Mobile Enterprise Services 2.0 – Beyond Connectivity.

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Foreword

This project is part of a VINNOVA program[1] aimed at strengthening needs-driven research and innovation networks within the ICT-sector. The participants from the business sector have been TeliaSonera AB and Saab AB and from the academic sector researchers from three universities with different specializations:

- CIC at Stockholm School of Economics,
- Wireless@KTH at the Royal Institute of Technology, and the
- Service Research Center at Karlstad University.

The project work has been limited to one year (2007). It has been focused on a joint exploration of potentially new approaches and business models, in line with the aims stated by Vinnova[2]:

> *"VINNOVA (Swedish Governmental Agency for Innovation Systems) aims to promote growth and prosperity throughout Sweden. Our particular area of responsibility comprises innovations linked to research and development. Our tasks are to fund the needs-driven research required by a competitive business and industrial sector, and to strengthen the networks that are such a necessary part of this work."*

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[1]In Swedish: branschforskningsprogram. The project was named BiKini - Business Infrastructure & Kundinteraktion (swedish for customer interaction).

[2]Source: www.vinnova.se

Executive summary

The emergence of mobile data services combined with more complex ICT solutions involving the core business operations of the enterprise customers, has radically changed the demand put on operators to understand the logics of their enterprise customers' business operations. The results presented in this report refer to a collaborative endeavour to do research on new approaches and business models needed for future development of mobile enterprise services.

Enterprises of all types and sizes are dependent on daily communication and interaction with a number of other firms and enterprises in its context. The introduction of a new ICT solution, whether wireless or not, will affect the organization's interactions with a net of suppliers, customers and other partners. This has important consequences for how we should approach segmentation and market analyses. Adopting traditional market segmentation practices is not enough. To gain knowledge and intelligence about the market – i.e., the companies' unique needs based on their business logic and working practices must be understood. Rather than segmentation, suppliers need to analyze and understand in-depth their enterprises communication patterns, information needs, position and their role in the overall production systems.

From our research work we conclude that providers of mobile enterprise services can approach the enterprise market by looking at different types of *user environments and critical events*. Within an industry (or company) there may be many different user environments that are complex and consist of nets of interconnected users. In addition, user environments in different industries have unique characteristics. By analyzing and utilizing the similarities and complementarities between activities and resources across user environments, suppliers of wireless applications can take advantage of scale economies in their enterprise markets. Furthermore, there seems to be a need for a wider and more dynamic view of value and value creation when approaching the enterprise markets for mobile services - a view that emphasis the fact that value frequently is created and changed over time as a result of an ongoing series of transactions (i.e., process view) by groups of actors in different *value constellations*.

Behind the interest in finding new sustainable business models lay the challenges from a number of new emerging trends in the telecom sector. A central argument made in this report is that future mobile enterprise services are to a large extent coupled to more diverse relationships, in the form of value networks and value constellations connecting actors involved in the delivery and use of mobile services, as compared to earlier, vertical business models. Our conclusion is that all stakeholders need to think on business models as adaptable. Ideas about "sustainable" in terms of "stable", might even be detrimental to companies actively trying to position themselves in the complex, dynamic networks of buyers, users, and suppliers. Hence, we see a need for *adaptable business models*. In a long-term perspective revenue models (as the business model in its totality) for mobile enterprise systems require flexibility, need to be more and more user-determined and will most likely be more application-centric. In an illustrative discussion of how to create growth with services and shift business models, against the background of digitalization and changes in information and communication technologies, two concluding cases describe how a shift in business models can be achieved.

The creation of future mobile enterprise services within value networks put demands on interoperability and new forms of agreements that stipulate how the development, implementation and testing of new services shall be organized. At an early stage, it becomes necessary to consider billing and charging practices which are coupled to the underlying business model for the enterprise service.

Another issue concerns the quality of service requirements. We can assume that service-level agreement will be more complex to manage in value networks as several actors will be responsible for characteristics of the delivered service. The network performance component of technical QoS will most likely be attributed to more than one actor and the service delivery network can in many cases be subdivided into segments under different ownership domains. Customer care can in a similar fashion be composed from representatives from a larger number of actors. QoS requirements also have a significant affect on the technical domain as the enterprise service must be engineered to fulfil stipulated requirements service level agreements. One aspect of such requirements is the required capacity of underlying communications networks.

The present project has been exploratory, with the aim of identifying new research questions and methods of potential relevance from enterprise as well as societal perspectives. There are no plans for any immediate follow-up project. We provide, however, a list of candidates for further research.

Contents

APPENDIX 1: Theoretical Discussion: How to Approach the Term Adaptable?

PART I:
THE ENTERPRISE MARKET FOR WIRELESS SYSTEMS – EXPLORING NEW OPPORTUNITIES

1 Introduction

> Today's mobile service market for enterprise customers is a highly competitive market with gradual price erosion for basic voice and data services primarily delivered through vertical business models.
>
> To ensure long-term growth and profitability, it becomes necessary to extend these vertical models to also account for a more diverse set of relationships, businesses and value added services. This report provides a framework for the description of such diverse models incorporating relationships, integration and technical aspects.

This chapter contains a background to the analysis in the following chapters. A basic definition of the enterprise market is complemented by an overview of the current and projected future market. Scope and methodology are described together with a list of concepts and overall content.

1.1 Background

Mobile services have during the last decade emerged as an important market segment, and where current service providers and suppliers act to extend or otherwise differentiate their offerings to increase market share, profitability and grow. A subset of the mobile services market concerns a particular class of users, here termed enterprise users, where the underlying logic for the establishment, use and payment differs as compared to the general public. In the context of this report, we will use the following term to define[3] enterprise users as applicable to general communications services:

> *Enterprise users are consumers of IT and communications services, representing businesses, authorities and other organizations, that are furnished with and use those services in relationship to specific organizational goals balanced by personal preferences and needs.*

Mobile communications systems have traditionally been designed, developed and deployed to fulfil a number of different requirements in different domains. However, basically by providing the very same highly uniformed networked offerings - as opposed to a variety of more or less "smart" handsets. When it comes to enterprise users however, the provision of yet another handset might simply not be good enough. Also the network services have to be more closely aligned to highly different customer requirements. Some of the enterprise users might well have requirements not too far from those on the consumer mass markets. Some enterprises have rather opted for more tailor made (one-off) solutions – in order to match their specific (unique) requirements. This means, there is a significant market still not matched by any of the extremes (mass-market vs. one-off). In the case of one-off even the (extra) cost of the handsets might well prove a real-world barrier. Ten times or even higher prices compared to those available on the mass-markets. The very aim of this research project is hence to

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[3]Our definition of enterprise is adapted from common definitions to account for the broader perspective taken in this report where we include authorities and other organizations that are not commonly described as enterprises. For example, the EU Commission Recommendation of 06/05/2003concerning the definition of micro, small and medium-sized enterprises states that:

> *An enterprise is considered to be any entity engaged in an economic activity, irrespective of its legal form. This includes, in particular, self-employed persons and family businesses engaged in craft or other activities, and partnerships or associations regularly engaged in an economic activity.*

explore ways to fill the gap between mass-markets *vs.* one-offs ordered to meet the requirements of a single customer only.

