centre’s activities will aim to accelerate the development and acceptance of research in this area through

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its focus on interaction models, methods and tools for user-centred design, and the creation of inspiring examples of mobile services and technology.

- The Centre inspires commercial and private development of enjoyment services and content.

1.4.2 Specific Goals

Industrial/Societal and scientific goals and connected milestones

The core activity in the centre has always been the experimental design and development of novel mobile services. *Design research* is the primary way for the centre to address its fundamental research questions, including issues concerning technology use, business models, and service domains. The approach also ensures that the generated knowledge is not only embodied in reports and academic papers, but also as concrete, working examples of technology and services. The services we will develop in five years' time, will exemplify:

- Motion and enjoyment experiences– we will mirror practices of people in our contemporary society shape mobile services, and vice versa.
- 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.
- Technological possibilities, limitations, consequences, requirements.
- The enjoying mobile society – making values such as living a good, rich and enjoying life, explicitly part of our design processes and study methods, creating for a human-friendly and meaningful society.

The milestones for the above goals are (detailed description in section 5.2):

- Board meetings
- Steering committee meetings
- Open house
- Industry day

Centre Performance Goals and connected milestones

- The Centre has a goal to grow its international excellence through conferences and networks. A number of conferences (CHI, CSCW, DIGRA, Mobile HCI, DIS) are identified as milestones for this purpose.
- The Centre will grow through related funding and partnerships. In the end of phase III, the Centre will be active in two additional partnerships.
- The Centre will broaden its industrial collaboration by attracting at least one new partner from industries outside of the ICT companies at the end of phase III.
- The Centre has a goal of examining ten Ph.D. students during the next five years.
- The Centre communication performance will increase through an expanded communication strategy during the next three years.

1.5 Strategies

1.5.1 Implementation of results

The Centre works with long term strategic innovation, through influencing industries strategic choices, inspiring the research community and benefiting society as a whole. While this will continue to be the main approach within the Mobile Life VINN Excellence Centre, during the upcoming period, these activities will be complemented by the establishment of what we name an *Innovation Box*, targeting medium term innovation.

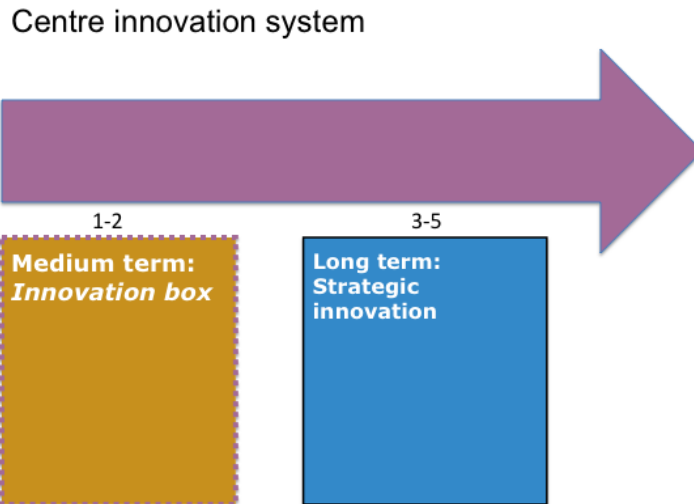


Figure 1 Estimated time to market for the Centre's innovation activities

Background and reasoning

The Mobile life Centre has a set of goals to fulfil (see section 1.4), and three categories of stakeholders. The first is Swedish Society, from the perspective of VINNOVA seeking results from the Centre that will spill over to the society in the form of actual market growth. The metrics for these results are number of spin-offs, patents as well as publications and networking activities. Secondly, universities and research partners are seeking results through high quality publications that will reflect on the organisations academic strength nationally as well as internationally. Finally, the industry partners in the Centre that primarily are looking for more soft and qualitative results such as knowledge transfer, inspiration and possibly spin-ins.

With such different stakeholder types, the Centre faces a challenge: it must not compromise between the goals so that it 'gets stuck in the middle'. It must strive for societal and industrial relevance as well as academic relevance. The term originates from Porter's (1980) discussion of "generic strategies", which is often referred to in the business world to identify a company's competitive strategy. As described in the previous section, the stakeholders demand certain types of results from the centre corresponding to their own goals, and all of them are not equally important to all stakeholders. The funding agency's (VINNOVA) mission is to finance "research and innovation for sustainable growth". If such sustainable growth is measured in terms of new companies from research projects and centres, it might diverge from the expectations of our industrial partners who are looking at results in a slightly different way. For example, they identify results as research that can inspire new product development and, in a long-term perspective, influence the strategic choices made by one company. The academic partners are looking for results primarily measured through the number of high quality publications produced by the Centre, but also for knowledge transfer through master student's and Ph.D. student's education completed and supervised within the centre. According to Porter, a company should choose one strategy in order to achieve competitive advantage. A combination of strategies will risk the company to 'get stuck in the middle', and possibly not succeeding with any of them. For an academic centre, we can use the model in a slightly different way: as the Centre pulled between serving society, industry, or academy.

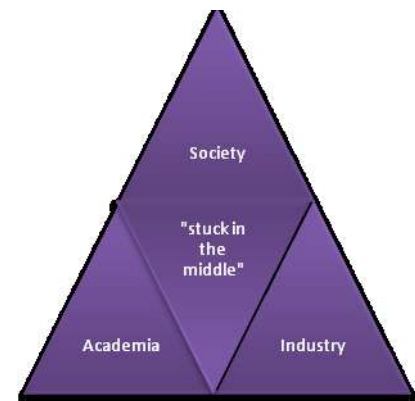


Figure 2 Porter's generic strategies

In phase I and in phase II we solved the potential conflicts by focussing on *strategic innovation*, where we expect to see the results of the research on the market in three to five years. At this

level, the goals of producing academic results and strategic knowledge can (and did) converge. The strategy allowed the research managers to focus their activities to deliver results to all types of stakeholders. Since this strategy was successful, we argue that this should continue to be the dominant focus during the upcoming period.

Strategic innovation as main approach

The Mobile Life Centre should have a *major and long-term impact* on research in mobile services, the related industry and society as a whole. The Centre is set up to provide strategic innovation in a three to five years perspective to our industrial partners. This is achieved through a number of activities:

Establishing a neutral arena for pre-competitive innovation activities: The vision is a mobility 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 research. The Centre makes use of innovative ways for securing relevance and participation of all partners in the research. A core issue is also 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.

A plethora of collaboration mechanisms (see also section 3.6): 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 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.

Highly qualified researchers: 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 Kista, where there already exist strong educational programs in many IT areas. This secures the inflow of well-educated master students and Ph.D. students. In Stockholm we also find KTH’s School of Computer Science and Communication (CSC), and the Swedish Institute of Computer Science (SICS). Several of the industry partners have advanced research and development departments in Kista.

Theoretical foundation: To ensure that the results provide strategically relevant knowledge, 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).

Collaboration with public partners: 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).

Complementing with a system for medium term innovation

However, as the Centre is entering its second half decade, it must also start to foster more short-term innovation and exploitation. Such innovation activities do not appear by themselves. The focus on strategic innovation fosters a concentration on strategically relevant research prototypes, that provoke ideas and allow us to explore novel usage models, but which not always are viable products in themselves. Very often, these provoke ideas that are simpler, more ready to market, and worthy to push towards commercial products, but that cannot be pursued further as strategic research activities. The Centre needs a way to support the development of such ideas into something akin to a commercial beta version. It is only when the idea is at the stage of a beta version

that it is ready to take the next step, and can be presented to an incubator or put the market. It is in this early stage of idea development and implementation that we have identified a gap in our innovation system, which hampers medium term and short term innovation. Here we will develop the Centre's innovation system by two additions i.e. including SME's as partners and through developing the external Innovation Box (see section 1.5.3).

SME's as partners

Two new SME's (Bambuser and Company P) were included as partners during phase II, and MovintoFun will join for phase III. Researchers within the Centre had worked in parallel projects with these companies for some time, in projects that were related to the research' in the Centre. Including SME's in the Centre gives us the opportunity to contribute and use our research to companies who works with a short or medium term to the market, in our specific topic area.

1.5.2 International

Research competition

While both companies and research centres around the world are focusing on Internet of Things, most focus on applications in areas such as Smart grids, traffic management, various M2M-scenarios, and automation (see e.g. Berkeley Mobile Millennium, Berkeley Wireless centre, Stanford's research on device software, CSAL, Crowcraft, EPFL Storage group, Zinghua University, China's 5-year plan for the use of Internet of Things to solve societal problems, IBM's Smarter Planet, Ericsson's 50 billion devices). As far as we know, none of these focuses in particular on leisure time activities with non-instrumental goals, activities that are intrinsically motivating.

Similarly, in the interaction design and HCI community, research is focusing on ubiquitous computing, but without integrating the competence on handling big data or networked systems. Only a few centres have attempted to integrate systems research and interaction design, e.g. Horizon at Nottingham University, U.K. They have created an interdisciplinary, university-wide centre on the "digital economy". One of their application domains is novel media and entertainment. There is also work at MIT, where Sandy Pentland's group is exploring how massive sensor deployments can be used to predict events, for instance the outbreak of diseases. Relevant related work also includes studies of large real-time data streams such as Twitter, which are done e.g. at Rutgers University (Mor Naaman).

We think it is of key importance that Sweden establishes a research Centre on consumer-driven Internet of Things, and the Mobile Life centre aims to be actively involved in that process.

Industrial activities

IoT is regarded as a huge market. Ericsson assumes that 50 billion devices will be connected to the web by 2020. IBM's vision of smarter planet talks about "trillions of digital devices, connected through the Internet". Intel's John Woodget, global director, telecoms sector has a more moderate prediction, in the range of 20 billion connected devices by 2020. On the more short-term, SAP believes that the world market for technologies, products, and applications alone that are related to the IoT will increase significantly from 1.35 billion Euro to more than 7.76 billion Euro in 2012, with 50% average growth rate annually.

It is within this new setting that Mobile Life's research plan should be understood. This new wave of technologies, materials, sensor and actuators, and forms of infrastructures, will be the basis for our innovative consumer-oriented applications and services.

1.5.3 Strategy for complementary activities – the larger Centre

On-going activities in the larger Centre

EIT ICTlabs: The Mobile Life centre has been invited to participate in several different projects within the larger scope of European Institute of Technology activity named ICT-labs. The aim of

ICTlabs is to integrate activities ranging from MSc-programmes, PhD-student programmes, research activities, innovation centres and all the way to companies in the general area of ICT. By connecting the local innovation centres of five European cities (Eindhoven, Stockholm, Helsinki, Paris, Berlin), a stronger innovation system is created. Mobile Life researchers are participating in or leading research projects and commercialisation projects. Our coordinator, Maria Holm, has been appointed to be Technical Transfer Office for SICS in the Technology Transfer programme within the EIT ICTlabs consortium.

SRA TNG: The Swedish government distributed parts of the faculty funding for universities through an open call – the so-called strategic funding. KTH, together with Stockholm University, SICS and Acreo obtained such a grant named ICT The Next Generation (SRA TNG) in 2010. 5% of this multiyear grant was given to Mobile Life. From 2012 and onwards, this amounts to around 1.6 MSEK/year. Within Mobile Life, we decided to use the funding to create a project on *Mobile Malleable Materials*. Similar to Web 2.0 applications where the content and sometimes the interaction is shaped by amateurs we expect that, in the future, there will be ‘materials’ in which many will be able to create their own applications. We already see this development happening with software based mobile services on iPhone, Android and other smartphones. New mobile services created by amateurs, as well as professionals, are launched daily. We want to allow amateurs to create their own pervasive games, their own mobile media productions, their own ways of expressing themselves through gestures or biosensors and experiencing others through haptics and other media. Creating the tools that will establish these new expressive genres and make them accessible to many – professionals as well as amateurs – is the challenge here.

EU-projects and other local funding: The Centre has also attracted quite some additional funding in EU-projects and locally funded projects, sometimes coordinated or strengthening activities in the centre, sometimes widening the scope of research. These include, e.g. Fascinate and LIREC, which are EU-funded projects, INGVAR-continuation grant to Kristina Höök, VR-grant to Kristina Höök and Jakob Tholander, or VINNmer-grants to Alexandra Weilenmann, Maria Normark and Corina Sas.

Planned activities in the larger Centre

There are two planned activities for the upcoming period, that are external to the joint-venture per se, but still will affect the results of the Centre. First, the extension of the innovation system and second the establishment of a Swedish Internet of Things Centre, where the Mobile Life centre will be a critical part.

Extending the Centre with an Innovation Box: We suggest that a start-up activity should be established at arms-length from the academic research centre, where inventions and ideas in an early stage could be developed. The activity should work as a complement to the existing innovation system of the centre (see figure below). This Innovation Box will provide funding for developers to take time off from research to develop a prototype, or in other words, conduct what we may name an *innovation sabbatical*.

