

# **NETWORKED BUSINESS MODEL DEVELOPMENT IN AN EMERGING BUSINESS FIELD**

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Emerging technologies present many opportunities for new business creation but also pose many challenges. A variety of actors and roles need to be identified and organized into business nets to develop and commercialize new technological solutions. In parallel, new business models need to be developed in the nets to create value for the actors. However, there is a lack of studies on new business creation and the development of such networked business models. Thus, this study focuses on the formation of networked business models for emerging technology-based services, and aims to elaborate what elements need to be considered in developing a networked business model. The empirical part of the paper employs interviews as a data collection method. The data has been collected among experts in the fields of developing, testing, and commercializing new ubiquitous services. As a result, the different alternative actors and roles are identified, and essential factors in future business creation are presented.

**Keywords:** Networked business model, business net, emerging business field, technology-based service

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### **INTRODUCTION**

Emerging technologies offer many market opportunities for companies but pose crucial challenges as well (Srinivasan, 2008). For example, companies commercializing technological innovations face problems as in the early emergence of new business fields there is no clear market structure (Möller & Svahn, 2009). Instead, a diversity of activities and resources are needed from various actors (see e.g. Komulainen et al., 2006; Lundgren, 1995; Möller & Svahn, 2009), which need to be identified. To create commercially viable services out of the emerging technology, the actors need to form business nets with radical changes in their value systems or completely new value activities (Möller & Rajala, 2007; Möller, Rajala & Svahn, 2005). Furthermore, there is also a need to find new innovative business models (e.g. Chesbrough & Rosenbloom, 2002) that are attractive to the multiple actors (Bouwman & Fiel, 2008).

Developing such networked business models (see e.g. Komulainen et al., 2006) represents a crucial challenge for companies in organizing and planning their future business. However, there is a lack of studies concerning the creation of new markets for emerging technologies (Simakova & Neyland, 2008) and less attention has been given to business net development or to intentionally developed nets (Möller et al., 2005) which are in a crucial role in the networked business model development. This study aims to increase understanding on the essential issues in new business development; the formation of business models in emerging business nets. The paper elaborates the following question: *what elements need to be considered in developing a networked business model for novel technology-based service?*

To answer to the above presented question, the study reviews the strategic and value net approach (e.g. Möller & Rajala, 2007; Möller et al., 2005; Parolini, 1999) and research on business models (e.g. Komulainen et al., 2006; Shafer, Smith & Linder, 2005). The emerging business field of novel technology and technology-based services will be elaborated through the empirical part of the paper. More specifically, the study examines ubiquitous computing and services (see e.g. Lyytinen & Yoo, 2002; Shin & Lee, 2005) since the appropriate

business models that would provide value as a new ubiquitous business or as converged with traditional businesses are yet to be found (Lee & Lee, 2005).

The study is qualitative and employs interviews as a data collection method. Interviews have been conducted with experts in the fields of developing, testing, and commercializing new ubiquitous services, and adopt a future time dimension focusing on future expectations and interactions. In a dynamic and changing business field such as emerging technology-based services, managers and firms need new and flexible ways to act, instead of relying on old decision models (Halinen & Törnroos, 1995, 518). Hence we need to examine the factors that can facilitate future business planning. As a result, the paper elaborates the elements affecting the development of business nets and future business models. Different alternative actors and roles are identified, and factors influencing networked business model development, such as the role of context, marketing, and service package, are presented. Hence, this study contributes to the understanding of emerging business nets and networked business models. The knowledge created can also be used as a valuable thinking device in companies' strategic business development; the identification of such essential elements facilitates companies in their new business development.

## THEORETICAL BASE

### Emerging business nets

Value creation is examined increasingly more at the level of networks and nets (e.g. Kothandaraman & Wilson, 2001; Möller et al., 2005; Parolini, 1999) instead of single firms or relationships. This is because often in new service development, and especially in the emergence of technology-based services, a single firm cannot master all the relevant competencies and resources but various actors are needed (e.g. Komulainen et al., 2006; Lundgren, 1995; Möller & Svahn, 2009). Value creating networks in the field of emerging technological services are dynamic and complex with new actors from different industries (Kijl, Bouwman, Haaker & Faber, 2005) but without clear market structure (Möller & Svahn, 2009). Hence, the actors and roles need to be identified and formed into strategic business nets to develop and commercialize new technology-based services (Möller et al., 2005). Such strategic networks are purposeful arrangements to gain or sustain competitive advantage by outsourcing activities and focusing on the key ones (Jarillo, 1988). Strategic networks are composed of enduring interorganizational ties and provide companies the access to information, resources, markets and technologies (Gulati, Nohria & Zaheer, 2000). Jarillo (1988) sees a hub firm as essential in setting up the network and taking a pro-active role in it.