For future communication systems targeted at the mobile service needs of enterprise users, we will in this report argue that this vertical model needs to be extended to also account for a more diverse set of relationships and businesses.

1.2 The Market for Enterprise Wireless Services

The Swedish market for enterprise users is highly variable as it encompasses both large and small public companies as well as a variety of authorities and other government organizations. As we are trying to describe the need for new and improved methods and models for the creation of value and growth, it is important to not only understand the current and predicted future size of the market but also its dynamics where we include adjoining market segments.

1.2.1 The Current Market for Enterprise Wireless Services

As seen in Table 1 turnover for mobile services and enterprise users shows a slight decrease during the years from 2003 to 2006. On average, our adopted market segment accounts for roughly 45 percent of the total turnover within the mobile services market segment. We therefore conclude that the enterprise market is to be considered as an important market segment although it can be expected that the costs associated to customer care, operations and maintenance are higher indicating that the net profit levels for enterprise users could be lower[4] than those for mobile services as a whole.

Table 1. A breakdown of turnover for the telecommunications market as a whole and for enterprise users as applicable (SEKm). Examples of other services are leased lines, Internet access, termination fees and similar services.

Market segment	2003	2004	2005	2006
Fixed com. services (PSTN/ISDN)	25 047	23 963	21 898	19 615
Of which enterprise	9 479	8 774	7 956	6 905
Mobile services	16 687	16 247	16 792	16 839
Of which enterprise	7 562	7 275	7 141	6 970
Other services	21 466	22 778	23 409	25 894

Source: Table 2.7, page 23 in SIKA Statistik Televerksamhet 2006 (in Swedish), 2007:15, Statens Institut för Kommunikationsanalys (SIKA), 2007.

The data presented in Table 2 (see below) relates to mobile call services rather than the mobile data services that are the main focus of this report. Available data for mobile call services show that there is a strong increase in the number of active users and average traffic rates. This increase can be expected to change, for example by increases to average amount of traffic per user for private customers, with the recent uptake of mobile broadband subscriptions.

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[4]Decreased marketing costs could, of course, reverse this statement even though our main assumption, that the enterprise market is and is likely to remain an important source of revenue for operators, remains valid.

Table 2. Number of GSM/UMTS subscribers and average monthly use of for mobile data services.

Category	2003	2004	2005	2006
Number of subscribers (thousands)	**516**	**973**	**2 558**	**3 728**
Private	357	763	1 942	2 776
Enterprise	159	209	615	952
Proportion of subscriptions with active users	**6%**	**11.2%**	**28.5%**	**39.3%**
Private	5.0%	11.0%	26.8%	36.4%
Enterprise	10.6%	12.3%	35.4%	51.2%
Average amount of traffic per active user and month (MB)	**0.65**	**1.13**	**2.84**	**5.37**
Private (MB)	0.43	0.82	1.87	3.68
Enterprise (MB)	1.06	2.05	6.00	10.48

Source: The Swedish Telecommunications Market first half year 2007, PTS-ER-2007:15, December 2007.

In the context of this report, it is important to note that increases in the number of enterprise subscriptions and monthly traffic will not immediately lead to long-term growth as price erosion will act as counterbalance which is also evident from the data presented in Table 1. This is one of the primary reasons why we turn to more multi-faceted services in later chapters in our search for this growth.

1.2.2 Service Needs and Drivers

The basic mobile service needs for enterprise users are related to network and communications services such as voice calls, SMS, voice mail, mobile data access and similar services. On the higher information layer, enterprise users emphasize quality of service to a larger extent more than the general public. Enterprises may also have different needs with respect to the administrative relationship to the operator with regards to billing information and usage statistics as well as for the integration of mobile services to exchanges and other ICT-infrastructure.

The conclusion that we draw from the preceding section is that the price-erosion is likely to remain for the more basic service offerings which in essence makes it necessary for operators and systems integrators to look elsewhere for growth and increased profitability. In addition to the basic services, there are a number of value added services that are potentially attractive to professional users. Examples of such value added services are positioning, telematics and various forms of office extension services in addition to e-mail[5].

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[5] According to Telia Trendspaning (in Swedish) 23 percent of small businesses with less than 10 employees plan to invest in mobile e-mail services. For large organizations, with more than 500 employees, the same number is 45 percent.
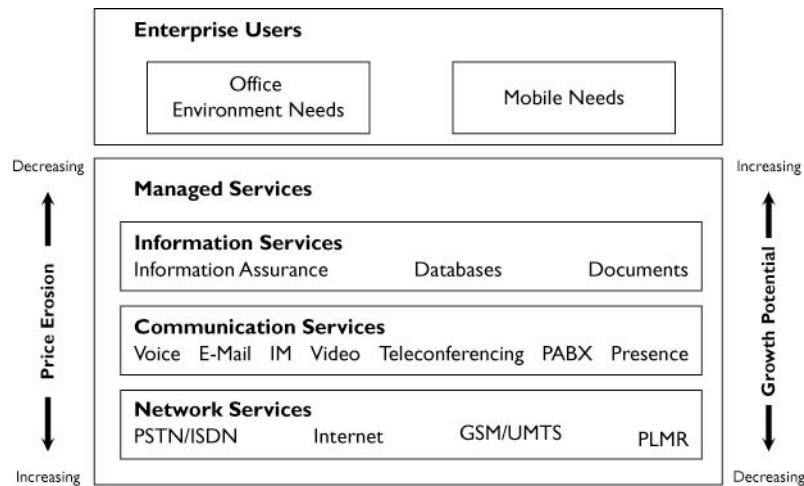
Figure 1. *Communications service needs to professional users can be described using network, communications and information services. Managed services refer to value added services built on top of the three service layers.*