The established incubators or innovation support systems provided by the university or the institutes are not designed to support very early stages of idea and product formation. The incubator and the business developers are primarily looking for developed technology with an identified market and business plan. The inventors are themselves facing the reality of the Swedish innovation system, which is set up to provide funding for commercialisation activities but does not grant funding for resources to develop a research prototype into a commercial beta-version: in particular, there is no funding for salaries. To avoid getting ‘stuck in the middle’ and maintain the long-term strategic cutting edge direction of the centre, the Innovation Box is deliberately intended to sit at the side of the Centre. Hence, we need to acquire more resources for putting this structure in place. We aim to build a structure for the commercialisation of prototypes that is external vis-à-vis the Mobile Life centre. We will do this by clarifying and making explicit the specific tasks we are attending to take on. Second, it is also important to create an environment where we can learn from our mistakes and take this knowledge back into the Centre and the research. The aim at this

level is not to build a big structure with large overhead costs, but take small incremental steps and try the research prototypes in a different setting. We will create this structure through:

Naming: Establishing a new organisational element, which we name the *Innovation Box*. The goal for this new organisational unit is to involve researchers and students in the centre in shorter-term development projects, outside their research tasks. We are aiming to relocate two people per year to, what we will name, an *innovation sabbatical*.

Selection principles: To select who gets to do an innovation sabbatical, we will form a committee with members from the board, representatives from incubators and research leaders. The early stage ideas, that will be selected for the “Innovation Box”, will be identified through a competition or selected through the committee.

Size: We aim for a realistic size of the box. As mentioned earlier we believe in incremental, small steps and our goal is to have two persons working in the Innovation Box for three months periods each. Our estimate is that the research in the Centre today is generating approximately two to four interesting prototypes per year that could be developed into beta-versions of fully functioning products.

Location: The Innovation Box will not be located physically in the centre. It is important that the innovation sabbatical take place in an environment close to an entrepreneurial environment. We suggest that we use the location and premises of STING, (Stockholm Innovation and Growth) in Kista. This location is still close to the Centre and the support of the research leaders.

Potential funders: VINNOVA, Innovationsbron, European commission through EIT ICTlabs.

Extending Mobile Life with a Swedish Centre for Internet of Things: The Mobile Life Centre is engaged in the planning and foundation of Centre specialised on research on Internet of Things, where several actors in Kista (such as Ericsson, SICS and KTH) has had a long term involvement in research. Globally ICT-technology is moving towards a highly connected future, where billions of devices in our daily lives will form an Internet of Things. As digital interaction has moved into our homes, into our mobile phones, into our things, the idea is to revisit the old dreams of ubiquitous interaction everywhere from a different perspective. Ubicomp has happened, but it looks different in the light of how mobiles have pervaded our everyday interactions, as well as all the services (in the cloud) that can be accessed from many different platforms.

In the Internet of Things world, a multitude of devices are connected with each other in order to exchange information and enable new functions. An important property of the Internet of Things-world lies in how the different units are connecting to one-another in various ad-hoc networks or to the Internet using very little bandwidth. Jointly, these ad-hoc connected devices may create for functionality arising from dynamically configured, mobile settings of many networked units. The units may produce large streams of data sensing various aspects of user movements, bodily data or interactions with other people, that can be capitalised to create services – using crowd-sourcing, recommender systems, or social navigation techniques.

The foundation of the Internet of Things have three pillars: the devices, the cloud, and the people. The devices are equipped with sensors that form the immediate bond between the digital and the physical worlds. They are low cost, low power, and low complexity. The cloud connects the devices by storing, analysing, and acting on the data generated by the devices. It is massive, large-scale, and complex. The people interact with both the devices and the cloud services. We, the people, are multi-faceted, demanding, and error-prone. To successfully realise the Internet of Things, the three must be combined.

As the Mobile Life Centre is now moving towards the Internet of Things area, we feel a need to strengthen our technical competences. Instead of extending the centre (that has reached an ideal size and critical mass in our view), we have decided to collaborate with three other research groups to create a network we name “Swedish Internet of Things”. The network has already received some funding from VINNOVA, but is currently applying for more to increase its size.

[Skriv text]

1.5.4 Beyond phase IV

The Centre's activities will continue beyond phase IV through the various forms of innovation systems established:

- Strategic innovation will lead to strategic decisions among our partners, which will create new activities in the partner organisations.
- Short and medium term innovation through the "innovation box" will lead to new companies, which will continue to thrive beyond phase IV.
- The research in the Centre will inspire new forms of collaborations, networks and research achievements in related engagements.

2 Centre Partners

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

- Research organisations: SU, SICS and KTH
- Industrial partners: Ericsson, Microsoft Research, TeliaSonera, Nokia Corporation, The Company P, MovintoFun, IKEA, ABB
- Organisations representing the public sector: City of Stockholm and Kista Science City
- Organisations that support the innovation system: STING

2.1 Industry partners

Ericsson AB. 164 80 Stockholm, Sweden. Organisational no: 556016-0680. 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 has participated in the Mobile Life Centre as a full industry partner since the start of the Centre in 2007. Besides representations in the Board and general industry partner meetings Ericsson are also actively collaborating in individual projects and activities. In addition to this Ericsson offer internship positions to Centre researchers at Ericsson locations. Ericsson provides the Centre with deep knowledge in present and future telecommunication systems as well as concrete technology and access to infrastructure components via Ericsson LABS.

The company's portfolio comprises mobile and fixed network infrastructure and broadband and multimedia solutions for operators, enterprises and developers. Ericsson is advancing its vision of the "networked society" through innovation, technology, and sustainable business solutions. In this we are very well aligned with the focus of Mobile Life VINN Excellence Centre.

TeliaSonera AB. 106 63 Stockholm, Sweden. Organisational no: 556103-4249. TeliaSonera provides network access and telecommunication services that help people and companies communicate in an easy, efficient and environmentally friendly way. International strength combined with local excellence is what makes TeliaSonera truly unique – and a world class customer experience, all the way from the Nordic countries to Nepal.

TeliaSonera is one of the founding partners of Mobile Life and has been a partner in the Centre since the start in 2007. The current direction fits well with TeliaSonera's objectives, where the forward-looking research of the Centre around mobile users, applications, and ecosystems support TeliaSonera to understand how to act in the future. TeliaSonera brings to Mobile Life its vast experience related to mobile access and telecommunication services. The mutual exchange of information is achieved through three channels: 1) Active participation in the steering board and discussions with the Centre management; 2) active participation and discussions within the projects and 3) internships.

Microsoft Research Ltd. 7 JJ Thomson Avenue, Cambridge, CB3 0FB, United Kingdom. Microsoft Research is a wholly owned subsidiary of Microsoft Corporation. Its terms of remit, budget and staffing are confidential to Microsoft Corporation, unless otherwise specified. Microsoft research has been a partner of the Centre since the start in 2007.

Microsoft Research 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.

The way needs-driven research is created is through a mutual sharing of interests, insights and know-how in the relevant management and board meetings as well as through the Centre's re-

search activities, such as workshops, seminars and related publication processes. The way ideas are commercialised by Microsoft entail mechanisms for evaluating, refining and ‘gating’ new concepts and ideas. These are confidential to Microsoft Corporation.

Nokia: Nokia corporation Keilalahdentie 4, FIN-02150 Espoo, Finland. Nokia Research Center (NRC) is chartered with exploring new frontiers for mobility, solving scientific challenges to transform the converging Internet and communications industries. Our teams are strategically located worldwide to collaborate with leading universities and research institutes in the mode of Open Innovation.

NRC has been exploring and developing mobile technologies for over 20 years. Our current research focuses on the areas of sensing and data intelligence, user interface, high performance mobile platforms, and cognitive radio. There are 500 researchers in NRC teams in Europe, Asia, Africa and North America. We have a variety of personal and technical backgrounds, but we are all researching topics related to the future of mobility in the merging physical and digital worlds.

NRC contributes to the Mobile Life Research Centre particularly in the areas of user experience research, novel applications of mobile multimedia, and future interaction models and metaphors for mobile devices and services.

Nokia Research Center is actively engaging in open innovation through selective and deep research collaborations with world-leading institutions. By sharing resources, leveraging ideas, and tapping each other’s expertise we are able to create vibrant innovation ecosystems, multiply our efforts, enhance innovation speed and efficiency, and derive more value for our organisations and ultimately for our end-customers. The geographical and thematic extent of our Open Innovation network reflects our ambition to foster innovation, tackle key technical challenges and unlock global business opportunities in collaboration with the world’s best experts.

IKEA of Sweden: 343 81 Älmhult, Sweden. Organisational no: 556074-7551. IKEA is a home furnishing company with a fully integrated supply chain, including its own industrial groups – Swedwood and Swedspan. The IKEA Group, directly or indirectly, also owns retail centres, always with an IKEA store as unique anchor tenant. The IKEA Group works in four basic areas: range strategy & product development, production, supply and retail. The parent company of the IKEA Group of Companies, INGKA Holding B.V., is owned by Stichting INGKA foundation in the Netherlands. The Stichting INGKA foundation was established in 1982 by the founder of IKEA, Ingvar Kamprad, to create an ownership structure and organisation that stand for independence and taking a long- term approach. It has two purposes – to reinvest in the IKEA Group and to fund charity through the Stichting IKEA foundation.

For IKEA, creating the home furnishing offer is about understanding the needs and dreams of the many people. By matching them to the needs and opportunities within our supply network we can create a range of well-designed, functional products at prices so low that as many people as possible can afford them. IKEA of Sweden lead business development at IKEA through our Home Furnishing Businesses i.e. creating the home furnishing offer, supplying the home furnishing offer as well as communicating & selling the home furnishing offer. IKEA of Sweden is a gearbox that lets the Home Furnishing Businesses (HFBs) and Categories work smoothly together.

ABB: ABB Corporate research, Forskargränd 7, 721 83 Västerås, Sweden. Organisational no: 556029-7029. ABB is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 130,000 people. With its technology leadership, global presence, application knowledge and local expertise, ABB offers products, systems, solutions and services that allow its customers to improve their operations – whether they need to increase the reliability of a power grid or raise productivity in a factory.

ABB has seven research centers, 6,000 scientists and 70 university collaborations across the world – all working to develop unique technologies that make its customers more competitive, while minimising environmental impact.

ABB joined the Mobile Life Excellence Center as a partner in 2012 and contributes to the center by sharing knowledge about user experience and situational awareness in the context of industrial systems. In addition, ABB will collaborate in a wide range of research projects that aim to provide operating effectiveness in the industrial environment. One main project where ABB will be an active player is "Introduce playfulness in the automation domain". ABB will also benefit by participating in board meetings, seminars and workshops. Through the Mobile Life center, ABB will collaborate with leading researchers and key players in the mobile industry and gain knowledge about designing experiences, especially for mobile use.

The Company P: Jungfrugatan 61 1 tr, 114 44 Stockholm, Sweden. Organisational no: 556700-9575. The company P makes participatory drama, live events, broadcast, mobile and online media. The company P created the participatory television series The Truth About Marika, together with SVT, awarded an Emmy for best Interactive TV Service, by The International Academy of Television Arts and Sciences, along with several other international awards and the Swedish SIME Award. Other notable productions include a participatory drama for Joss Whedon's show Dollhouse for FOX, and transmedia advice on the upcoming Canwest primetime drama Endgame.

The interaction with the Centre lays in concrete work resulting directly in improved Pervasive games.

Movinto Fun: Årevägen 138, 830 13 Åre, Sweden. Organisational no: 556727-3965. Movinto Fun is a Swedish company developing innovative interactive entertainment products that deliver great user experience and make people move. Their first product Oriboo is unique in how it generates user experience and creative expression, combining the mobility of portable hand-held devices, the engaging interaction of motion-based games, interaction and sharing within social media online, and the personal and emotional aspects of electronic pets and robots. Through a variety of software applications the Oriboo platform targets different segments, e.g. teenagers and children for fun dance and movement games; women for yoga and fitness applications; toddlers for movement stimulation, exploration and physical play; elderly for exercising; disabled people and stroke patients for rehabilitation. Oriboo is a result of several years of multidisciplinary scientific research merging dance education and user centered interaction design.

Movinto Fun has a great interest in following and taking part in scientific research within the areas in which Mobile Life is working, especially regarding interaction design, bodily interaction and games. The company has its background in multidisciplinary research and sees this an important part of the company's work that contribute to the product development process.

As a partner, Movinto Fun contributes with expertise and knowledge of movement-based interaction and movement-based mobile devices (both hardware and software), commercial perspectives on game and product development, and experiences of commercialising research results. Movinto Fun can also provide test platforms (hardware and software) for movement-based interaction concepts that might be used in the projects.

Movinto Fun expects that the partnership will result in innovative product ideas and concepts that can be further commercialised by Movinto Fun directly and/or in collaboration with the Centre and/or its partner(s).

2.2 Public sector representatives

City of Stockholm. Ragnar Östbergs plan 1, 105 35 Stockholm, Sweden. Organisational no: 212000-0142. 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 has been recognised 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 co-operating regarding the various mobile initiatives in the city.

Kista Science City AB. Isafjordsgatan 39B, 164 40 Kista, Sweden. Organisational no: 556567-6953. 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.

2.3 Innovation system partner

STING. Isafjordsgatan 39B, 164 40 Kista, Sweden. Organisational no: 556678-4665. 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 commercialise ideas from the IT-university, research institutes and spin-offs from company employees. STING offers support for entrepreneurs in four sequential programs named Start-up, 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.