Value creation logic and management mechanisms are central in understanding emerging business nets (Möller & Rajala, 2007; Möller et al., 2005). Value creating systems can be defined as sets of activities that create value and that are connected to each other by flows of information, material, money and influence relationships (Parolini, 1999). Different value creation logics require different management mechanisms (Möller & Rajala, 2007). There are differing views on the manageability of organizations and networks, e.g. between the 'networks of organization' view and the 'network organization' view (Achrol, 1997; Möller & Rajala, 2007), as well as between organizational theory and strategy management research (Håkansson & Snehota, 2006). However, as Möller and Rajala (2007) argue, the key issue is not whether business networks or nets can or cannot be managed, but what kinds of management mechanisms are suitable for different types of nets. They identify three types of nets in the domain of emerging business nets. Firstly, there are innovation nets which are

mainly loose science and technology-based research networks consisting of universities, research institutions and research organizations of corporations. Secondly, there are dominant design nets in which companies try to create dominant technological designs in order to favour their positions in the field. The third type is application nets which are formed in order to achieve commercially viable business applications out of the evolving technology. (Möller & Rajala, 2007.) The types of nets are seen essential in an emerging business field, and need to evolve from innovation nets towards application and viable business nets. Technological innovation is a sequence of actions pursued in networks and although it is affected by the existing structure of the network, the actors and their relationships as well as the combinations of activities and resources, it also determines the future structure of the network (Lundgren, 1995). For example to understand the structure of mobile communications market or sector, technological development in terms of standards are important, and has direct and indirect impact on the possible actors in the market (Nyström, 2008).

Hence, the specific features of technology and technology-based services affect the structure of the net including the actors and their roles. Kallio (2004) for example has identified various roles in wireless business such as the application provider, content provider, infrastructure provider, operator, service provider and the end user. Kalakota and Robinson (2002) categorize the actors of the mobile market according to business areas. They identify altogether seven different business areas although the leading companies can participate in more than one area. These business areas include 1) *the network infrastructure* (companies enabling the convergence of telecommunications and IP networks), 2) *access* (companies selling network connections), 3) *content* (companies providing content), 4) *commerce* (companies selling merchandise or information, or facilitating the matching of buyers and sellers), 5) *software* (companies facilitating communication and commerce), 6) *hardware* (companies providing e.g. PCs or networking equipment), and 7) *applications* (companies providing a range of services). Instead of business areas, Nyström (2008) presents the following actors in the mobile communications identified by practitioners; 1) network operators, service operators and MVNOs (mobile virtual network operators), 2) content providers, 3) content owner, 4) content packagers, 5) mobile portals, 6) mobile retailers, 7) system and platform providers, 8) software companies, 9) technical enablers, 10) mobile handset manufacturers, 11) regulator, and 12) end-users/mobile service subscribers. To provide mobile services to end-users requires cooperation between various actors in the market, where the value chain has been deconstructed into a value network.

These represent examples of what kinds of actors there can be in the emerging business net. In the context of the current study, it is important to examine to what extent the actors identified e.g. in the mobile communications market are relevant also in the field of ubiquitous computing, as it aims to combine different technologies, and to what extent there can be identified completely new actors, or combinations of the existing ones.

### Networked business models

The business model concept has been increasingly discussed among academics (Mäkinen & Seppänen, 2007), and previous literature offers various definitions of the concept (see e.g. Hedman & Kalling, 2003; Nenonen & Storbacka, 2009; Osterwalder, Pigneur & Tucci, 2005; Shafer et al., 2005) but still there appears to be much confusion around the term. This may be due to the fact that the term business model is a rather young phenomenon (Osterwalder et al., 2005) and the concept draws from as well as integrates a range of disciplines (Chesbrough & Rosenbloom, 2002; Shafer et al., 2005). Hence, the role of business model in the firm is often

debated (Osterwalder et al., 2005). However, in spite of the confusion around the various definitions, Mäkinen and Seppänen (2007) see that the business model field has advanced in its scientific inquiry and has become an intermediate unit of analysis in managing technological ventures from R&D projects. Hence they can facilitate future business creation in the field of emerging technologies.