The benefits of mobile services to the customer are, of course, variable. From the enterprise perspective, the primary benefits revolve around increasing efficiency in relationship to enterprise goals – for example by increasing availability to the general public for a government agency or decreased costs for a private company – and benefits gained from a more satisfied workforce. In many cases, the values of such efficiency gains will lead the enterprise to accept comparably higher cost as compared to basic services and other user groups. Historically, usage based charging has been the common charging method for wireless services complemented by recent flat rate subscriptions for wireless, broadband access. Such flat rate pricing might not be sustainable in the longer term when current and future networks become more heavily loaded. With current annual ARPU[6] for enterprise voice services around 500€ per year in Europe and nearing market saturation, future growth can not be coupled to increases in voice traffic or the number of customers. Now consider an employee who through the use of mobile services becomes 10 percent more efficient. In monetary terms, this increase in efficiency can be converted to annual savings of 10 000 to 20 000 €[7] which is 10 to 20 times higher than a doubling of voice ARPU levels.

From an employee perspective, the most important benefits with the establishment of a mobile office environment are[8]:

- Being more flexible in time (59 percent)
- The ability to work independent of position (45 percent)
- Increase (personal) efficiency (39 percent)
- Better balance between work and private life (30 percent)
- Saving time and money by reduced travel

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[6] Average Revenue Per User.

[7] Based on annual costs of between 100 000 and 200 000 € as described in Andersson, P. and Markendahl, J.: Value added services and new business roles for support of mobile professional users and project working processes, International Telecommunications Society 17th Biennial Conference, June 24th - 27th 2008, Montréal, Québec, Canada.

[8] Telia Trendspaning for 2007.

During a two year time span, professional users are also deemed likely to have calendar functions in their mobile terminals which are capable of multi-modal operation[9], map services, music and all vital business correspondence. One additional factor in the adaptation of new services is framework contracts that are commonly used for the procurement of ICT services in the public sector. Such framework contracts are, by necessity, general in nature and not always adapted to more complex and multi-faceted relationships between service providers and customers. This means that for the public sector, the acceptance and adaptation of the new service delivery models described in this report can, in general, be expected to lag behind the private sector. In our later analyses of specific user environments, we will give more specific examples of different types of value added services and specific mobile services enterprise drivers.

Almost three out of four enterprises (cf. Table) sees cost or cost reductions as the primary motivation for their choice of operator with almost identical results from the public and private sectors[10], and where the emphasis on costs is even more accentuated in larger cities. Even though it is only natural that organizations in rural areas place a higher emphasis on the QoS[11] attribute coverage, the same organizations also give priority to other QoS attributes such as reliability and availability with a difference of over 20 percent as compared to the national average. Customer loyalty, measured as the number of organizations that have changed service provider within the last 12 months, is 24 percent, a percentage that is almost doubled for larger private companies which are high numbers as many organizations are affected by service contracts.

Table 3. A review of the top three criteria deemed to be important for professional users' choice of mobile telecommunications services shows that cost and coverage are the most important attributes[12]. Criteria and percentages are shown for the six most frequent answers.

Criterion for Service Provider Choice	Percentage
Cost or cost reductions	74 %
Coverage, improved coverage or good network	71 %
Reliability and high availability	31 %
Customer service and support	11 %
Brand perception	9 %
Service offerings (call transfer, voice mail et cetera)	5 %

It should be noted that the percentages given in Table are to a large extent coupled to existing services rather than the value added services that are primarily considered in the context of this report where we will assume that customers place a higher emphasis on functionality and quality of service.

1.2.3 Trends for the Future

In a recently published market forecast[13], similar trends to those described earlier in Section 1.2.1 are extended to the future. One prediction is that turnover for the enterprise mobile

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[9] Telia Trendspaning here describes this ability as terminals capable of both mobile and fixed, IP-based access which we interpret as cellular and WiFi access.

[10] Fagerfjäll, H., et al. Företagens användning av elektronisk kommunikation - 2005 (in Swedish), Post- och telestyrelsen and TEMO, 2006.

[11] We will define and describe quality of service later in Chapter 6.

[12] Fagerfjäll, H., et al. Företagens användning av elektronisk kommunikation - 2005 (in Swedish), Post- och telestyrelsen and TEMO, 2006.

services market is expected to show a marginal decline from 2007 to 2011[14] which is in line with our previous analysis. It is important to note that the marginal decline relates to basic services rather than the value-added services that are the focus of this report. There is also currently a technological migration where organizations choose to become solely dependant on mobile services and forego the traditional fixed telephony offerings. In the survey[15], it is stated that around 33 percent of all organizations are willing to make such a shift, a number that increases for organizations within the public sector and for larger companies as compared to smaller.

In general, we see a continuing blurring of boundaries between IT and communications which will also be reflected in our later analysis.

For the future, it is also important to consider the parallels between mobile services and the Internet[16] where the content and applications driven focus in the web based economy places a comparatively low value on the actual network. This could mean that we will see a similar shift in the mobile market where the systems integrator role is emphasized and bit transport is procured as a commodity. However, the enterprise market is likely to demand various forms of quality of service guarantees which is set to work as a balancing factor to this development.

Finally, there are high believes that mobile enterprise services will have a transformational potential in terms of the ways in which the individual employees and the companies deploying them will communicate and design their future workplace and business processes within, but also *across* firm boundaries. In consequence of the clear trend towards increased networking and collaboration among enterprises, service providers will need to understand how (if) mobile services can combine and converge into 'multi-actor' offerings. In other words, it becomes increasingly important to discuss how future services can support the value creation process and the interaction between companies in different business constellations.

1.3 Scope and Limitations

The primary aim of this report is to describe extensions to the current vertical service provider-customer relationship model in the enterprise mobile services. These extensions are necessary to ensure long-term growth and profitability as the vertical model is set to continue moving the market towards increasing competition and continuing price erosion. On a macroscopic level, our extensions can be described as a layered model for the analysis of the richer and more diverse relationships that we see as foundations for the creation of future value added services. This layered approach separates between three principal domains:

- the *service relationship domain* collecting actors participating in use of a service,
- the *service integration domain* describing actors and relationships involved in the creation of new services, and
- the *technical service domain* where all technical systems used to create and deliver a service is included.