2.4 Research organisations

Stockholm University. Isafjordsgatan 39, 164 40 Kista, Sweden. Organisational no: 202100-3062. Mobile Life is organised 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 connected with undergraduate and graduate educations and the general social science faculty. Students employed in the Centre will be enrolled in the masters and doctorate programs within the University. Senior researchers will be actively involved in the formation of such programs, primarily in this department but also in other departments within Stockholm.

Key faculty: Dean Mats Danielson, Head of DSV Love Ekenberg, Vice head of DSV Uno Fors.

SICS. Isafjordsgatan 22, 164 40 Kista, Sweden. Organisational no: 556587-0119. The role of SICS in Mobile Life Centre will be that of a co-executor of research together with Stockholm University. SICS have their main office in Kista. During the upcoming period, SICS will receive around 25% of the VINNOVA funding (1.75 MSEK/year) and will co-fund the Centre with an equal amount.

Key faculty: CEO Christer Norström.

The Royal Institute of Technology (KTH): Valhallavägen 79 114 27 Stockholm, Sweden. Organisational no: 202100-3054. The Mobile Life Centre will cooperate with KTH School of Computer Science and Communication. The School of Computer Science and Communication is engaged in education and research within the traditional core areas of computer science - numerical analysis and datalogy - from theory construction and analysis of mathematical models via algorithm development to computerised implementation and simulation. Other core areas of growing importance include the technology and methods used to sustain human communication and computer supported cooperation over distance in time and space. The role of KTH in Mobile Life Centre will be that of a co-executor of research together with Stockholm University. During the upcoming period, KTH will co-fund a Ph D student.

Key faculty: Dean Jan Gulliksen.

Annika Waern will be the Centre Director of Mobile Life for the first two years of phase 3. The Co-Director will be Barry Brown. Maria Holm will be Coordinator during phase III.

3.1.3 Management Group

The management group consists of the senior researchers that act as group leaders within the Centre and the administrative coordinator. 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. During phase III, this group will consist of the Centre Director Annika Waern, the senior research leaders Kristina Höök, Barry Brown, Oskar Juhlin and the administrative coordinator, Maria Holm. Dr Petra Sundström will join the management group as of October 2012. This group shares the responsibility for ensuring that the research program is realised through leading the individual research projects, supervising Centre researchers, and interacting with industry partners.

- The Management Group has 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 Centre Director has a decisive vote.

3.1.4 XL-team

The Centre is also organised through an extended management group, called the XL-team, that consists of project leaders and researchers that are starting to develop their own research agendas, including all Ph.D.'s within the Centre. The XL-team has monthly meetings where research plans, reporting, relationships to industrial partners and funding are discussed.

3.1.5 Academic Advisory Board

The academic advisory board 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 organisational and educational issues. The Board of Directors, on suggestion by the research management group, appoints the scientific advisory board. The members of the Academic Advisory Board are listed in the section "Plan for measurement".

3.2 Forms of Collaboration within the Centre

The Centre aims to actively contribute to the research frontier, but also relate 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.

Steering groups and industrial days: The responsibility of the steering group is to give advice to the project leader on the project content. The group should also make sure that results are properly transferred between the different partners in the project, and support the project manager in finding the right people in the partner organisations that can be involved in the project.

The steering group also has to identify potential IPR and results early in the project developments, make sure that it is properly transferred to industry, and discussed with the board when appropriate. The idea is that the steering groups of each project are given responsibility to identify results and when needed, inform the board about possible results. During a year, there are four meetings in the steering committee. There are two physical steering group meetings, during so called industrial days; one as a telephone conference and one via email. During an industrial day, the whole Centre gathers to discuss results, collaborations, and new ideas.

Partner meetings: There are at least one meeting per year where the entire Centre meets with colleagues at a particular partner. Then, the entire portfolio of activities in the Centre is discussed, with reference to the demand of that specific partner.

XL-team meetings: In addition to the management team the Centre also has an extended management committee, the XL-team that consists of project leaders and researchers that are starting to develop their own research agendas, including all Ph.D.'s within the Centre. In this group, meeting once per month, we share information on upcoming funding calls and the progress in projects in the "larger Centre", see below.

3.3 Plan for equality of opportunity

The gender balance can be measured in quantitative terms.¹ 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 three women and two men. The Centre Director will be a woman, and the deputy Centre Director 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.

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.²

3.4 The Centre in the University Organisation

The Mobile Life Centre is organised 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), located in Sweden's capital city, is the region's centre for higher education and research in science, the humanities, the social sciences and law, and a focus for the work of leading international researchers. With over 64,000 undergraduate and master's students, 1,800 doctoral students and 5,000 employees, Stockholm University is one of the largest universities in Sweden and one of the largest employers in the capital. People of many different nationalities, with contacts throughout the world, contribute to the creation of a highly international atmosphere at Stockholm University.

¹ Genusperspektiv på innovationssystem, Daniel Hallencreutz, Per Lundequist & Katarina Petersson. Serienummer: VR 2003:12 Publikationer/VINNOVA Rapport/VR - 2003/

² Jämställdhetsplan 2006, Institutionen för data- och systemvetenskap SU/KTH, 2006-03-07 and Stockholms universitets jämställdhetspolicy för åren 2004-2006, SU 601-0840-04

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 commercialisation and innovation potential.

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 (DSV) is the largest department within Stockholm University and is organised under the Faculty of Social Sciences. 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 University as well as with many other Universities in the world. 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 strengthens the 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 at DSV, under the supervision of 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.

DSV is located in the middle of the ICT “cluster”, Kista outside Stockholm. The Mobile Life Centre’s office is in the Electrum-building where a range of other research centres and institutes are located, such as SICS, KTH 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.

3.5 Centre Communication Plan

The centre has a developed communications strategy for internal and external communication.

3.5.1 Communication strategy

A new communications strategy will be introduced in phase III in order to improve the communication and enhance the brand *Mobile Life*. The purpose of the strategy is to place Mobile Life on the international and national research arena and increase the visibility of the Centre. With a stronger brand the Centre will increase its chances to attract new partners, funding and skilled researchers, Ph.D. Students and Master Students. The target groups are internally, the researchers and the industry partners involved in research projects. External target groups are new partners, funders, society and organisations.

The purpose of the communication strategy is also to create opportunities for people to meet and interact. The aim with the strategy is to continue to create an identity for the Centre that provides a strong feeling of connectivity for the Centre participants and communicate this to research community, industry, funding agencies and political decision makers.

3.5.2 Internal communication

The Centre is located in the Electrum building in Kista, in close proximity to DSV at Stockholm University as well as the research performing partner 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 other relevant personnel, e.g. industry interns, are co-located in the same facilities.

The regular bi-weekly seminar series will continue, which is open to researchers and partners in Mobile Life as well as other Ph.D. students and researchers at Stockholm University with similar interests. The seminars strengthen the awareness and discussion of current research within the Centre.

Approximately 3 % of the cash contribution to the Centre is allocated annually to internal communication.

3.5.3 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 society and the ICT industry. The communication will also target potential new partners in the retail industry.

The series of open houses, which has already occurred in August 2007, March 2009 and December 2010, will be continued. Next open house is planned to be held in March 2013. This will be a day with scientific workshops, public demonstrations, invited speakers and many other activities.

The results of the Centre is also communicated externally through our scientific publications where we have as a goal to increase the level of co-authorship in-between the academic researchers and the industry researchers.

The Centre will continue to be visible in the press. A news desk has been established and press releases will be published on a regular basis. The Centre will also actively engage Stockholm University as well as industry partners to publish articles about the Centre in internal magazines. A newsletter will be launched and published with the start in the beginning of phase III.

Approximately 1 % of the cash contribution to the Centre is allocated annually to the external communication.

Table 1 Annual goals for communication

	Full papers/co-authored	Other publications/co-authored	Events	Seminars	Internships	Exhibitions	Newsletters
Mobile Life Centre			2	5	1	8	3
Conferences and journals	15/6	20/8					
Stockholm University							2
Partners			2	3	5	1	3
VINNOVA							2
Kista				20			
Mobile Showcase							

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 is open to the public. In addition to this we will organise 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.

Public receptions at prominent conferences

We will host an industrially oriented conference on consumer-oriented Internet of Things in Kista.

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 45 publications at major conferences and journals (full papers), and at least another 60 other 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 and industry exhibits such as Mobilgalan and Telekomdagarna.

3.6 Learning activities for Centre progress

Every research project in the Centre is related to the happiness theme of the Centre, employs design research methodologies, and focus on the emerging Internet of Things technology landscape. To leverage on the individual research projects, the Centre also carries out joint activities in order to further our understanding of the focal area.

The Seminar Series: The Centre seminar series is the most important venue for discussion. Seminars are announced openly, and attracts academic and industrial researchers also from outside the Centre. The series mixes invited speakers with internal presentations.

- *2012 - 2013:* The seminar series will focus on exploring the research areas more in-depth, furthering the Centre's common understanding of theory, practice, and technology.

Ph.D. Courses: The Centre organises joint Ph.D. courses in the form of reading circles, in which the students share their reading experience of important academics texts, under the guidance of Centre seniors.

- *2012-2013:* The Centre will organise a reading course on happiness research.

Workshops: Centre workshops are typically arranged by one of the Centre projects, who invite Centre researchers and industry participants to collectively discuss a topic, develop an idea, or share experiences.

- *2012-2013:* Joint workshops will primarily be arranged as part of the ecosystems project, in order to further a joint understanding in the Centre (including the industry partners) of the opportunities and challenges of a future ecosystem for consumer-oriented IoT services.

Study trips: About every second year, the Centre organises a joint 'study trip' to an area of particular interest. Previous trips have been arranged to Japan and the Bay area, California. The trips are done jointly with industry representatives as well as senior researchers from the Centre.

[Skriv text]

- *2012-2013:* The next Centre study trip is planned to go to South Africa, India, or China, furthering our understanding of developing markets.

Workshops with new partners. Several new partners have joined Mobile Life for the upcoming phase and the Centre also expects new partners to join in the future. In order to provide them with the best possible support in joining, the Centre will organise targeted workshops for new partners, wherein we explore joint research interests and brainstorm ideas for collaboration.

3.7 Procedure for generating new projects

For upcoming years, senior researchers in the Centre can propose new or modified projects. The Centre management team, in dialogue with all partners, does the selection. The final selection is presented to the Board of Directors for approval at the last meeting of the previous centre year. No project can start unless the Board of Directors has approved of its plan and budget. In the case where external organisations are involved in a Centre project, the partners must also approve of the terms on which these participate. The Board of Directors is also responsible for monitoring their execution.

The idea for a project might start from a previous project, with an idea from a researcher in the Centre or a partner. Sometimes we also organise brainstorming sessions together with our partners to generate ideas within specific domain areas. Once such an idea is on the table and is properly fleshed out, it is put to the Board of Directors for approval.

The Board of Directors obtains status reports for all projects at every board meeting. Each of the projects have a steering group with representatives of the partners who are active in the project to ensure that all partners get equal access to results and put in the efforts needed to make the project progress successfully.

4 Research Programme

4.1 Centre research profile (SWOT)

Strengths

- The Centre has a strong identity and a management team, that work together and share the responsibility for sustaining and developing the Centre.
- The Centre has dedicated partners, of which many are of a size where it is important to consider long term strategic innovation.
- The Centre has managed to extend its leadership with new members.

Weakness

- The Centre would be weakened if the seniors attention is diluted with other activities, or if they move to positions outside the Centre.
- The Centre would be weakened if the partners do not find ways of engaging with the research at the Centre.

Opportunities

- The Centre's position and focus on consumer oriented digital services might be truly catalytic to the industry and strongly influence the direction of the European industry.

Threats

- Although there is an increased interest for our area of interest, very few industrial partners has it as their main target.
- The mobile eco-system is highly dynamic and the industrial partners' ability to engage in external research fluctuates over the years.

4.2 In a 5 years perspective

The *research areas* constitutes an agenda for the Centre research focus. The research areas, further described in section 4.3.1 are:

- *Happiness in motion*
- *Mobile devices and "Internet of Things" as design material*
- *Design inquiry*

The concrete research conducted to investigate these areas is conducted in short-term 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 *research project*. In a project we produce concrete enjoyment services. 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. A new project always has to fit with the general goals of Mobile Life – as outlined in the vision statement and goals above, as well as contribute to investigate the research areas. Overall, the projects in Mobile Life are futuristic and high-risk. A project proposal that lies too close to the commercialisation frontier has to motivate its existence to a higher degree.

A typical project will not only develop one mobile service or perform one empirical study – it will generate several implemented services, infrastructure, technology, methods, numerous concept designs and a range of empirical studies with end-users. The project leader has a major responsibility in making choices about what to implement or study, and to keep the partners of the project involved in the decision process.