Business model is seen to provide a broader conceptualization (Nenonen & Storbacka, 2009; Zott & Amit, 2008) for capturing the evolution of value creation from individual firms to networks (Nenonen & Storbacka, 2009). Interorganizational networks are a key element of business models (Westerlund, Rajala & Leminen, 2008). Various definitions of business models highlight the notion of actors and relations (e.g. Timmers, 1998; Weill & Vitale, 2001) as well as the role or the position of a company in a network (e.g. Chesbrough & Rosenbloom, 2002; Westerlund et al., 2008). Furthermore, a business model is seen as a crucial source of value creation for the firm and its suppliers, partners and customers (Amit & Zott, 2001) and as the firm's logic for creating and capturing value in a value network (Shafer et al., 2005). According to Kijl et al. (2005, 2) "business model describes the way a company or network of companies aims to create customer and network value". They continue that changes in a business model lead to changes in value creation in the network.

However, generally business models are explored from a single firm's perspective. Traditional business models are based on the idea of developing, producing, marketing and selling the product by oneself (Chesbrough & Schwartz, 2007) and hence business models are considered to be centred on a particular actor (Amit & Zott, 2001). However, cooperating with partners in the research and development of a new product or a service creates business model options with many benefits, such as reducing expenses and opening new markets (Chesbrough & Schwartz, 2007). The value created often cannot be owned by single companies but it is created for the network of actors, and hence business models of companies must be linked to the business models of other companies (Helander & Rissanen, 2005) and be attractive to multiple actors (Bouwman & Fielt, 2008; Komulainen et al., 2006). Chesbrough and Schwartz (2007) discuss about business model alignment; in developing co-development relationships, a fundamental task is to determine to what extent one's business model is aligned to those of one's partners. Aligned business models are complementary and can turn the relationships into more valuable partnerships. Komulainen et al. (2006) use the concept of network business model and identify three core elements of it; the product/service, the business actors and their roles, and the value-creating exchanges among the actors. This study uses to concept of networked business model in a similar vein to describe the various actors coordinating and combining their activities and resources to create value from the emerging technology-based services, that is the logic of the emerging business net.

### Business model development

Although there has been recently a lot of interest in defining, classifying and presenting real world instances of business models (Osterwalder et al., 2005), business model research is missing studies on the phases in business model evolution (Kijl et al., 2005). Hence, it is common to see technological innovations and achievements fail commercially since there has been a lack of studies on designing business models (Teece, 2010) as well as business model implementation (Osterwalder et al., 2005). Companies often invest extensive resources and processes to explore new technology and technological innovations while they have a rather limited ability to innovate business models for the new ideas (Chesbrough, 2010). Therefore it is important to look at the phases and critical factors in the business model development,