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[13] PTS and IDC, Svensk Telemarknad - Prognoser 2007-2011 (in Swedish), PTS-ER-2007:25, PTS, 2007.

[14] The forecasted turnover (ibid.), given in Table 4.4 uses Mobile voice services (Swedish: Mobila samtalstjänster) as a heading although the assumptions underlying the forecast are given as Mobile voice services and mobile data services (Swedish: Mobiltelefoni/Mobila datatjänster).

[15] Ibid.

[16] Andersson, P. and Markendahl, J.: Value added services and new business roles for support of mobile professional users and project working processes, International Telecommunications Society 17th Biennial Conference, June 24th - 27th 2008, Montréal, Québec, Canada.

Even though the current vertical model can be described in terms of our proposed domains, we aim to show that future growth will lead to increased complexities in all domains. It should also be noted that the domains defined as above includes an inherent timeline where actors and relationships change during the development, deployment and subsequent use of a new service.

To make the layered model more concrete, consider a case where an enterprise within the forestry industry is in need of a combined telematics and information system connecting its distributed logging operation to several, independent distribution contractors responsible for delivering logs to a number of (likewise independent) sawmills. The enterprise would like to develop the ability to dispatch trucks to logging areas and sawmills to minimize costs and serve customer orders in an optimal manner. In doing so, the forestry enterprise wants to collect information from the independent trucking contractors and sawmills about their status, availability and current price tariffs. As each sawmill will have its own ICT infrastructure in place and each truck must be free to choose its own communications service provider, the enterprise might delegate the responsibility to develop, deploy and support the forestry information service to a systems integrator. Figure 2 outlines actors and relationships in each of the three modelled layers.
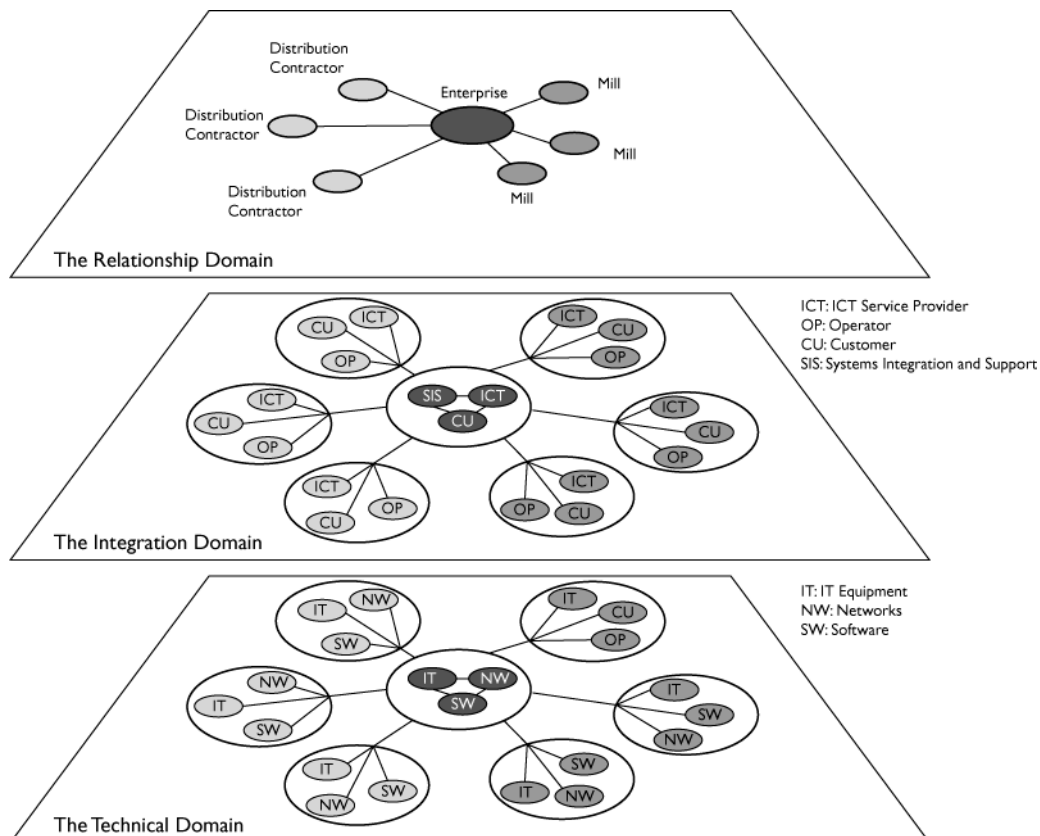
Figure 2. *Example interaction between actors and systems as part of a creation of a new service.*

Throughout this report, we will mainly analyze and describe the service relationship domain although some general remarks and comments will be made to the other two layers. We will also return to the overall model, encompassing all three domains, later in the report when possible future research is discussed. We have also chosen to exclude the influences of regulation, procurement practices and the differentiation aspects related to the qualities by which services are delivered from the scope.

1.4 Methodology

Our analysis of the current enterprise market has shown that future growth and profitability of systems integrators and operators are to a large extent dependant on their ability to create value added services beyond today's basic communications services. Such value added services will in many cases lead to more complex relationships between a larger set of actors as compared to previously. Our research has shown that the process by which such relationships are created and maintained can best be described as a four-step process, a process that will be used repeatedly in later chapters of this report:

- Step 1: Analysis of user environments and processes
- Step 2: Value creation and supply chain identification
- Step 3: Creation of joint value and common work processes
- Step 4: Building the value network between suppliers, partners and customers

Step 1	Step 2	Step 3	Step 4
Analysis of user environments and processes	Value creation and supply chain identification	Creation of joint value and common work processes	Building the value network between suppliers, partners and customers
1	2	3	4
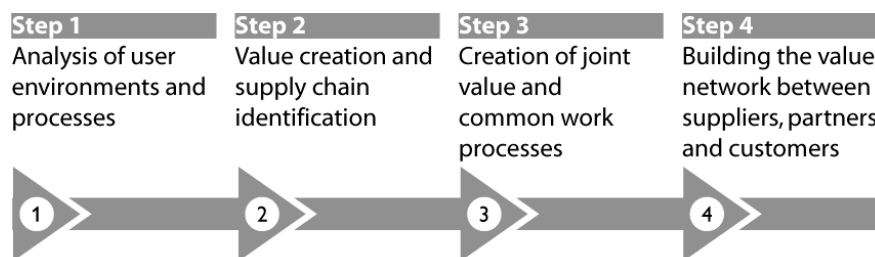
Figure 3. *Our model for the extension of vertical business models consists of four steps that will be developed in later chapters of this report.*