Research projects are defined on a yearly basis. The first year's projects are included in the operational plan. A project description includes a motivation that connects the task to the over-arching research areas. It also presents the project leaders, the partners included, as well as the staff. The projects include:

- Eco-systems for enjoyment services
- LiveNature
- mFashion
- Play Spaces
- Citizen Dialogue
- Bodily Experiences
- Re-mobiling – breaking apart time and technology
- Internet of Sports
- Clouds and Surfaces

4.3 For phase III

4.3.1 Research areas

Happiness in motion

The Centre research focuses on investigating the area of happiness, enjoyment, playfulness and pleasure in social and individual practices, and specifically with regard to how it occurs in conjunction with digital interactions. An important part of the research is to provide generalized knowledge on how to account for such experiences as consisting of embodied practices, including physical motion of various sorts, and in intricate social relations given temporal changes and interaction with the environment. We are interested in types of enjoyment ranging from “now for now” pleasures, to subjective happiness and pleasure concerning all elements that can be included in a good or bad life. It includes then bodily pleasures as well as pleasure coming out of e.g. intellectual achievements as well as happiness which follows when humans express virtue and does what is worth doing according to themselves and their peers. Even though there has been some research in this area for example within human-computer-interaction (HCI) the understanding of such interaction, on a level that is interesting for design, is still very much an open question.

Fun and play has always been a key design concern within computer science, and some of the first applications of technology were games such as “Hack”, “Adventure” and “Space Wars”. In the 1980's, this interest has been articulated as research topics per se within the field of human-computer-interaction. It emerged with the introduction of desktop computers in homes, where users are much more likely to demand enjoyment in the interaction, than what they would in work environments. The predominant approach within HCI at that time was to improve usability of digital products by reducing the complexity to handle them. Enjoyment, or rather satisfaction, was only considered as being relieved from the pain of a complicated interface. Instead of ignoring these problems, or challenges, the focus should instead be to turn the complexity into something beneficial. Since then, the interest for enjoyment has increased and there is research, in the form of theoretical frameworks, presentation of design methods, as well as case studies, presented with the intent to make the use of digital services more enjoyable to use. The research in this area is dominated by individual case studies including applications e.g. interactive art pieces, live action narrative, platforms, and games research of various kinds.

But there has also been a small number of attempts to frame the area on a more general level. This discussion has very much been between researchers who have grand ambitions, that draw on psychology and focus on providing global maps of enjoyment, and those researchers who on a theoretical basis argue against the possibility of articulating any detail guidelines or theories in this area. Supporters of the first position argues that the best way to include experiential aspects into the design of information technology is to draw on available research in social psychology and psychology in general. The attempts to model experiences, such as enjoyment, have been criti-

cized of over-emphasizing the cognitive and the mind. This criticism has led to the formulation of an approach that disdain from generalized guidelines, instead talking about the *ineffable*. Here we find arguments for refraining from theoretically articulated approaches and instead utilize professional designers' competence, which include other aspects such as physical and bodily interaction. Such tacit professionalism brings together all senses, with a digital product, as a place where aesthetics and enjoyment occur. Another approach, that draws on the same sort of criticism argues that the shift to experience design, must be a shift to another way of doing research, which would be open and leave much more of the creation of the experience to the user. Paradoxically, these theoretical frameworks are in a sense "anti-theoretical," in that they argue against the possibility to elicit enjoyment requirement through intellectual analysis. Instead it is argued that research should either invite professional designers, who know how to do it by training or downgrade the ambition with design in this area.

We argue that, although acknowledging that there is much competence in designing for enjoyment among users and professionals that should be accounted for, it is much too early to give up on the possibility to further articulate the ways in which enjoyment occurs as part of technology use. The strength of the available approaches is that it has pleasure as a motivational factor when designing and implementing research prototypes, and that we learn very much on e.g. individual examples add or reduce enjoyment. Unfortunately, most of the research very seldom, adds to generative understanding of our topic. We suggest that research, within the human computer interaction area, can provide generative knowledge that can influence what and how we should design before the implementation starts. We suggest that there is a need to do so since the models and frameworks that do exists, are introduced from other fields of research, such as psychology or philosophy, as if everything there is to know about this new topic is available, without further inquiry, in other knowledge domains.

Physical motion in interaction: Designing such services are complex and demanding both from a user experience perspective, since they attempt to fit digital functionality to local and situated life. It is the matching between the digital world and what's at hand in the physical world that raises the stakes but also the opportunities. A common theme, within the Centre, focus on how to account for physical motion of the body in interaction.

The experiential characteristics of physical motion is a common theme in our research on enjoyment services. For example, physical motion of bodies and objects occurs as an ordinary and everyday thing in most people's lives. As a social practice it is a continuous concern in several areas, and the research has also had wide scope. We are particularly interested in the experiences of physical motion and how this is, or could be, supported by digital technology. The motion of persons and objects brings with it e.g. temporary relation to the locations we visit and the situation we engage in. It allows us to encounter a number of people and places and affect the experiences of these interactions. People who are on the move provide for an increasing number of more fleeting relationships. Furthermore, physical motion takes us from one place to another – but every visit will be shorter and thus breed other types of experiences of those places. The role of physical motion of people and objects in small and constrained settings is also essential in unpacking how movement of objects fit into social experiences, such as how small objects, such as documents, tabs or smart phones are micro managed to allow collaboration.

The role of physical motion of people and objects in small and constrained settings is also essential in unpacking how movement of objects fit into social experiences, such as how small objects, such as documents, tabs or smart phones are micro-managed to allow collaboration.

By building the kinds of applications proposed in Mobile Life, we are forced to consider issues around how technology will pervade our everyday lives. Based on our prior studies, we know that current technology often takes away attention from the immediate surroundings, it forces its users into rigid bodily positions and movement patterns that may hurt their bodies, and much of the richness of possible sensory experiences are removed.

Lately, the aesthetic aspects of bodily movements, i.e. *somaesthetics*³, have emerged as a strong theme in Centre research. Somaesthetics is the study and understanding of how to improve our bodily, or somatic, agency. We need to focus on; become more aware of, train and find a sensory-aesthetic appreciation, similar to how we must study any other subject at which we want to excel. Certain movements, brought about through critically aware somatic training, are good for us. This concept, relatively new to HCI, looks at our bodies as the centre of our experiential existence and looks at design, from the perspective of providing for better bodily experiences, ones which do not harm our bodies, but rather allow for fuller and more pleasurable experiences and interactions. With the shift towards IoT-technology together with a renewed interest in the role of the human body in interaction (most notable perhaps through technologies such as Wii-motes or Kinect), the Centre has more and more engaged in the possible bodily experiences we can design for. By designing applications with an explicit focus on aesthetics, somaesthetics, empathy with ourselves and others, Mobile Life research moves beyond treating our bodies as mere input-output machines, using impoverished interaction modalities, towards richer, more meaningful interactions based on our human ways of living in the world. Please note that a somaesthetic perspective does not necessarily mean avoiding experience of pain or applying yourself hard to learn a bodily practice.

We are interested in the *full range* of rich body-/movement-based experiences, as they unfold over time that the new IoT-technology and infrastructure may enable.

Mobile devices and “Internet-of-Things” as design material

The type of technology that will support the enjoyment experiences we are interested in is not yet set. We foresee three types of technological paths through which the services will continue to emerge i.e. sensors, networks and software. Enjoyment services will change dependent on the availability of new sensors that are integrated in a mobile device (the phone); attached to the body or to clothes, or embedded in the environment. Apart from the already prevalent accelerometers and pedometers, we expect that other sensors will become more commonplace, such as pressure sensors, bio-sensors for measuring heart rate, galvanic skin response (GSR), sensors measuring air pollution, weather sensors, moisture sensors, motion sensors and similar. Oftentimes, the camera and microphone on the mobile can be used as sensors. For example, the microphone has been used as a stethoscope and the camera has been used as a motion sensor. Sensors are becoming embedded in textiles, can be made out of paper, or integrated in plasters. Increasingly, these sensors are integrated with wireless communication in so-called sensor nodes. We will also see more actuators, such as small subtle vibrators, heat actuators, or materials that increase/decrease in size or shape.

These services are also dependent on advances in *networking technologies*. An important property of these services lies in how the different units are networked to one-another in various ad-hoc networks or to the Internet and the data cloud. Jointly, these ad-hoc connected devices may create for functionality arising from dynamically configured, mobile settings of many networked units. The units may produce large streams of data sensing various aspects of user movements, bodily data or interactions with other people, which can be capitalized to create services – using crowd-sourcing, recommender systems, social navigation techniques, or other machine learning algorithms. This data is fed back to data centres where they are matched, analysed, stored, and relayed to other devices. Out of data, information and knowledge is created. Massive streams of data are not only generated by the users and devices that constitute the systems, but data content is also consumed in the form of video, audio, games, and messaging content. As the processing power, storage capacity, and available bandwidth of these devices in such systems are limited, most computation and storage will happen at datacentres. These data centres will serve user-facing services, such as chat, messaging, and gaming, as well as back-end services, such as indexing, spam filtering, and data analysis. In fact, a very influential point of departure for enjoyment

³ Somaesthetics is a term coined by Shusterman (2008).

services is already here today via machine-to-machine deployments and applications. However, these deployments are of “silo” type and data and information is currently maintained inside these stovepipes. A challenge lies in how to make data and information available outside these stovepipes for reuse to create new applications.

Design inquiry

Mobile Life employs a particular methodology for research: it is a *design research* centre. Our work practices are fundamentally user-centred: Mobile Life studies human practices, we involve users in every step of the design cycle, and every design is evaluated from the perspective of how it is adopted by people (and in some cases, animals). An important component in this process is that the analysis of current practices, often in the form of social and ethnographic studies, is used to form design hypothesis and inspire the service innovation process. Our theoretical foundation can be found in ethnomethodology, phenomenology and constructivism and so called embodied interaction. An equally important component is the active design and development of concrete design examples, by engaging thoroughly with novel information technology as a design material. We employ a *designerly* approach to research. Design research has often made strong contribution to methods development; most of the interaction design methods used in industry today have their roots in human-computer interaction research. Hence, Mobile Life has as one of its goals to innovate, test, and document its design and research methods and tools.

Although every design example carries knowledge in itself, the goals of design research go beyond the individual systems and services developed. In Mobile Life, we strive to articulate this knowledge through framing it in four dimensions: articulated design ideals, strong concepts that can inspire and generate more than one application, situated experiential qualities, and finally the technology, methods and tools developed to support these. The individual projects differ in their emphasis on which of these aspects are in focus, but all share the essential quality of integrating these four aspects into a coherent design research approach.

The overarching design ideal for mobile life is to strive for happiness and the good life. But as with all design activities, design research faces an almost infinite space of possibilities: there are many, many ways to make people happy. Hence, the individual projects are guided by slightly different aesthetic design ideals, sometimes these ideals are rooted in ethnographic studies of aesthetic practices e.g. aesthetics among fashionable people, but often they are rooted in traditions that predate information technology. But whereas such ideals often are tacit in the design practice, design researchers work with articulating these ideals in the context of their history as well as alternative ideals. Above, we mentioned e.g. *somaesthetics* as an ideal for bodily involvement and experiences. In the descriptions of individual projects below, other design ideals are put forth.

An important result in design research is the formation of ‘strong concepts’. These are re-usable design elements abstracted beyond the particular example, so that designers and researchers can appropriate them in new domains. This way, they help generate new design solutions within a delimited scope. A strong concept can be seen as the design research correspondent to a research hypothesis: they suggest an *approach* towards achieving a particular effect, and they are proven through the successful re-use of the design concept in multiple design projects. Examples of strong concepts previously brought forth in the Centre is e.g. *affective loops* or *temporal hybridity*.

It is equally important to articulate lived experiences in society and how they relate to technology use, sometimes by identifying specifically interesting user practices, e.g. the experiences in *human animal interaction* in between hunting dogs and dog owners, or as desirable and decontextualised effects of a design concept. Mobile Life projects look for effects ranging from the *experiential qualities* of a mode of interaction, over playful modes of engagement, to convivial social relationships. Some of these are observable in the miniscule, whereas other effects require long-term and fairly large-scale studies with working systems. Design research must articulate these desirable effects, and develop study methods that can capture and document the extent to which they are achieved. Below we discuss, for example, how we engaged with the concept of *suppleness* as a desirable experiential quality.

Design research must also engage with its design material. In Mobile Life, the core design material is information technology, and in particular, the development of a re-invented Internet of Things vision as discussed above. By engagement, we do not just mean understanding and using a material at hand, but actively contributing to technology innovation. One form of knowledge lies in the *methods* we use. As we oftentimes address unknown territory, we have to create entirely novel methods, or adapt existing methods to fit with the ludic aims and in the everyday-settings we encounter.

The situation is further complicated by the integration of mobile and sensor-based services. The hybrid services we foresee will not consist purely of software – it will be increasingly common that these come with targeted hardware. We have already seen the Internet-connected running shoe, and the smart home is a very old vision within the area of Internet of Things. We can also foresee a development wherein also hardware becomes increasingly malleable, making it easier and easier to build tailored hardware solutions to a specific service or purpose.

4.3.2 Research projects

Eco-systems for enjoyment services

Project leader: Barry Brown

Partners: Ericsson, Microsoft research, Nokia, TeliaSonera, IKEA, ABB, City of Stockholm, Movinto Fun, Company P

Time period: 20120401 – 20130331

Description: Since the start of Mobile Life, the app store model has become the predominant model for the spread of mobile services. Both lone developers and large development teams can now reach wide audiences relatively easy. Until recently, the implementation of advanced mobile services and IoT applications required extensive hardware development, or had to be done on platforms outside the reach of ordinary consumers. Today, core IoT concepts, such as context awareness, location-based services, object recognition and so on, can be realised using sensors on standard mobile phones, that are in turn connected to other devices and servers. Consequently, a variety of IoT applications have been rapidly appearing.