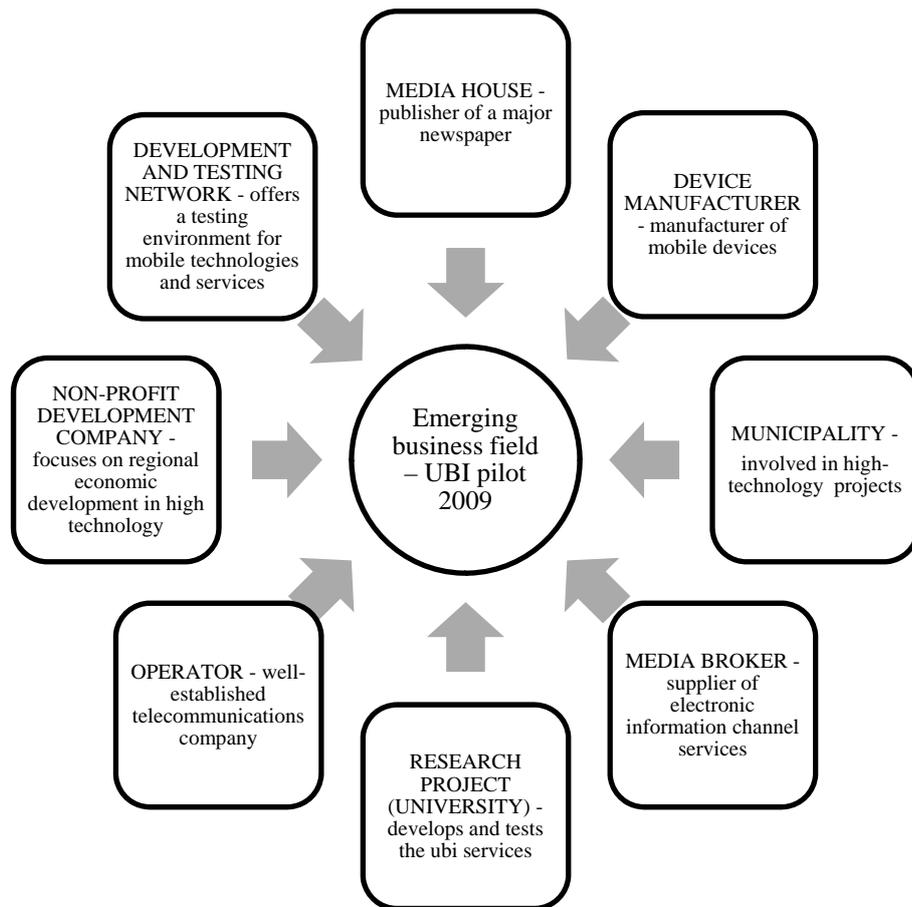
especially in emerging business fields where new technology and services are being developed and tested. Technological innovation often triggers business model design because of the need to bring new discoveries to market and the chance to satisfy novel customer needs (Teece, 2010). Hence, companies need to develop capabilities for business model development (Chesbrough, 2010). In addition, they need business model management and implementation skills since the business model needs to be transformed into more concrete elements such as business structure and processes (Osterwalder et al., 2005).

Creativity, insight, as well as customer, competitor, and supplier information and intelligence are needed in developing new business models (Teece, 2010). Defining the type of innovation (e.g. radical or disruptive vs. incremental or sustainable technological innovation) can also be helpful in business model development since it can facilitate the development of suitable business models and networks to capitalize on a technological innovation (Kijl et al., 2005). Other key issues in developing a business model are defining how to deliver value to the customer and how to capture value in doing so (Teece, 2010). Also organizational processes must change; companies need to adopt an effectual attitude toward business model experimentation, identify internal leaders for business model change, as well as adjust the culture to embrace the new model (Chesbrough, 2010). In the business net of the service or the product, there are often one or more leading actors, which can influence the business model development greatly; such actors have usually critical roles performing many activities, such as the telecom operators, but also the service and content providers may have the opportunity to be the leading firm in the network (Kijl et al., 2005).

Companies should take into account the external factors that influence business models such as market, technological, and regulatory influences (Kijl et al., 2005). Teece (2010) has recognised different elements that need to be determined in a business model design: selection of technologies to be embedded in a product/service, determining the benefit of the product/service to the customer, identification of market segments, confirmation of available revenue streams, and design of mechanisms to capture value. Kijl et al. (2005) have identified three main phases in business model development: the technology/R&D phase, the implementation/roll-out phase, and the market phase. In the technology/R&D phase the focus is on technology, investments, and the development of service concepts. The shift to implementation/roll-out phase involves the service concepts testing, field experiments, first introduction and small scale roll-out services. In these first two phases, actors such as research institutes, entrepreneurs, and venture capitalists have an important role. The shift to the market phase is a shift to commercial exploitation, where big companies such as telecom operators usually become the leading actors. This study sees that the phases describe the emergence of a new business field, and involve the evolution of the net as well.

## RESEARCH APPROACH

The study is qualitative and employs interviews as empirical data. The data collection focused on a real life experiment, UBI pilot in summer 2009, in which new ubiquitous service infrastructure and service applications were tested by real end users. During and after the pilot, altogether 12 experts in the fields of developing, testing, and commercializing new technology-based services were interviewed. The interviewees represented different actors (altogether 8), both commercial companies as well as non-business organizations (see figure 1). They were selected to include a wide range of expertise of the phenomenon to get rich and diverse data and perspectives. Hence, the pilot provided a possibility to collect unique data in an emerging business field.