The analysis of user environments and processes is based on an analysis of the relations, internal communication and working processes that are part of the behaviour and business logic of an enterprise, where needs to a large extent will vary between enterprises. The identification of value and supply chains is made to determine roles and value-creating capabilities for the participating actors. As each actor will support a specific pattern of mutual communication and common working processes, the combined value-added service has to embrace such diversity. Our proposed process will in its fourth step lead to a value network to which suppliers, partners and customers are connected[17]. The value created in this network will be governed by an instance of a framework for adaptive business models where the service is adapted to what (time-variable) role and position the enterprise has.

1.5 List of Concepts

The analysis will be centered on a number of key business concepts and definitions. The most central of these concepts are listed below in order to further indicate the scope of the analysis in the report. The concepts are in most cases listed in "order of appearance" in the report according to the step-wise approach illustrated in Figure 3.

- In this report *enterprise*, *enterprise customer* or *enterprise market* refer not only to organisations engaged in economic activity but also to organisations in the corporate and public sector.
- *User environment* is a group of enterprise situations where some similarities can be found between businesses, industrial logics, actor relations and user activities.

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[17] The individual roles of a supplier, partner and customer, will lose meaning in a value network.

- *Working process* is describing "how the work is done" with both planning, management and realization of activities as well as interaction and coordination between activities and people including formal and non-formal rules for behaviour.
- A *Business role* consists of a set of capabilities or resources that can be used to perform specific activities in order to fulfil responsibilities within an area, e.g. network maintenance or customer support. A business role controls one or more types of functionality and interacts with other business roles belonging to other market actors or within the same market actor (company).
- *Business relations* both deal with agreements (term & conditions for service delivery & payments) and are related to the relation itself, i.e. the implementation of the agreement. This includes processes for establishment and management of the relation between business entities of the type B2B, B2C and partnerships.
- *Market actor* is used to denote a business entity, a company or a private person. Market actors have business relations and can take one or several business roles.
- *Value and added value*. Value can be of two forms: i) value of the products or offerings and ii) value of the actual relationship between the buyer and the seller. From the customer/consumer perspective the "added value" is related to what and how needs are satisfied, increase of the utility, delivering a surplus. From the provider perspective it is the ability to provide this "added" value to the customer.
- *Connectivity services* provide the user with access, transport, interconnection and other types of connectivity related aspects that add value to the user.
- *Value added services* is in this report used to describe all other type services than the connectivity services and that use the connectivity for delivery of added value; e.g. ring tones, films, storage of pictures, access to database, project coordination
- *Value analysis*. Based on different suggestions for value analysis three important areas for understanding value are: i) how value analysis is realized by customers, ii) how value analysis can be brought into the development of offerings, and iii) how value actually is delivered in various value constellations to customers.
- *Value chain* is one way to describe how actors (companies or business roles) interact in the value creation process using a sequence of activities.
- *Value network and value constellation* is similar to "value chain" but in this case the interaction between actors involved in the value creation is not necessarily "a sequence" but can be any form of configuration. The name *value constellation* was introduced by Normann and Ramírez suggested that the focus of a strategic analysis of value creation should not be the company or the industry but instead the value creating system itself.
- *Business model* usually includes many aspects related to "how to run your business" in order to make money or in order to create value to the customers. Some themes appear often in various definitions, many of which are captured in this study: the value to customers of the offering provided, the customer segment, the constellations of actors cooperating around the offering, the business roles and the actors in the activity network, the revenue model and cost structure.
- *Revenue model and revenues streams* describes how money is flowing between actors involved in the value creation and what terms and conditions that are used when actors compensate each other financially.
- *Adaptive business models* are used in the project related to the idea that companies may need to act differently in different business situations. We argue that the meaning of the term "capable of being adapted or of adapting oneself" can be transferred to include also business models. The reasoning implies that companies actively will try

to position and maybe re-position themselves dynamically in the complex, dynamic networks of buyers, users, suppliers.

Business roles and market actors are illustrated in figure 4. Different actor can have different sets of business roles. Actors and business roles can interact in different ways. Different value constellations can be formed within or between market actors.
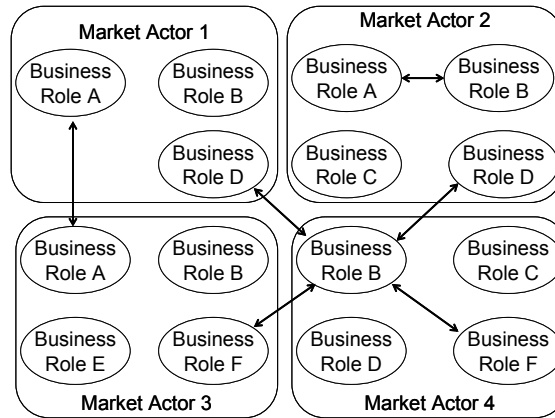
Figure 4. *Illustration of market actors, value networks and business roles & relations*

1.6 Contents

The report continues with a discussion on principles for customer segmentation in chapter 2. We then (chapter 3) describe the concept of user environments to show that the relationships within an enterprise and between actors involved in the delivery and consumption of value added mobile services might be the way we can better analyse and understand customers' future demand and needs for mobile enterprise services. In chapter 4, we arrive at a methodology for assessing user situations together with value analyses. Chapter 5 continues with the service supply side where we describe why companies active in complex enterprise market for mobile services need to think on business models as adaptable as opposed to more traditional, static business models. While chapters 3 and 4 first and foremost focus on the relationship domain in our layered model, chapter 5 also includes aspects for the service integration and technical domains. Together, the chapters 6 and 7 lead to a description of strategic and management implications. The report concludes in chapter 8 with suggestions for further research.