The scale of IoT applications ranges from single “things” interacting with one user, to sensor-equipped buildings, cities and projects aggregation millions of data points. Sensor-equipped running shoes, tweeting scales, new payment services such as Square that combine ‘standard’ mobile phones with dedicated small devices, are approaching mainstream. Services connecting the virtual and physical world via tags, image recognition or location sensing have appeared. Services like Pachube allow sharing of real-time sensor data streams. Huge opportunities are arising for end-user creation of services that are hyper-local, and hyper-personalized, to be used only by one of a few users, for a specific purpose, for a limited time or at a specific location. Ideally, this will both put innovation in the hands of everyday users, and allow for large-scale integration of sensors and devices.

However, we do not yet know what the *future consumer oriented* IoT-eco systems will look like, and how its properties will affect the services and “things” that will be available to consumers. The service ecosystem will not include only device manufacturers and telecom companies, but also manufacturers of low-level sensors, domestic appliances, retailers, data warehousing and aggregation services and many local and international players. Services and their data streams will pose demands on the ecosystem and its infrastructure. While a selection of services will take advantage of the sensors already present in mobile devices, or existing possibilities to recognize objects in the world, other hybrid services will require dedicated hardware. If sensors, devices, existing services and data streams are combined, interoperability of protocols and ‘standards’ from traditionally separate industries, access and proprietary platforms are important factors. Questions also arise on ownership and data privacy. Local conditions, business models and legis-

lation will affect the availability of these services to various types of consumers, as well as their success.

This project will explore the effects of ecosystem properties for services in an IoT era. In theory, IoT concepts can now be quickly implemented, can take advantage of existing infrastructure, and potentially reach critical mass very quickly. However, the mobile ecosystem is a research and design material, offering huge opportunities for reaching end-users, but also requiring adaptation of existing methods – especially when introducing new devices or using data from the public on a large scale. This builds on previous Mobile Ecosystem efforts at Mobile Life, as well as the Mobile 2.0 Research in the Large and foresight themes. The project maps out the players and influencers that affect the design space, as well as the actual spread of services to consumers. It will do so via an exploration of “alternative universes” of IoT visions, and their demands on infrastructure, business models and new industry roles.

Research areas

Happiness in motion: The mobile ecosystem will affect which services will reach consumers, how they may adapt them, and the (un)intended consequences of their use. It is imperative to understand these factors, especially as they affect the manner in which the digital world and the motion at hand in the physical world can be combined.

Mobile devices and “Internet-of-Things” as design material: Combining sensors, devices and data streams in the creation of IoT applications has consequences that go beyond the technical realm, and the social materiality of technology is apparent from the influence of market players, device manufacturers, data ownership etc. Understanding these infrastructure and ecosystem demands is imperative in designing new services.

Design inquiry: The mobile ecosystem is a design material, with its properties affecting the design space and requirements on research methods. Through a better understanding of its dynamics, we can in addition actively contribute to ecosystem developments.

Questions

- Which players and factors affect the design space for IoT services, and their success?
- What demands do new IoT applications pose on the ecosystem and its infrastructure?
- Which services are made (im)possible by alternative ecosystem properties? Which business, research and design hurdles and opportunities are posed? How would operators charge for IoT services? How can objects be registered and identified? How will we deal with the massive data streams?
- What is the role of end-users in this ecosystem? Who will actually own and have the rights to use the data that sensors, devices, services and users generate? What are the societal and political factors that influence these developments?

Method

- Inventarisation of current IoT visions, ecosystem properties and IoT applications through contact with industry, incl. learning from real-world successes - and failures.
- Case studies of IoT service designs and their ecosystem needs: inventarisation of opportunities and challenges to future services and ‘things’.
- Design exercises based on ecosystem properties & scenario studies of ‘alternative universes’ of ecosystem developments.

Results

- Overview of IoT visions of the different market players, and their consequences.
- Overview of potential consequences of ecosystem and business model choices on services available for consumers, and in turn, demands of services on the (mobile) ecosystem and infrastructure.
- Overview considerations in wide distribution of IoT services (incl. market strategies, Research in the Large perspective, tools & dealing with large data)

[Skriv text]

Detailed plans for the period April 2012 – March 2013

A pre-study will be conducted during Jan-March 2012 in cooperation with TeliaSonera.

April - June: Workshops with industry partners & inventarisation of current state of the art.

August - October: Scenario development & Design explorations

November - January: Further development case studies & overview ecosystem consequences

February - March: Reporting

Participants

Barry Brown 20%

Kristina Höök 20 %

LiveNature

Project leader: Oskar Juhlin

Partners: Ericsson, Microsoft research, Nokia, IKEA, ABB, City of Stockholm

Time period: 20120401 – 20130331

Description: The project investigates a new hybrid media that combines emergent mobile technologies for live video streaming with the advances in the Internet of Things. Video traffic has quickly become the bulk of data communication on the Internet. This medium is now moving beyond consumption of TV and movies, and become integrated with other interactive services and social media. A new type of social media, displaying live broadcasts from mobile devices, is becoming increasingly popular. Mobile video sharing broadcasting applications differ from earlier webcam technologies in that the cameras are wireless, which enables capturing content from anywhere within the reach of a mobile network, and extended physical control of the device for doing camerawork. The ability to experience remote events, as they happen, is a strong perceived value in live video, from traditional live television to newer forms of online and mobile media. Broadcasting capabilities in inexpensive camera phones mean that the range of events that can be shared, and experienced remotely, in real time is multiplied. Looking at the mediation of live events, video and audio have been the dominant media. But the proliferation of sensing and networking within the area of Internet of Things provides yet another interesting source of real time data. Combining these sources with video into new hybrid formats could produce more diverse ways of experiencing remote contexts.

Internet of things will provide access to a rich amount of sensor data that is available both synchronous and asynchronous. Such data will be able to combine with existing media formats (video, pictures, audio) to provide new hybrid media. These new media will support new forms of experiences such as haptic effects or very personalized and situated experiences, extending over long durations. Previous examples include the initial experimentation with Adam Dunkels and his colleagues equipping sport professionals with biometric sensors as a way to augment live broadcasts. It will also relate to the use of sensors and networks in broadcasting the weather.

We are interested in the role of emerging enjoyment services in temporally and spatially distributed leisure and experience activities, what we call ‘distributed/enacted experiences’. Such activities are socially and collectively managed and typically shaped by (explicit and implicit) rules, roles, and tools. We are well used to such experiences and already have names for them: hunting, skateboarding, and bird watching. The emerging technology allows for the deliberate design of novel types of distributed experiences; pervasive games being the prime example that we previously have worked with. Hence, “distributed experiences” emerge out of complex socio-technical setups of communication tools, people, and things in a physical/spatial and social arrangement. The situation is messy to the extreme, with people being present in multiple social contexts and activities at the same time, activities stretching out in time from the local ‘now’ to an extended online life, all coexisting in a heterogeneous technical arrangement.

[Skriv text]

We foresee that developing new hybrid media to broadcast the wild and nature would be a particularly inspirational application area. Building on ethnographic work studying people's experiences of nature and the wild, as well as outdoor activities, we propose to build trial systems that support sharing nature experiences online. Using sensors, cameras, microphones and mobile phones we will experiment with medialisng what goes on in forests and in the sea, as well as sharing it online over the web to phone and on the web.

Research areas

Happiness in motion: Enjoyment through engagement with nature

Mobile devices and "Internet-of-Things" as design material: New media that draws on abundant sensing and broadcasting of nature to be consumed on mobile devices or other pre-installed locations

Design inquiry: Studies of peoples' experiences of nature informs the design, which is then evaluated in similar domains.

Question

- How do we design rules, roles, and tools in the context of a complex socio-technological landscape?
- How do people appropriate this landscape for the purpose of leisure, play, and recreation? What entirely new recreations arise?
- How do distributed experiences scale?
- How are enjoyments shared and distributed in complex socio-technical landscapes?

Method

- Studies of existing use cases in the area to unpack relevant user experiences including amateur meteorologists and technically advanced gardeners
- Studies of business models in the area
- Design exercises
- Implementation of consumer oriented services to support nature experiences through "enjoyment services"

Results

- An article describing the experiences of amateurs that are sensing nature
- Conceptualisation of at least three mobility experience service
- At least one mobility experience service will be implemented within the project
- At least two master theses

Detailed plans for the period April 2012 – March 2013

The project will draw upon a six months pre-study conducted by Mudassir Ahmad Mughal, Elin Örnevall and You Le Chong.

- Implementation of application
- Installation in Nature
- Autoethnographic study of nature experiences and the LiveNature application
- Ethnographic study of amateur meteorologists
- Design study of presentations techniques and incorporation of Nature media in small space home environments, with specific attention to children
- Ethnography of gardening
- International workshop on medialization of nature

Participants

Oskar Juhlin 40%

Elin Örnevall 100%

[Skriv text]

Arvid Engström 50%

Mudassir Ahmad Mughal 100% (HEC foundation)

mFashion

Project leader: Oskar Juhlin

Partners: Ericsson, Microsoft research, Nokia, IKEA, ABB, City of Stockholm

Time period: 20120401 – 20130331

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, pay 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. 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. We are inspired by the fashion theory that fashion exists in a social system that creates desire, influence our taste and legitimize the products through its mechanisms. We see mobile design as a social practice in a wide social context.

We look at the theoretical discussion of aesthetics in HCI field, questioning the pragmatist approach derived from John Dewey's philosophy through studying representation of mobile phones in online fashion media. Fashion practices, as a typical aesthetic practice, diverge from this theory, since here aesthetics can be visual, ambiguous and incomplete although it still provides a lot of meanings for people. This demonstrates that it is more fruitful to put empirical studies at the forefront instead of a theoretically oriented aesthetic approach.

We also experiment with the concept of 'fashion accessory'. We suggest that the outfit-centric view of fashion accessory urges us to design a mobile phone that can match the whole look instead of just changing the covers. New enjoyment services in this area allows for complex input technology that in various ways picks up on daily clothes selections, through tagging or visual recognition.

Research areas

Happiness in motion: Fashion practices are linked to the enjoyment of visual, and other forms of, aesthetics.

Mobile devices and "Internet-of-Things" as design material: New design that draws on complex connections between clothes and mobile devices will provide for more fashionable user orientations.

Design inquiry: The project combines detailed investigations, with design.

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

- Studies of fashionable people and previous design approaches
- Design exercises

[Skriv text]

- Implementation of outfit centric design examples

Results

- One conference paper
- Four design concepts for “outfit centric design”
- One implemented application
- A PhD thesis

Detailed plans for the period April 2012 – March 2013

- Recruitment of PhD student
- Implementation of outfit centric concepts
- Evaluation of outfit centric concepts
- Internship at Nokia to study the history of Designer phones
- Workshop on Fashion and digital media

Participants

Oskar Juhlin 20%

Celia Yanqing Zang 100%

New PhD student at KTH CSC-school 80%

Play Spaces

Project leader: Annika Waern

Partners: Ericsson, Microsoft research, Nokia, IKEA, ABB, City of Stockholm, Movinto Fun, Company P

Time period: 20120401 – 20130331

Description: This project develops design solutions, tools and technology assemblies that can support a wide range of play activities. Whereas the former Pervasive Games project centred on fully designed and staged pervasive games, we now turn our focus to brief encounters with play, play artefacts, and playful engagement related to hybrid (physical and virtual) spaces, body, and movement. A wider take on play (outside of games) requires that players can themselves establish the rules and conditions of play. Designing for fun in play is not so much a quest for an optimally designed and balanced game: design solutions need a level of openness for appropriation that traditional computer games seldom offer. Instead, it becomes critical that the designs are able to establish *a context in which people feel inspired to play, and safe to engage*, supporting a movement in and out of game that at the same time supports intense engagement and detached reflection. According to the Flemish historian Huizinga, the activity of play is signified by its deliberate delimitation from ‘the real’. Everything we play at doing is set aside of what we consider the ordinary, but at the same time, just about anything we do can be done as play. Through the explicit identification of the time, place, and players, we establish a zone in which we feel encouraged to try things we do not normally dare to do, or feel comfortable being seen doing. It is common for safe zones to be, at the same time, established and transgressed, in particular in pervasive play. In previous work on pervasive games, we have discussed the concept ‘apophenia’ – the random coincidence between a real world context and in-game fiction that often is reported as the major ‘fun’ value of such games. In general, the intentional or accidental transgression of the boundary of play safe zone is a major source of enjoyment in many games.

In this project, we investigate the concept of ‘safe zones’ in the context of an emerging hybrid sociotechnological landscape. We plan for four types of activities:

- Study practices, stories, contexts and technological solutions that help participants establish safe zones. These are studied to identify mechanisms that people employ to establish and also

transgress the perception of safety. Example practices could be street artists, clubbers, freerunners, and role-players.

- Develop play interventions. We design and stage playful interventions, with a particular focus on play in public space.
- Study of play interventions. We study designed playful interventions, our own but also commercial examples. The latter is particularly useful when studying large productions.
- Develop open and semi-generic playtools. The technological systems supporting our interventions will be of semi-generic nature, the goal is that they will be applicable to a wider range of interventions than the ones we stage within the project.