**Figure 1. Actors in the emerging business field – UBI pilot 2009**

Semi-structured interviews covered issues such as the business potential and opportunities of the ubiquitous infrastructure and services but enabled discussion on issues the experts felt important. The interviews adopted a future time dimension, and focused on future expectations and interactions since companies need new and flexible ways to act in dynamic business fields (Halinen & Törnroos, 1995, 518). Hence we need to examine the factors that can facilitate future business planning. Any exact limits for the analysis were not predefined, but issues relevant considering the specific field were allowed to be raised.

In addition to the interviews, observation has been done in two business meetings in which the future commercialization of ubiquitous service infrastructure was discussed, and an interview of a company in the field of mobile solutions and information management has been done to gain pre-understanding of the phenomenon of commercializing new technology-based services. However, at this point, the analysis has focused on the expert interviews, and is still in progress. In the following, the empirical context of the study, the UBI pilot, is shortly introduced, and the preliminary analysis of the data is presented.

## NETWORKED BUSINESS MODEL DEVELOPMENT – ANALYSIS

### The UBI pilot – emerging business field

The technology and technology-based services which are under focus in the present study have been developed and tested within a multidisciplinary research project. Hence, they have not been commercialized yet but their business potential is to be explored. The project

combines basic research of ubiquitous computing with different angles on the phenomenon. The project focuses on fundamental research problems of ubiquitous computing, deploys a new ubiquitous service infrastructure, and develops novel ubi-service applications. The developed technologies are integrated into a software platform, which supports the creation of novel and innovative service applications for mobile users. A Living Lab approach is used, so that users can participate in the design of the proof of concept pilots, which are then empirically evaluated by conducting field trials in real-life settings and with real end users. Assorted services are integrated into large-scale pilots to the general public. The first UBI pilot was organized during summer 2009 in the city centre of Oulu, Finland.

The ubiquitous service infrastructure and service applications developed and tested in the UBI pilot are seen to represent a potential new business field, since it provides a new kind of urban computing infrastructure and the possibility to provide new kinds of services atop the infrastructure as well as new service interfaces. In the pilot the city centre represented a smart urban space where a new computing infrastructure was built consisting of ubi-hotspots (interactive displays which provide interaction between physical, virtual and social spaces), open network, WPAN hotspots (Bluetooth), wireless sensor network, ubi-middleware software, ubi-mobile software, and different kinds of service applications atop the infrastructure. Smart phones were used as interaction devices in addition to touch-screen displays. The service applications tested in the pilot can be divided into three main categories: ubi-channel (for commercial use as well as non-commercial communication), ubi-portal (web-portal browsed with a touch screen), and mobile applications. The project and the UBI pilot are the first steps towards a commercial, ubiquitous city, but yet the business potential is debated among various actors. Hence, an essential feature of the empirical context and the data is that the emerging technology is in between the technology/R&D and the implementation/roll-out phases (Kijl et al., 2005), and the data focuses on the shift to the market phase. The different views and perceptions of the experts are examined and analysed in the following.

#### Expert perspectives on future business creation

Ubiquitous technology is seen as a new wave of technological development in the interaction between people and computing. A phased development of such an emerging technology is seen as an integral feature in this context; the current infrastructure is one of the first steps towards a world in which technology is embedded in the surroundings. A crucial element in the early phases of the development is the research and testing activities to see how potential customers react and use the services, and to learn and develop the technological solutions further. The interactive displays in the city centre can be comprehended as one layer or step towards an ubiquitous city enabling further development steps in technology and in business. The value of ubiquitous computing to be exploited in business models are mobility, context-awareness, and interactivity. Additional value emphasized in the empirical data is the change in people's behavior and processes; the innovation is seen to take place in people's mindsets, including mental changes, instead of radically new technological development. People need to change their behavior in terms of how to use services, and need guidance in this. Ubiquitous computing provides ways to integrate and exploit existing technology in new, innovative ways and hence creates novel ways to use services. Value can be created by integrating new technology into existing services and business. It became clear from the preliminary data analysis that the experts identified possible actors and roles, opportunities and challenges as well as critical issues to consider as important elements in the field, which are presented in table 1.