2 Segmenting the Enterprise Market

In this chapter we question the use of segmentation leading to a well defined "Enterprise Market". Service providers that rely too heavily on traditional segmentation, i.e. grouping enterprise customers based on their similarities, will lead to problems. We discuss segmentation based on technologies, on company size, type of enterprise and organization function. Adopting traditional market segmentation practices from "traditional" consumer market analyses is not enough, we argue. Rather than segmentation, suppliers need to analyze and understand in-depth their enterprises communication patterns, information needs, position and role in their production systems, and more. Every company or organization, its business logic, working practices and unique needs need to be understood. One of the standpoints taken in this chapter is the idea that enterprises of all types and sizes are dependent on daily communication and interaction with a number of other firms and enterprises in its context. The introduction of a new ICT solution, whether wireless or not, will affect the using organization's interactions with a net of suppliers, customers and other partners, and this in turn has important consequences for how we should approach segmentation and market analyses. Segmentation models also need to include the fact that the business customer is also private at the same time.

2.1 Introduction

Mobile offerings are dynamic; they change in the hands of the users during the course of long-term usage. Although many wireless solutions are still in their infancy, we can expect that substantial changes can occur in the long-term processes of usage. Hence, another complexity concerns the fact that enterprise customers and their situations will change over time, after the initial implementation. Consequently, a static view on segmentation will make it difficult for technology and service suppliers to keep up and adapt to the sometimes very rapid development within and among the enterprise organizations.

One message of this chapter is that the use of the concept "Enterprise Market" (widely used for example among telecom operators and system suppliers) is useless and can in parts be misleading (given the links to the private consumer market). Every organisation investing in some kind of wireless application is unique, and its unique needs need to be understood. Still, in order to understand the market, and its development, suppliers need to analyze aggregated parts of the market through categorization, segmentation etc. However, we will argue that for the single supplier of wireless applications, services or systems a too strong focus on traditional segmentation, i.e. grouping enterprise customers based on their similarities, will lead to problems. The chapter focuses on these issues, looking at some of the most common ways of analysing the enterprise market among telecom suppliers, including their problems. Some alternative views on segmentation and market analyses are discussed.

2.2 The Enterprise *vs.* the Private Consumer Market for Wireless Applications

The enterprise market for wireless applications and services is a heterogeneous market. It is in many respects very different from what is normally described as the other, second half of the wireless application market, "the private consumer market". Rightly observed by Ahonen et al (2004), mobile telecoms might have two basic segments business and residential customers, but "one has to keep in mind that behind business customers there is always the individual as end-user" (p.48). They argue that the buyer is a hybrid where the business customer is also private at the same time, and powerful segmentation models might need to include this fact. One way to do this would be to cross-segment situations and roles (e.g. in business or private contexts) with users. Situations and communication needs could be a powerful basis for

analyses and segmentation that would acknowledge the user as a private and business customer hybrid.

Hence, it is important to remember that organisations are made of individuals that also are private consumers of information and communication services. As stated by Ahonen et al (ibid) "the acceptance of business services reflects on private behaviour and vice versa" (p.48). What does this mean for our understanding of the former, i.e. of the enterprise customer and the business services? Let us point at three important issues:

2.2.1 Acknowledging the Blurred Boundaries between Business and Private Life Activities.

The work life of many individuals is changing due to the increased acceptance of and dependence on new ICT technologies, including wireless technologies and applications. In the 1990s, when the term "mobile office" was becoming widely use, it reflected an anticipated, and in parts real, shift in the work behaviour of some people. Big established consultancy firms, for example, officially announced that as a consequence of the increased use of laptops in combination with mobile telephones, consultants became more "mobile" resulting in the reduction up to 75 percent of fixed office space. Consultants could work from home and certain activities could be done on the move or in connection with visits to customers. New work patterns also in many cases seemed to lead new divisions (in time and space) – and sometimes more blurred boundaries between - "private" and "business" communications and activities. People were increasingly using the same devices, the same applications and the same services in their daily business and private communications. We can anticipate that in the future, some "enterprise markets" and some organizational functions and categories of personnel, will continue on this path. However, we need also to acknowledge the fact that many of the ideas around "the mobile office" resulting from the emergence of "mobile data" were just visions without any connections to the reality of many people. Work life continued to be concentrated in time – nine to five – and in space. An important implication for ICT industry companies including mobile telecom operators, and hardware, application and service providers, is to acknowledge this duality: For some categories of professional users of wireless applications the division of business and private communications and activities will continue to be divided (and integrated) in new forms. For others, this division will not change so much or will change at a much slower pace. Important to acknowledge is the fact that these two general categories of users (and their many middle forms) will cut across demographics, geographical regions and industry boundaries.

2.2.2 Overcoming Resistance, Reaching Forerunners, and Acknowledging Possible Correlations between Private and Business Communications Behaviour.

From experience, since the 1990s, we know that in many enterprise markets for mobile applications, mobile telecom operators and other suppliers have experienced inertia and sometimes resistance among enterprise customers to accept, implement and make use of the new opportunities of wireless technologies. Having identified the decision makers in the organisation (which sometimes can be a difficult task, see more on this in Part II), it can prove difficult to identify the users most likely to accept the new systems and services. The idea of certain "forerunners" (despite its many uncertainties) can be helpful in this identification. And in some cases, but not all, we can anticipate a correlation between forerunners in the consumer market and the likelihood that these will be precursors also in their work life and business context. In many cases, people are more likely to be forerunners and try new things in their private life, spilling over on their professional life and communication behaviour. In some cases, we can expect the opposite. Progressive organisations with strong and clear ideas about the use of new ICT technologies will spill over on their users' more orthodox private communication behaviour. In the critical phase of adopting new ICT systems in organisations,

the identification of individual lead users which in their private life are open to trying out new technologies and services might help overcoming certain forces of inertia.

From a long tradition of previous research on customers' (very often private consumers/ individuals) readiness to accept new technologies we can anticipate some factors to be more important when trying to identify individuals that could be important drivers in the acceptance of new technologies in organisations. Venkatesh (2003), for example, has in an influential analysis of this field of research presented a unified theory for individuals' acceptance of information technologies in organisations, The Unified Theory of Acceptance and Use of Technology (UTAUT). It consists of 4 central determinants of intention and use behaviour:

- "Performance expectancy"
- "Effort expectancy"
- "Social influences"
- "Facilitating conditions"

The four determinants were extracted from broad survey studies in organisations and work places where information technologies hade been introduced, indicating a high explanatory power of the four general factors. If we assume that these explanatory factors can be transferred to the context of wireless technologies and applications in enterprises (which can be discussed), we get a powerful analytical tool for testing, understanding and analysing individuals' attitudes, beliefs and behaviour towards (new) technologies in organisational contexts:

"Performance expectancy": This factor describes the degree to which different individuals in organisations believes that using a new wireless technology and application will help him or her to attain gains in job performance. Applying the model to analyze this factor, we can assume that different individuals in different work situations will have different expectations on the new wireless technologies: their perceived usefulness, their job-fit, their relative advantage in relation to existing technologies, and general expectations concerning the outcomes of implementing the new wireless technologies.