Research areas

Happiness in motion: Play is a central aspect of happiness. Not only children but also adults need to, and do, play.

Mobile devices and “Internet-of-Things” as design material: The project is set in the context of an emerging sociotechnological landscape, where body and environment sensors are increasingly integrated in everyday practices. We also see the project as an excellent frame for testing novel technology solutions. Successful designs can both produce rich datasets and provide additional layers of meaning to non-game datasets.

Design inquiry: The project is grounded in a design ideal for games in which deep engagement and playful appropriation space are put in focus rather than winning and excellence. Furthermore, our goal is not to study play as a method to achieve something else, such as learning or persuasion. We study play for its own sake – as an element of a happy and complete life. We study playful activities and design and stage our own play interventions, and develop design concepts in which sensor-based technology is used in new and innovative play interventions.

Method

- Literature review
- Ethnography
- Design
- Staged experiments
- Play tests and field studies

Results

- Publications
- Systems
- Tools
- Designed play interventions (partially or fully technology-supported)

Detailed plans for the period April 2012 – March 2013

Activity Heroes:

April 2012 - June 2012: Trial study of Heroes: A large-scale and long-term pervasive game developed within Mobile Life during previous year

April 2012 - August 2012: Detailed study of a small-scale public space intervention (in collaboration with EIT), potentially integrated also in Heroes

September 2012 - December 2012: Evaluation and redesign for Heroes

January 2013 - March 2013: Second trial, Heroes

Activity Intervention in Public Space:

May 2012 - June 2012: Field work: Ethnography of play interventions in public space (in particular street artists)

August - September 2012: Literature survey, play interventions

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September 2012 - January 2013: Design of one or more small-scale interventions with a focus on public space

February 2013 - March 2013: Implementation of playful interventions.

Participants

Annika Waern 10%

Jon Back 70%

Kim Nevelsteen 80%

Citizen Dialogue

Project: leader: Marie Denward

Partners: Ericsson, Microsoft research, Nokia, IKEA, ABB, City of Stockholm

Time period: 20120401 – 20130331

Description: All over the world, urban areas are expanding rapidly. The rapid urbanisation faces challenges both from a sustainability perspective, but also from the perspective of democracy. Established models for plan processes do not ensure that all citizens are given a voice; in particular, young people and marginalized groups are seldom heard. This is not only a democratic problem. It also leads to the risk of overlooking important social and cultural values for an area, as well as failure to recognise local, concrete and useful suggestions for its development.

In this project, we aim to develop processes as well as prototype tools for an enhanced citizen dialogue. At the Centre lay tools for slow, local and digital story sharing based on mobile phones and GPS technology. These have their roots in a previous Mobile Life prototype *I'm Your Body*, designed in collaboration with Kista theatre as a basis for urban dialogue through art, theatre, and game productions, as well as in previous prototypes from the Mobile 2.0 projects.

We proceed to experiment with the concrete use of such tools within the city planning process. A particular focus is placed on dialogue with children and young adults. A core aim is to capture 'soft values', such as popular meeting and play spaces, as well as concrete ideas for development that people may already harbour. Building on our previous work with cultural projects, we will collaborate primarily with cultural institutions, the network 'Staden i ögonhöjd' within the city of Stockholm, and also with independent institutions like Kista theatre. The reason is that when the dialogue is designed as creative cultural activities and contexts, be it play, theatre or film, people both find it easier and more interesting to participate as well as are more willing to discover and express soft values. We aim to design three exhibition spaces: firstly on-site exhibitions in the form of art installations, city walks, explorative games, and localized theatre performances, secondly on-line exhibitions such as remote access to performances or story content through map traversal, and thirdly library and museum exhibitions in the form of public interactive installations.

Research areas

Happiness in motion: Citizen dialogue addresses happiness from the perspective of making people feel influential and meaningful. Plan processes affect people at a local and personal level where they may feel more content and included in decision processes where results will influence their lives.

Mobile devices and "Internet-of-Things" as design material: The city is increasingly being equipped with sensor technology tracing traffic and transportation, weather and pollution, etcetera. These installations are rich sources of data but it is hard to tie the link between these aggregated data sources and the life of an individual citizen. We will investigate how such data can meaningfully be integrated with the citizen dialogue, tying qualitative storytelling to aggregations of sensor information.

Design inquiry: The design ideal of the project is that of playful interaction and participatory design. Although Mobile Life focuses on the development of support tools and exhibition spaces, the project as a whole looks at designing much more than technology – it looks at the issue of designing at the same time technology and plan processes.

Method

The project is run in close collaboration with the city of Stockholm and representatives from Stadsbyggnadskontoret, Kulturförvaltningen, and the Stockholm City Museum. The research model is that of action research, as we aim not only to introduce new tools but also new work processes.

Results

- Case studies, selected cases from City of Stockholm
- Redesign and extension of existing tools
- Field studies of tools and exhibition concepts applied to the case studies
- Evaluative studies of re-designed plan processes

Detailed plans for the period April 2012 – March 2013

April - May 2012: Prior to this project, we expect to have identified the phases and steps in the plan process in which citizen dialogue may increase, as well as methods and processes that could fit each phase. During the year, we will select to work with one or two such phases and methods. Selection of concrete projects – possibly several at different stages of development - that will function as test cases.

June - September 2012: Rapid development of test tools for dialogue and interactive exhibition that fit the target methods.

October 2012 - February 2013: Concrete tests with tools in the target cases. During the year we have time to do at most two iterations.

March 2013: Evaluation of project results, paper writing started.

Participants

Marie Denward 30% (plus planned external financing by grants 50%)

Jon Back 10%

Annika Waern 5%

Bodily Experiences

Project leader: Petra Sundström

Partners: Ericsson, Microsoft research, Nokia, TeliaSonera, IKEA, ABB, City of Stockholm

Time Period: 20120401 – 20150331

Description: The overall goal of this project is to design for free-movement interaction in different applications in mobile settings. The project consists of two parts: (1) general design methods and tools for design, and (2) a few applications developed using those tools and methods.

1) Methods and Tools: Experiential approaches to understanding technology use for bodily interactions start from the understanding of the individual's experience in using a particular system in the world. Whether it is a horseback rider or an artist using photoshop, individuals have a rich embedded physical experience of the world, one which involves complex skills and knowledge. With an artist each movement of their stylus can involve a huge amount of skill and judgment, just as a horseback rider must remember and feel as they ride their horse. To address these complex processes, we have been forced to develop novel methods for research and design. We have to explore experiential approaches to the use and design of technology – developing an under-

standing of how we can design technology that in use evokes key bodily human experiences and feelings.

Articulation: A design team needs to agree on what experience they are trying to design for. Glossing over those experiences through concepts like “designing for flow” or “inducing a game play experience” are often too vague. We need to better understand the details of the experiences we are design-ing for. Are we designing for pleasurable or unpleasurable ones? Are we designing for those that are subjective and unique, or ones that are common and shared? Experiences that deliver serendipitous experiences or that are evocative and emotional? These are not all the same, even if all may emphasize aspects of bodily experience. Moreover, once we have started design-ing, we need to involve end-users to make sure we are on the track towards a relevant application. What methods will allow our prospec-tive end-users to articulate their bodily, experience-oriented everyday practices or interactions with our prototypes, in such a detailed way that it can be fed into the design process?

At mobile life we have experimented with tools such as the Sensual Evaluation Instrument that allows users to express their experiences in physical form while interacting with a system but more work is needed here. From these previous experiences, we know the design of an experience-oriented service must start from designing its core experience – or in game terminology, its ‘core mechanics’. Every-thing else, such as scoring, organisation, and logistics etcetera can then be designed to support and further enhance this core experience.

Sketching tool: We are currently developing a toolkit for rapid development and sketching of bodily applications in mobile settings. The toolkit so far consists of:

- a wirelessly connected sensor – and actuator-platform that can be placed on the mobile or elsewhere
- a flexible software toolkit for Android where new sensors/actuators can be smoothly integrated and incorporating all the potentialities of the Android phone (already existing sensors and actuators as well as modes of interaction). The underlying architecture will open up for different systems exploring emotional, whole body and somaesthetic interactions

Repeatedly we find that the *devil is in the details* when designing for experience and small details in the design may kill the whole experience. The toolkit therefore need to help the stepwise crafting of the interaction, from initial ideas, through the meeting with the digital material, all the way to fully-fledged user experience.

Exposing material properties: When designing for bodily experiences the properties of the digital material is of key importance. While we may have interesting design ideas for how technology should function, we must also respect, and cultivate, deep knowledge in a design team of the materials they are working with. Sometimes, this will reveal possibilities and experiences beyond what we imagined. For example, in the method *Inspirational Bits* and *Experiential Artefacts* developed in Mobile Life, we change the engineer’s role in a design team focused on affective, bodily or social experiences. When designing for experience, it is of key importance to be able to *feel* how an interaction unfolds over time – its *dynamic gestalt*. When the whole team can feel the dynamic gestalt of e.g. a sensor, they can together come up with interesting designs.

The IoT field offer a rich array of novel materials: classical input and output devices, different types of hardware platforms (phones, tablets, interactive tables, etc.), various sensors and actuators, different frequencies of wireless communication protocols (IR, Bluetooth, radio, wifi), and physical materials that in different ways are used to control digital media and applications (textile, metal, wood, rubber, etc.). It is not realistic for individual designers to be deeply familiar with all these materials, their interactions and how they can best be assembled in a user- and experience-centred design. Instead, an active, structured, material exploration needs to take place in each project, preferably at a very early stage. In addition, a deep knowledge of materials may spur creative solutions, inventions and innova-tions, beyond the initial purpose of the project.

2) *Applications:* The mobile applications will be designed for people in motion, abandoning the screen as the feedback surface. But designing for free body movement is hard, both in terms of

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design-ing feedback mechanisms without screens, and developing useful as well as pleasant ways of tracing body movement and user emotions.

Applications currently planned include:

IMPACT: a tool for communication between friends in mobile settings where the main interaction happens through touch and physical expressions. Builds upon experiences of the Lega.

BoredomKiller: an application for operators in plants. Operators are responsible for controlling the operation and making sure that the production level is optimal. Sometimes this work can be stressful when there are lots of problems at the plant that need to be fixed right away – any stops in the production will cost money. However, the work of operators is often very tedious and dull as for long periods of time the process is running smoothly without need for the operator to interact. The operators still have to remain in front of the operator stations in case of any abnormal situation arise during the process. The increased automation level in many industry domains will cause problems with operators involuntary idling. Therefore, the question that has to be addressed is what can be done to beat the operators' boredom to ensure that they continue to operate the plants in most effective and secure way. We also have to challenge how the operators' daily job could be filled with exciting challenges, fun and entertainment at the same time as they operate the plant. As an example, the control room can be designed to be gaming-like environment where the operators compete with themselves, each other or between shifts.

Research areas

Happiness in motion: Bodily experiences have, for a long time, been under-valued. Physical movement can be the start of strong experiences, ranging from pleasureable to un-pleasureable, ranging from moving to restore health to simply fun.

Mobile devices and "Internet of Things" as design material: This project explicitly explores the possibilities and limitations of IoT-materials when designing for movement outside controlled environments.

Design inquiry: The approach here is grounded in material explorations and a designerly approach to research.

Questions

- How do we articulate bodily experiences so that we can on the one hand involve users in our design processes and on the other hand can frame what we aim to design?
- How do we take material qualities into account when designing so that we make full use of the IoT-material potentials?
- What are the novel bodily experiences we can design for – either within the system we are building or as social activities 'around' the tools we provide?

Method

Explorative design work consisting of three steps:

1. Design and development of *core experiences*, the physical correspondent to the game concept *core mechanics*. In the development of these, the technical and physical properties of the information technology design material are key
2. Explorative design of playful services built upon these core experiences
3. And finally, the careful study of their appropriation in actual use

Results

A set of implemented and fully working physically engaging designs, spurred from the design methods developed before, and within, the project.

Detailed plans for the period October 2012 – March 2013

April – July 2012: Design explorations of the experiential artefacts we already have. Workshops with various practitioners who use their bodies in extreme ways, such as ballet dancers or acro-

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bats, this to allow for potential transfer scenarios to the more ‘normal’ user/s. Studies of movement patterns in the control room as well as in the home to inspire design of the control room or of the home to spur movements that feel aesthetically or emotionally pleasing, evocative or interesting.

August – December 2012: Parallel design and implementation work, both on what could be new experiential artifacts, but also towards a few more fully fledged systems.

January – March 2013: User testing, analysis and paper writing.

Participants

Petra Sundström 20%

Pedro Ferreira, 40%, KTH

Jordi Solosona, PhD-student at KTH, 80% (not paid by Mobile Life)

Elena Márquez Segura, 80%

Mattias Jacobsson, 25%

Mattias Rost, 35%

Ylva Fernaeus, 10%

Anna Ståhl, 25%

Re-mobiling – breaking apart time and technology

Project leader: Elsa Kosmack Vaara

Partners: Ericsson, Microsoft research, Nokia, TeliaSonera, IKEA, ABB, City of Stockholm

Time period: 20120401 – 20130331

Description: Currently mobile phones are monolithic devices where all functions are stuffed into a single package. Furthermore, they have become a centralized and persistent log of certain aspects of users’ lives, through e.g. call and sms logs. The re-mobiling project aims to challenge the design of such core features, but also mobile phones themselves, based on findings from a study performed in Vanuatu, an island culture where mobile technology was recently introduced, as well as previous design explorations performed within the Centre.