**Table 1. Expert perspectives on the emerging business field - The UBI pilot**

<b>Expert organization</b>	<b>Actors and roles</b>	<b>Opportunities</b>	<b>Challenges</b>	<b>Critical issues in the business field</b>
Media house	Infrastructure operator; a commercial actor, a project, or a coalition → Focal actor  Municipality, university, and the commercial actors	New channel combined with existing channels to reach people better and provide relevant information in real time in a certain context, interactively  Both commercial and public use	A threat to traditional activities and channels	Use of established technologies with reasonable price level and quality  User experience  Content  Simple user interfaces  Cross-media
Device manufacturer	Service provider, telecom operator, device manufacturer  New possibilities → for smaller content providers → fragmentation → integrating role → integration of roles	Potential for infrastructure operators and device manufacturers  Different purposes of use	Money flows  Continuous use  Security issues  Requirements for the mobile devices	The financing of the infrastructure: users or the society via taxes  User experience and expenses  Identification of business opportunities
Municipality	Municipality leads the service production, commercial companies develop the software  Infrastructure operator → service provider: new or existing actor → municipality provides testing possibilities for companies	Exploitation in public service production; a new channel for the citizens, tourism, education, healthcare  Improving existing services  New entrepreneurship and export	Content production; various actors in the municipality → difficult to coordinate  Price tag?  Target groups and needs  Identification of business opportunities	Identification of actors, roles and relations  Integration of the interests of different actors  Target groups and concrete benefits  Productization, comprehensive and simple service packages
Media broker	University → development and project management role  Mobile technology providers, content providers, media house and media broker	Interactive, real time advertising, information and guidance for specific target groups  Ubiquitous city → attractive environment	Test bed environment  Gaining people's trust  Mobile services  Integration of systems and technologies	Consistent development  Customer needs and content first, technology second  Competence in content production  Open-mindedness  Cross-media
Research project (university)	Infrastructure operator → a new actor (commercial actor/project/etc) → focal actor  Device manufacturer, municipality, service providers, operator, media broker	Change in people's behavior and processes  Advertising possibilities  Research potential  Possibility for people to learn new things  Interactivity	Resistance towards change, a threat to traditional activities  Infrastructure operator in the future?  Difference between research and business interests	Special know-how and expertise needed in operating the ubi-infrastructure (cf. traditional billboards)  Communications  Consistent development  Commercial vs. public use

Operator	The customer, infrastructure/service operator(s), service providers, possible broker between the service providers and the operator  Coordinating the service management tools an essential role → new business for operators/new actors	Research and testing activities → customer reaction → learning and developing the technological solutions further  New kind of interaction with the environment  Arousing interest among actors	Introduction and consumption of the services  Slow development of terminal devices and the adoption of new practices in different industries  Standardization – various devices and systems  Infrastructure development	Integration into existing services  Content and context  User experience  Identification of actors  Dialog between device manufacturers and infrastructure providers  International functionality standards by operators
Non-profit development company	Infrastructure operator, municipality, telecom operator, middleware updater, content provider, media house and broker	A new channel for commercial purposes, and for creating and improving city image  High quality research → research results and intellectual capital  Improving the existing services or creating new business	What is the business model, or the desired state, or the ownership of the infrastructure?  Responsibility to operate and maintain the system  Money flows	Creativity  Involvement of commercial actors already in the steering phase  Dialog between the research organization and companies about development interests  Commercial vs. public use
Development and testing network	Infrastructure operator → in the development phase a focal firm → once more stable, more actors involved  Focal actor needed to make decisions  Customer	Change in people's behavior and processes  Ways to integrate and exploit existing technology in new, innovative ways  New test environment	Change in people's behavior and processes  Introduction of the services  Security and privacy  Gaining trust  Money flows	Additional value of the services?  Target groups, needs and benefits (user driven innovation)  Clear communication and guidance

Based on the alternative actors and roles identified in the data, it can be seen that the role of the service infrastructure is essential in the business model. The infrastructure needs an operator; it may be an existing actor with a new role (e.g. telecom operator) or a completely new actor. Furthermore, it may be a business operator or a non-profit one, e.g. the municipality. Overall, the operator is responsible for the maintenance, devices (technical elements) and updates, and acts as an interface for the service providers. Also many traditional roles were identified, such as the content and service providers, device manufacturers, and in some perspectives media broker. However, the role of the infrastructure operator was seen as the focal actor in the networked business model. Also the emergence of new roles was seen possible, e.g. in creating tools for service providers to use the infrastructure, coordinating the infrastructure, and integrating/intermediating between the various actors such as service providers. Also the traditional roles may be integrated to some extent, such as service production and device manufacture. The municipality was emphasized as an actor as well, either as an alternative infrastructure operator, or providing access to the city premises by controlling and coordinating the space. A surviving business net differs in different contexts; it influences the constellation of both the service and the business net.