"Effort expectancy":   It is often heard that both private consumers and individuals in organisations prefer wireless applications that are easy to use. This connects to the second variable. In line with the model, we can assume that the degree to which different individuals in organisations associate different wireless applications with different degrees of ease. Applying this assumption to wireless technologies in organisations, we get a tool for analysing certain individuals' perceived ease of use of the technology and perceived complexity of the new technology.

"Social influence": Like in private life, individuals are also affected by various social norms in their organisational contexts, in connection with the adoption and use of new technologies. This gives us a power tool to analyze the degree to which individuals perceive that important others in the organisation believe that he or she should use the new wireless system. It embraces various subjective norms, image, and other social factors that can affect behaviour and intentions among people in the organisation.

"Facilitating conditions": This factor describes the degree to which different individuals in organisations believes that an organisational and technical infrastructure exists to support use of the system. For example, individuals perceive differently, the way in which a new wireless application supports a fit between the individual's work style and situation and the use of the new system in the organisation.

To sum up, the concepts and ideas of the original so called UTAUT model could be used as a tool and framework for connecting the individual and the organisation when analysing the implementation and use of new mobile technologies and services. To reach possible lead users, and in order to be able to segment individuals and individual behaviour and intentions towards wireless technologies in organisations, the use of determinants like the four here could prove to be powerful tools. One important question is of course, if these individuals will behave differently and will have different intentions when new "wireless technologies" are in focus, in comparison to information technologies in general? Overall, it can be assumed that the generality of performance expectancy, effort expectancy, social influences, and facilitating conditions make them suitable determinants to use when analysing individuals' intentions and behaviour towards new wireless technologies. Successively, in the upcoming chapters we will describe some of the more specific characteristics of wireless technologies, and how this might affect behaviour within and between organisations.

2.2.3 Incorporating Individuals' Communication and Use Behaviour in Analyses of Enterprise Markets.

As is evident from the reasoning here, an organisational perspective on the enterprise market for wireless services and applications, should include analyses of the individual. Furthermore, the individual appears in two roles: the individual as private consumer and user of the applications, and the individual as a professional and organisational member. Furthermore, the communication activities of the two roles can be more or less intertwined. Consequently, to understand the behaviour of customer organisations in enterprise markets we also need to understand the behaviour of different individuals adopting and using the new wireless applications. Different individuals will have different *roles* in the different *phases* of buying, adopting, implementing and using the new wireless technologies.

In addition, different individuals will have different types of communication patterns and needs, internally and externally. A study aiming to see how a certain type of SME firms – plumbers – could make use of new mobile phones and new mobile services and applications in their daily work (Andersson et al 2005), was based on a detailed analysis of individuals' internal and external interaction and communication patterns. In a second step, this lay the platform for analysing *critical events* and *critical situations* where communications and work practices could be improved with the help of new wireless applications. The analysis also helped to identify central actors in the communication networks, e.g., actors with a potential to support and/or hinder the process of implementation. Hence, while segmentation of individuals based on similarities can be a powerful tool when analysing and targeting the private consumer market, as will be discussed below, the analysis of the enterprise market given the uniqueness of every enterprise's communication situation, limits the transfer of traditional segmentation practices to the latter.

2.3 Segmentation Principles

The mobile telephony market has during the 1990s rapidly adopted established consumer goods industries' sophistication in market segmentation and analyses. Traditional segmentation based on e.g. demographics (age, marital status, gender, income level etc.) has been adopted and made a very common basis for analysing the consumer market for e.g. mobile telephones and various wireless services. But, as stated by for example Ahonen et al (2004), "as there is remarkable variety in all societies among people in any given demographic group, especially when it comes to consuming digital content and managing communication needs, demographics prove to be of very limited value" (p.36).

A quick overview of e.g. major telecom enterprises' segmentation strategies for the enterprise market will not only reveal differences, but also reveals another fact: due to the rapid changes both in technologies on the supply side and in the technologies and organizations on the user

side, the major telecom enterprises on the supply side try out new and changes, sometimes frequently, segmentation principles. As stated by one marketing manager of one international telecom operator:

"I think we have adopted and tested every segmentation principle there is for our services on the enterprise market. First it was technology that governed segmentation, then company size. After that we went for business areas and corporate functions. It is very difficult to find the optimal segmentation principle…"

Hence, in practice, we will find a number of different segmentation principles, and thus also sales and marketing organization principles among suppliers. To name some:

1. Segmentation based on technologies
In emerging markets, many suppliers try to segment market their markets, based on various technological dimensions. For example, building on Paavilainen's (2001, p.3) idea that mobile applications often are generated from four different sources (fixed internet applications, technology driven solutions, internal corporate systems, and content driven multi-channel services) we also se that some of these are also sometimes used for segmentation purposes. Thus, it has been common to find suppliers of wireless applications to base their enterprise customer segmentation on, for example, instant messaging technology, personalization technology, location technology, and the like. Other common technology based segmentation principles for the wireless enterprise market connect to existing internet technologies and application. Hence the market is segmented along the lines of various already existing internet technologies, where the mobile applications only become an extension of existing technologies (e.g. enterprise segments for "mobile" e-mails). In addition, various enterprises' different corporate systems and technologies also influence segmentation strategies among suppliers. And hardware is another technology factor used in segmentation. The mobile hardware industry, especially the mobile phone industry, can be said to be driven by segmentation. The enterprise market can then be divided in different ways depending on requirements on technologies depending on user and usage situation: environments requiring screens etc. for a lot of writing, rough environment requiring non-sensitive, waterproof devices and technologies, enterprise user environments requiring larger screens for graphics and browsing (building construction etc.), and more. Hence, technologies of various types, is still a key factor in many mobile suppliers' strategies and tactics for segmenting the enterprise market. And these technologies can be more or less distant from the different "technologies" associated with the users' direct user situation.