The main focus area of the project is related to the monolithic design of mobile phones themselves. By breaking the mobile phone apart we wish to empower users to incorporate mobiles with their bodily practices, orientations and postures. The mobile might be both unpacked and made more body centric is through the emergence of various new sensors on mobile devices: so though the devices are packed with more things, these thing – these sensors – might allow the devices to act in new ways that attends to the body of the user, ways that might not have been possible before. This may allow for interfaces with a better *form factor* vis-à-vis their function. There is an extensive literature on how mobiles are peculiarly close to the human body and thus have a different ontological status than other ICT. Our design approach includes a *somaesthetic* perspective. This concept, relatively new to HCI, looks at our bodies as the centre of our experiential existence and looks at design, from the perspective of providing for better bodily experiences, ones which do not harm our bodies, but rather allow for fuller and more pleasurable experiences and interactions.

A second focus area of the project will be to explore aspects of temporality and persistence of logged data. The dominating view of time inherent in the creation of mobile phones and services is of something that progresses at a steady unchanging pace. The lived experience of time however is completely different. Time can fly as we are having fun with friends, inch by as we are waiting for the day to end, or sometimes completely stop as we are experiencing a shocking moment. Persistence of e.g. texting and calls may also be a double-edged sword as illustrated by our Vanuatu studies where it sometimes became an obstacle for achieving secrecy. This raises ques-

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tions regarding how to represent e.g. SMS traffic over time in ways that reflects the lived experience and also how, and for how long, such data should be stored and accessed.

Our aim is to achieve a coherent whole from a somaesthetic, technological, and form factor perspective.

Research areas

Happiness in motion: Somaesthetics is a philosophy addressing the aesthetics of movements.

Mobile devices and “Internet of Things” as design material: This project explicitly explores the possibilities and limitations of the mobile and IoT-materials when designing for somaesthetics.

Design inquiry: The approach here is grounded in material explorations and a designerly approach to research. The aim is to arrive at *strong concepts* that can generate many different applications.

Questions

By breaking apart the mobile – both its form and in terms of its services – can we create a novel design space with alternative ways of interacting with basic functionalities, various novel form factors for the mobile itself, as well a new understanding of what we want from our mobile interactions?

In particular, can we be inspired by revisiting and reformulating our understanding of basic concepts, such as time, communication, and bodily behaviors when creating those designs?

Method

The project will revolve around a series of small-scale prototypes and a range of sketching of novel forms of both hardware and software each investigating and highlighting different aspects of the design space. Overall the project will adopt a designerly way of working, pursuing several ideas/solutions/suggestions in parallel to investigate different options, rather than prematurely narrowing down on a single solution.

We will conduct design explorations alongside with rapid prototyping of core concepts, which we will then present to people, allowing us to explore dilemmas around time, bodies and mobiles.

Results

The project aims to produce the following results:

- Orienting designs that illustrate how to gracefully incorporate temporal aspects of usage, that move away from linear representations of time in favour of episodic and experienced time, into mobile interfaces.
- Semi functional prototypes illustrating new possibilities of mobile design, novel form factors, and how they integrate with one’s bodily posture and practices.
- New implementations for how to store and access data from the mobile in relation to different concepts of time, space and spheres of involvement (i.e. what are the contexts in which certain logged data is or is not appropriate, what is desired and undesirable in relation to the ways logged data is displayed in time).

Detailed plans for the period April 2012 – March 2013

April - June: Design explorations and investigations of relevant mobile phone use practices.

August - October: In house prototype development

November - January: User studies

February - March: Analysis of results

Participants

Pedro Ferreira 40%, KTH

Elsa Kosmack Vaara 50%

Internet of Sports

Project leader: Jakob Tholander

Partners: Ericsson, Microsoft research, Nokia, IKEA, ABB, City of Stockholm

Time period: 20120401 – 20130331

Description: In the Internet of sports project we will develop mobile applications targeted for people in physical exercise to experience aspects of their performance, such as balance, rhythm, pace, and technique during exercise and training. These aspects are especially interesting in several sports, since the difficulty for the athlete to get a sense of the correct feeling is well known. Moreover, it is also challenging for an outside observer, such as a coach, to identify some of the very nuanced details of such actions.

Given the turn to an Internet of Things this domain poses several interesting challenges. It regards already existing physical activities that involve a number of non-digital specialised artefacts (e.g. in skiing skis, ski poles, ski tracks) that will be augmented with interactive properties and connected to other digital devices, thus becoming hybrid interaction objects. This allows us to study and design aspects of interaction that are peripheral to the overall physical activities that users are engaged in. This relates to the following research challenges:

- Developing novel forms of interaction mechanisms and experiences that leverage on the possibilities offered by the shift towards Internet of Things technology, such as sensors, actuators and connected devices. Our focus is on how these technologies can broaden the scope of meaningful human activities by engaging people socially, bodily and emotionally, e.g. through bodily means of interaction such as movement, haptics, and tactility, in joint activities.
- Developing human-centric design methods for creating interactions and experiences for an Internet of Things. This requires the possibility of describing and articulating experiences in a design relevant fashion to allow for efficient prototyping and implementation of human-centric Internet of Things systems.
- Developing methods for studying experiences and interaction in highly distributed multi-participant environments. Here ad-hoc connectedness of things and mobility of users in particular pose challenges that make it difficult to rely on traditional means of observation and experimentation.

Research areas

Happiness in motion: Perfecting your movements in your favorite sports activity is the reasons why many spend substantial time and money on training.

Mobile devices and “Internet-of-Things” as design material: This project explicitly explores the possibilities and limitations of the mobile and IoT-materials when designing for sports and performance.

Design inquiry: The approach here is grounded in material explorations and a designerly approach to research.

Questions

- How to design novel forms of interaction based on sensing of and feedback to - people in movement - in ways that ‘speaks to’ recreational as well as advanced practitioners?
- To explore modalities for representing data of bodily activity to users?
- How to create individual as well as social interaction based on the vast amounts of movement data generated by the potentially large number of users of such multi-participant applications?

Method

The technology that we aim at developing will support athletes and coaches in cross-country skiing. Through collaborative work with the Swedish Winter Sports Research Centre we will develop applications that target the needs of top international skiers, while also making the technol-

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ogy available for the everyday practitioner. The goal is to develop applications that make use of the sensor and actuator technology available in most smart phones or such technologies that can easily be integrated with some of the artefacts used in cross country skiing.

The project will revolve around a number of small-scale activities investigating different aspects of the design space. The project will work closely with Swedish elite skiers in a participatory fashion to draw out design qualities. These will be used for developing prototypes targeted towards both elite skiers and everyday practitioners.

We also plan to expand this work into other domain of activity and sports. This will allow us to explore additional aspects of movement experiences, as well as to generalize the methods and technologies that we develop.

Results

We will develop applications that stand a chance of reaching out to large user groups at elite, junior, and everyday practitioners. For the latter groups we will explore how the sensor data can form the basis for designing usages that focus on leisure, social and multi-participant experiences, rather than on specific performance.

- A working prototype that allows skiers and other involved (audience, friends, coaches) experiencing some aspects of the performance as well as social and playful aspects of the activity.
- Investigation of methods for studying how the system is interacted within realistic conditions including the specific circumstances that physically challenging cross-country skiing involves.

Detailed plans for the period April 2012 – March 2013

April - June: In-house prototyping

August - October: Early field trials and tweaking of the system

November - January: User studies with different user groups

February - March: Analysis of results

Participants

Jakob Tholander 15%

Stina Nylander 15%

Christer Norström

Clouds and surfaces

Project leader: Barry Brown

Partners: Ericsson, Microsoft research, Nokia, TeliaSonera, IKEA, ABB, City of Stockholm

Time period: 20120401 – 20150331

Description: The adoption of tablets, iPads and surface computing, alongside the greater dependence on 'cloud services' represent two twin radical changes in the format that computing takes. The first has changed the form that our electronic devices take. If we consider the adoption of smartphones and tablets we can see that already the majority of electronic devices are interacted with through touch rather than through the mouse and keyboard. Smartphones are also physically mobile in a way that even the smallest laptops are not. Yet they are also mobile in how they can be brought into interaction and discussion - mobile surface computing supports 'micro-mobility' through the ability of information and communication to be threaded into co-present interaction with others in a dynamic way than with conventional technologies. This means that (for example, with smartphones) that the answer to a wikipedia question can be drawn on when interacting with others, or a user can make a quick glance to a text message while dashing to another meeting. In

turn, with tablets we also have a certain intimacy with information, where touch manipulation encourages a close relationship that comes as much from the contact of skin as with the simplicity of the given applications. Through incremental improvements in size and power tablets have taken a step change in the interactions they support.

The concept of surfaces as the form of computing encourages us to think about computer use as something that is not simply mobile in the sense of portable, but in the sense of being inter-threaded with movement of different sorts, such as gesture, exchange or being shared. So, for example, when we go and visit a colleagues office, we might be physically stationary during the time spent meeting, but the need to move to meet has a number of implications with respect to our access to information and computing. In the interactive situation itself we might want to occlude certain parts of information and share others - or we might want to pass over information itself in a form that can be immediately shared and interacted around (such as in giving someone a paper document). These are all aspects where computing in the form of portable surfaces fits much better than information on fixed displays. In terms of research around surfaces the opportunity is in understanding the range of situations where computing can be brought into interaction or mobility in ways in which it would have previously been too disruptive. Other contexts where such systems might be appropriate include presentations, during repair or technical work (such as assembling furniture), when working with information from a range of different sources, or when a collaborative situation requires attention to be split between information resources and others who are co-present. What comes to the forefront here though is questions about how information systems can fit into interaction, co-present activities and tasks in more fluid ways than they do currently. This is directly applicable to happiness and the good life - a holiday can be as information rich an experience as many work activities, hunting dogs involves surfaces as much as fixing a car. Indeed, the predominant use of tablet computers is the consumption of different media (games, video, websites) for pleasure. So here also pleasure and enjoyment come to the fore.

A corresponding subtle technical shift that goes alongside (and supports) the use of surfaces is the greater reliance on different storage and computing resources connected over the Internet. In ambiguous ways this has come to be known as the 'cloud'. As the surface world necessarily rely upon multiple devices the distribution of information obviously becomes vitally important. While this is often conceived of in terms of storage, another axis in which to relate to the cloud is in terms of power - having a device constantly available to support remote queries about (say) text messages received would be costly, whereas storing these on a server avoids these limitations. A second way of thinking about the cloud, however, is not in terms of computing or storage but in terms of a disappearance of concerns about the location of computing resources in different ways. If your data is all stored in distributed databases, and always accessible in seamless ways then one loses the need to worry about whether it is on a particular computer, or device (except in the ever present case of failure).

These technological drivers are not worth nothing if they do not impact the use of technology in new ways. This has potential to move beyond the promise of simple mobility though in how dynamic surfaces can support interaction around continually updated information. Take, for example, the situation of assembling IKEA furniture, where a tablet could fit into the task in a way that other forms of computing might not. Or how a computer guidebook might fit into the interaction between tourists as they plan their visit in a city. What is key here in terms of research are the new interactional situations that technology can come part of. In terms of cloud computing, we have parallel challenges in terms of what happens to the world of media as it goes online. How does our relationship with storage change if that storage goes all online.

Research areas

Happiness in motion: The predominant use of tablet computing is for leisure activities such as reading, game playing and web surfing – understand this will fit with depending our understanding of technology's role in the good life.

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Mobile devices and “Internet-of-Things” as design material: The Internet of things vision connects directly with the focus on tablet computing and ecosystems of multiple devices and cloud services.

Design inquiry: Surface computing is in many ways a new design material with different design opportunities for computing. Through study and prototyping this project will explore new possibilities for this new design material.

Questions

- How can surface computing support new interactional situations of use?
- How do enjoyable activities change as they are instantiated in different and new forms?
- What is the emotional and practical relationship with managing objects that are now digital?
- How does the move away from location-based storage and computation influence mobile computing?
- What new metaphors are needed to support cloud computing?

Method

- Interview based study of interactions with cloud based services
- Observational studies of tablet and surface computing use
- Design exploration of new software and surface computing devices

Results

- Paper on cloud based services & users
- One prototype new surface computing device
- Trial of tablet/cloud based system

Detailed plans for the period April 2012 – March 2013

April-June 2012: Concept generation: In the initial phases of the project we will explore and generate a number of concept systems that explore the ideas of this document, but apply them to specific application areas

June-Dec 2012: Interviewing families in the UK and China about what materials they have online that they used to have in their house and how it changes their storage behaviours. Development of prototype system to illustrate main themes, a new type of tablet-based application system that draws further on opportunities for cloud based interaction models.

June-Sep 2012: Development of paper on how relationship with media changes

Jan-Mar 2013: Initial trial of tablet/cloud based system.

Participant

Barry Brown 100%

4.4 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.