The role of the customer was seen by most actors essential in the development of future business; user experience and target groups as a basis for service development were seen highly important. However, the role of the customer as an actor in the business net was not so much discussed. Creativity and open-mindedness were seen as necessary in developing the services and business models, but yet the customer needs and the value of the services were emphasized as the cornerstone in the business models. Furthermore, the content of the services should steer the technological development and not the other way around. Competences and know-how are important resources in commercializing and developing the future business. The analysis shows that business potential exists, but only if the services are easy to use and create value for both the consumers and the business customers. In addition, the benefits of the services need to be skillfully marketed to the users. All this is can guide companies towards commercially viable ubi-services.

The experts identified various different ways to use the ubiquitous technology and infrastructure which can mainly be divided into two parts; namely public/non-commercial or commercial use, which are not exclusionary but can be combined. Commercial actors are in any case important, and the dialog between the companies and the research organizations is essential already in the technology development/R&D phase. The challenges in such an emerging business field relate to the introduction and the consumption of the solutions, the slow development of terminal devices, and the overall adoption of new practices and possibilities in different industries to name a few. Ubiquitous computing covers and employs different technologies; such disconnected and separate technologies used in an urban environment need to be integrated. Hence, actors need to cooperate to create standards in the fields of mobile devices, sensor networks, wireless networks, etc. Standards are crucial in terms of commercializing the ubiquitous solutions.

The research project has developed the infrastructure and service applications with a lot of effort and resources, and the different actors see enormous potential in the pilot. Value is seen e.g. in the opportunity for companies to develop business, learn, and do research. Yet, no-one really knows what is the the main vision or the ownership of the infrastructure. Questions on business models may hamper the creativity on the r&d side, but it facilitates the future business creation. If no-one has the vision, the business model development is difficult.

## CONCLUSIONS

The study focused on networked business model development in an emerging business field. The empirical context, the UBI pilot, represented such an emerging business field with opportunities for new business creation but also many challenges. This study identified the opportunities and challenges related to the field, as well as critical issues and actors in networked business model development based on the expert perspectives, and hence contributes to the understanding of networked business models. The knowledge created can also be used as a valuable thinking device in companies' strategic business development; the identification of such essential elements facilitates companies in their new business development. The study is still in progress and presented the preliminary analysis of the data.

Emerging technology such as ubiquitous computing represents a dynamic and complex business environment. There is no clear market structure or business net with identifiable actors (Möller & Svahn, 2009). However, this study provides initial insights into the structure of the emerging business nets and networked business model development. Based on the data, different alternative actors and roles were identified. To some extent the actors are similar to

those identified in the mobile communications market (see e.g. Kalakota & Robinson, 2002; Nyström, 2008) but also the need for new actors and roles was emphasized in the fields of the infrastructure and service production. This can help companies in the early phases of service development to better identify and structure the necessary actors and resources needed in the production of the services.

Cooperation among the actors, e.g. in developing technological standards is important in such an emerging business field. The shift from technology/r&d and implementation/roll-out phases to the market phase (Kijl et al., 2005) is crucial but challenging, and involves transition of actors and roles. The issues and challenges identified in this study relate to this, such as the importance of the dialog between the research organization and the commercial actors concerning their service development interests. Also the role of the commercial actors is vital already in the r&d phase, and the identification of such actors needs to be done although it may hamper the creativity of the technological experts. This can facilitate the future business creation since the identification of the actors and business opportunities can guide the service development and not vice versa. Issues such as the role of content, target groups and user interfaces, as well as creativity and competences, need to be considered in the business model development, and companies can take them into consideration and aim for such resources.

Overall, it can be seen from the current study, that different actors may have similar but also very differing views concerning e.g. the service development, which needs special attention in developing the networked business model. Companies and other actors can already in the service development and testing phases outline what kinds of actors and resources are needed in minimum to develop commercial services of new technology. In addition, they may focus on the potential business opportunities and prepare for the challenges in developing their future business.

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