[Skriv text]

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.

5 Plan for evaluation

The Centre has a plan for evaluation of to the general and specific Centre goals.

5.1 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 steering committees
- regular status reports for each of the issues above will be produced for the board meetings (three to four times 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 has an Academic 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
Tom Rodden	Professor	School of Computer Science and IT, Nottingham University	UK

The board will be extended with one or two participants during phase III. The goal is to have the whole academic advisory board meet physically twice during the next period, and to be in continuous contact with them in the periods between meetings.

Finally, annual reports are produced which summarises all of the Centre's scientific results. The annual report will be used by the Centre Management team and Board of Directors as a basis to assess the success of the Centre.

5.2 Systematic measurement of results including milestones

The Mobile Life Centre has a system with milestones for measuring results.

[Skriv text]

An overall systematic measurement conducted according to the yearly communication plan and to the goals presented there (see table 1).

Milestone; An annual report presented at the first board meeting every year a summary of results from the previous year.

Milestone: Status reports with an inventory of activities and results delivered three to four times per year.

Milestone: Each project is systematically measured by its steering committee. These meetings occur four times per year on a predefined formula (see section 3.2).

5.3 Systematic measurements of implementation of results in industries/public partners etc

The systematic measurement of implementation of strategic innovation results in industry will be evaluated according to the goals formulated in the communication plan (see Table 1) as well as the goals formulated in section 1.3.3:

- Number of papers published which are co-authored between academic researchers and industry researchers
- Number of invitations to strategic decision making in industry such as scenario workshops or keynotes
- Number of invitation of researchers to present at industrial events
- Number of invitations to demonstrate applications at industrial events
- Number internships by academic researchers in industry
- Number of patents
- Number of success stories among our partners
- Number of policies
- Number of spin-offs

5.4 Systematic evaluation of technical and scientific outcome

The scientific results of the Centre will be evaluated according to the goals formulated in the communication plan (see Table 1):

- 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

[Skriv text]

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

5.5 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-standardised 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.

A process for documenting the IPR generated in the Centre has been defined. The academic researchers upload their publications to an internal wiki. First partners are regularly reminded of investigating these results for targeting new IP. Second, each project summarise new IP in the projects and file a description ahead of steering group meetings. The aim is to create a portfolio of design concepts, business propositions and other results (user studies, etc).

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 research projects
- Have at least one Mobile Life intern at every major partner per year

5.6 Preparation for the VINNOVA evaluation

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

6 Evaluation of phase II

In November 2011 the Centre was evaluated by the VINNOVA Evaluation team (three generalists and two scientific experts). Below are the recommendations from the team and actions taken by the Mobile Life management team.

That the Centre articulates a more explicit vision and accompanying specific research questions and links the vision and questions to the research agenda for the next five years.

The new operational plan, presented above, articulate the vision of an enjoyment society, through inverting our previous goals. The societal goal is stated ahead of the technological goals, in order to push for a clear articulation of the Centre's contribution in this area.

This re-orientation is supported by several activities in the operational plan:

- The societal goal is complemented with a specific research area, called "Happiness in motion" (section 4.3.1).
- Each project makes explicit its relevance to understand the research areas.
- The Centre will organise a seminar series on "Enjoyment and Happiness as research topics"
- Barry Brown's and Oskar Juhlin's book manuscript "Enjoying machines", which provide a specific sociological framing of the research in this area, will be presented in the seminar above on two sequential occasions.
- The Centre will organise a reading course on happiness research during the first year of phase III
- A joint workshop, during an industrial day, will be devoted to articulate the Centre's vision on enjoyment.
- The Centre will, together with the management of the European Institute of Technology ICT-labs, organise a European workshop on enjoyment and innovation.

That the Centre steps back and reflects on current research contributions and systems with the goal of summarizing what has been learned and sharpening the specific research questions being addressed.

The Centre Writers' workshop will be re-organised to allow for increased time to elaborate on the papers, given the comments from Centre colleagues. This will give more opportunities to articulate and generalise on the findings in our research.

The Centre will continue to encourage our researchers to author monograph books; edit books or special issues in journals, where the specific research topics in individual projects are generalized and framed in a broader setting.

The means and ways to improve on the generalisability of the research in the Centre will be made a topic at the next Academic Advisory Board to be held during 2013.

The Centre will organise a meeting with its partners to reflect on the current work systems in order to generate ideas for improvement.

That the Centre continues to diversify in the partnerships it develops, whilst maintaining strategic focus.

We are happy to announce that this operational plan depend on collaboration with three new industrial partners and one new academic partner i.e. IKEA, ABB, Movinto Fun and KTH.

That the Centre debates, possibly through new partners and collaborators, ethical and philosophical issues that are raised by the research.

The Centre will establish a debate on ethics and moral issues with our partners, supported by the Board member Richard Harper at Microsoft Research.

The Centre will organise a joint workshop on this topic during the next phase.

That the Centre, with the assistance of the Chair of the Board, reviews and articulates the roles and responsibilities of the members of the Management Team.

The new Director, together with the Centre Coordinator, will update the “Instructions for the Centre Director” to incorporate the roles and responsibilities of the management team. That plan will be presented at the first board meeting in phase III.

That the Centre updates the organisation chart.

The available operational plan provides an updated chart (see figure 1).

That the Centre improves the website to make it more informative, up-to-date and easy to navigate.

We will provide an improved marketing strategy, with the help of an external marketing consultant, as well as by some of our partners in the Centre. The plan for improvement of the web site will be part of this work. It will be presented at the first board meeting in phase III.

That the Centre increases its visibility in Stockholm University, for instance by presenting its work to the senior leadership of the University.

We will present the Centre at a meeting for the Heads of Department in the Social Science faculty, as a first step to make it more visible at Stockholm University.

That the Centre prioritizes its budget so as to increase the proportion of Centre’s funding that is devoted to PhD student salaries.

The Centre is a joint venture with several type of research providers (“Forskningsutförare”). The demand to examine Ph D students is not as valid at the institutes as it is among the Universities, and it is therefore difficult to focus on this individual factor. We need additional clarification of the motivation for this recommendation in order to act appropriately.

Furthermore, the Centre has also decided to focus on recruiting high level international scholars to improve the research output of the Centre, in combination with efforts to support our young Ph D’s becoming the next generation leaders in our field.

In all, we believe that the current balance between Ph D students, Ph D’s and more senior researchers, accounts for several important goals that the Centre needs to meet.

That the Centre arranges for students to receive education in commercialization and entrepreneurship as part of their course requirements.

The Centre will contact our partner Stockholm Innovation and Growth to elaborate a plan to improve our students’ competencies in this area.

[Skriv text]

7 Financing Plan and Budget for Phase III

VINN Excellence Center:			Fyll i denna ruta endast på denna sida, övriga fylls i automatiskt!		
Dnr:					
Year 6:			2012-04-01 -- 2013-03-31		
Year 7:			2013-04-01 -- 2014-03-31		
Year 8:			2014-04-01 -- 2015-03-31		

[Skriv text]

VINN Excellence Center:

Dnr:

Year 6: 2012-04-01 - - 2013-03-31

Year 7: 2013-04-01 - - 2014-03-31

Year 8: 2014-04-01 - - 2015-03-31

Table 9: Overall Expenditures

List all expenses for the centre at an aggregated level.

	Year 6						Year 7					
	Budget (kSEK)			Outcome (kSEK)			Budget (kSEK)			Outcome (kSEK)		
	Cash	In kind	Total	Cash	In kind	Total	Cash	In kind	Total	Cash	In kind	Total
Salaries (from "Staff sheet")	7 890	8 460	16 350				8 864	8 460	17 324			
External services												
Equipment												
Material, running costs etc.	943		943				943		943			
Travel	588		588				587		587			
Other												
Overhead costs	2 046	1 435	3 481				2 046	1 435	3 481			
Sum	11 467	9 895	21 362				12 440	9 895	22 335			

	Year 8						Summary Stage 3					
	Budget (kSEK)			Outcome (kSEK)			Budget (kSEK)			Outcome (kSEK)		
	Cash	In kind	Total	Cash	In kind	Total	Cash	In kind	Total	Cash	In kind	Total
Salaries (from "Staff sheet")	9 837	8 460	18 297				26 591	25 380	51 971			
External services												
Equipment												
Material, running costs etc.	943		943				2 829		2 829			
Travel	587		587				1 762		1 762			
Other												
Overhead costs	2 046	1 435	3 481				6 138	4 305	10 443			
Sum	13 413	9 895	23 308				37 320	29 685	67 005			

[Skriv text]

VINN Excellence Center:																		
Dir:																		
Year 6:																		
Year 7:																		
Year 8:																		
Table 10: Research Personnel																		
Only indicate personnel over 5 % FTE																		
List all personnel working in the centre. Preferably group them in order to use the information in other parts of the report																		
Name	Year 6						Year 7						Year 8					
	Budget			Outcome			Budget			Outcome			Budget			Outcome		
	Degree of activity in the center	Cash contr.	In kind contr.	Degree of activity in the center	Cash contr.	In kind contr.	Degree of activity in the center	Cash contr.	In kind contr.	Degree of activity in the center	Cash contr.	In kind contr.	Degree of activity in the center	Cash contr.	In kind contr.			
	% of full time	kSEK	kSEK	% of full time	kSEK	kSEK	% of full time	kSEK	kSEK	% of full time	kSEK	kSEK	% of full time	kSEK	kSEK			
Chakar Jylin	80	894					80	894					80	894				
Arvid Engstrand	50	328					50	328					50	328				
Celia Zhang (fak)	70		295				70		295				70		295			
Lin Omerell	70	295					70	295					70	295				
NH (fak) Nyckelring	80		337				80		337				80		337			
Arvika Wörn	25	270					25	270					25	270				
Jon Black (fak)	80		359				80		359				80		359			
Kyr Naverdalen (fak)	90		404				90		404				90		404			
Syed Nuseh																		
Barry Brown	99	1106					99	1106					99	1106				
Maria Desoari	25	187					25	187					25	187				
Elena Marques-Segura																		
Jakob Tholander	30	225					30	225					30	225				
Arvika Wörn	50	552					50	552					50	552				
Maria Holm	70	699					70	699					70	699				
Lin Omerell	20	88					20	88					20	88				
Chad Kothmann Waag	50	316	316				50	316	316				50	316	316			
Anna Skani	25	186	186				25	186	186				25	186	186			
Yara Farnelius	10	108	108				10	108	108				10	108	108			
Kristina Håk	20	167	167				20	167	167				20	167	167			
Elena Marques-Segura	80	806	806				80	806	806				80	806	806			
Mattias Rott	10	126					10	126					10	126				
Mattias Jacobsson	25	372					25	372					25	372				
Mattias Rott	25	372					25	372					25	372				
Peter Sundström	20	298					20	298					20	298				
Jakob Tholander	15	251					15	251					15	251				
Sara Nylander	15	162	162				15	162	162				15	162	162			
Pedro Ferreira	80	210	210				80	210	210				80	210	210			
NH nyckelring	80	180	180				80	180	180				80	180	180			
Ericsson			600						600						600			
Anders Björk																		
Mikael Anandhi																		
Gustav Norin																		
Joakim Forno																		
Marius Nyberg																		
TeliaSonera			400						400						400			
Roger Bengtsson																		
Monika Lyden																		
Anders Trana																		
Tove Jansson																		
Telea			850						850						850			
Jyr Hultström																		
Viljoelena Andersson																		
Microsoft			850						850						850			
Richard Harper																		
Alex Taylor																		
Company P			300						300						300			
Christopher Sandberg																		
Monarto Fun			300						300						300			
Jan Moen																		
Karl-Peter Alarsson																		
BRCA			300						300						300			
Mikael Ylfinen																		
ABB			300						300						300			
Kee-Cam Sanku Johnson																		
Magnus Larkson																		
Elina Varonen																		
Stockholm stad			800						800						800			
Anette Holm																		
Stefan Carlsson																		
Monica Bernström																		
STRAO			100						100						100			
Pär Hedberg																		
Vista Science City			400						400						400			
Anette Schulte																		
Thomas Bernsch																		
	7883	8460					7883	8460					7883	8460				

[Skriv text]

[illegible]

[Skriv text]

Table 12: Related Research Grants

List grants granted, applied for and under preparation - project title, total amount applied for, duration of project, funding source, date of application and any comment you might have

Only indicate grants that are bigger than € 70 000 and explicitly strengthens the center activities without directly financing it.

Project Title	Status Granted / Applied / Under preparation/ Rejected	Total amount applied for kSEK	Duration of project	Funding source	Date of application	Comments
Extended Ingvar grant Future Research Leader K Höök	Granted	10 000	2012-2016	SSF	2011	
LIREC Lars Erik Holmquist	Granted	7 000	2008-2012	EU	2006 11 30	
IOT	Pending	10 000	2013-2014	VINNOVA	20120417	
SRA - TNG	Granted	1 200	2010 - 2015	Government	2009	
Fascinate Oskar Juhlin	Granted	5 700	2010-2013	EU	2009	
European institute of Technology: Juhlin, Waern, Höök	Granted	1 500		EIT	2009 03 25	
European Internet Science + Brown	Granted	630	20122014	EU	10/11/2012	