2. Segmentation based on company size (SMEs vs. Large Enterprises)
Another common segmentation factor takes as starting point the fact that small/medium sized and large corporations behave differently and have different requirements, and hence, must be approached in different ways. Starting with the actual purchasing behaviour connected to the procurement of wireless applications we immediately encounter differences between the two. For a small craftsman firm (plumber, electrician etc.) thinking about investing in a new wireless application for its fieldwork, this investment can be substantial. It immediately turns into a strategic sourcing issue (for management), affecting major and central parts of the whole business operations. And thus, it requires a certain type of sales, marketing and support from the wireless supplier's organization. A large enterprise on the other hand is characterized by its often substantial organizational complexity, both in the functions using the mobile application, and in the various units deciding on and purchasing the application. As will be discussed later, understanding the organizational consequences in large enterprises of an increased integration of information and telecommunication activities and resources can be

difficult for a supplier of wireless applications, irrespective of whether the supplier is large or small. Segmentation based on sized can be justified, depending on the fact that small and large enterprises must be approached in different ways.

3. Segmentation based on type of enterprise (Public vs. Private Organisations)
Many suppliers of wireless applications also separate their private and public customer accounts. The rules and regulations associated with public procurement often require specialized resources and support on the supplier's side. As an example we may mention investments in a new generation of mobile safety systems (e.g., police, ambulance and other emergency operations) by a government agency where requirements for safety etc are extremely high. Will put high demands on the supplying organization(s). The issues and high requirements associated with implementation of a new public communication system like emergency systems can, but need not be different. The regulated procurement environment most often will be somewhat different.

4. Segmentation based on organisational function
In medium sized and large corporations with a higher degree of organizational complexity and specialization, different organizational functions, functional areas and units will have different needs for "mobility". There will be differences between functional areas as regards the way they communicate internally and externally, access internal information, and contribute to the value creation and business development processes of the company.

The needs of a highly mobile, technical service fieldwork function will obviously be different from the mobility needs of a sales force function, or an R&D or manufacturing function's mobility needs. Wireless applications can affect most functions, irrespective of whether the spatial mobility is high or low. The needs for access to internal corporate information also differ between functions. When discussing the differences between business operations above, we argued that when analyzing the potential for wireless applications in different sectors, four central factors were:

- The dominating value creation and business models
- The drivers of efficiency in business operations
- The value networks
- The communication patterns

It can be anticipated that in large enterprises with complex organizational structures, dimensions of the same four factors will be present and important also when looking at organizational functions. For example, "border" functions like after sales service function or sales function with a high degree of external communication and interactions will in their interactions and communications be central in the process of creating value, interacting with the enterprise's own customers. Moreover, the functions' central position in the value networks and in the enterprise's external communication patterns means that the introduction of new mobile information and communication devices and services in the functions' operations can have very important consequences for the company. Hence, the "logics" of different organizational functions can be analyzed partly in the same way as when analyzing different industrial logics taking into account patterns for internal and external communication.

5. Horizontal and vertical segmentation
The previous discussion on segmentation along the needs of various organizational functions connects to a common base for segmentation- vertical and horizontal segmentation. Paavilainen (2001) describes *vertical target groups* for mobile enterprise applications as

"typically narrow user segments, such as filed engineers or sales representatives", giving the examples like (p.129-130):

- Mobile recruitment tools
- Mobile tools for field engineers
- Mobile sales reporting
- Mobile supply chain tools

- Mobile fleet control
- Mobile remote control
- Mobile job dispatch

Horizontal applications, on the other hand, "are meant for a massive number of users. Mobile e-mail, for example, could be an application for a horizontal target group", exemplified by (Paavilainen, 2001):

- Mobile e-mail
- Mobile bulletin board
- Mobile time entry

- Mobile calendar
- Mobile travel management
- Mobile pay slip

It is also argued that initially, most mobile applications are initially targeted for vertical target groups as they most often can be tested more effectively and with lower costs. In line with the previous section, vertical target group applications are driven by the specific, detailed needs of certain individual departments. But as stated by Paavilainen (2001) "as horizontal applications serve a large number of users and are specifically aligned with the strategic goals of the company, they usually attract more interest" (ibid.). Obviously, the differences between vertical and horizontal target groups in organizations have implications for the way that suppliers of wireless applications bridge the gap(s) between the company and its various target groups.

2.4 Mobile Enterprises or Mobile Networks? Segmentation According to the Logics of Industrial Processes

No mobile enterprise application is used in isolation. With the maturity of mobile applications in enterprises follows the increased interdependency between different mobile (and fixed) ICT applications within and between organizations. Every narrow, specialized (vertical) user group in an organization implementing a mobile application will affect and be affected by other actors in its context. Segmenting the enterprise market based only on the characteristics of single divisions/functional areas or organizations will miss important aspects of this network embeddedness. As stated by one of the representatives of a very small plumbing firm, when interviewed about the process of implementing new wireless application with the aim to simplify and make more efficient the fieldwork, reporting routines and invoicing: "This process of implementing a new wireless system will never be fully successful if it cannot in some way be connected to our main parts wholesaler and to some other important suppliers which we need to be in contact with daily. Enterprises of all types and sizes are dependent on daily communication and interaction with a number of other firms and enterprises in its context. The introduction of a new ICT solution, whether wireless or not, will affect the using organization's interactions with a net of suppliers, customers and other partners.

The implementation and use of new wireless applications, in e.g. sales or field service units will sometimes be directly aimed at changing the communication and interaction with the enterprise's own customers. The value of the new wireless application can thus partly be determined by the (new) values created in the interactions between the users of the wireless application and their counterparts in the customer organization. In some cases, there is little need for integrating technologies across company borders. In other cases, system integration might sooner or later become a crucial factor.

What this means for suppliers doing customer analyses and segmentation of enterprise markets for mobile applications is that in order to understand and approach different potential user organizations, suppliers sometimes need to acquire knowledge on a wider part of the user's communication and interaction context. In addition to the grouping of potential customers/users along similarities between single enterprises, like in traditional segmentation analyses, suppliers should also acknowledge similarities and differences between the "logics" of different industrial processes and networks in which the wireless application is to be implemented. The example of the plumber above indicates that these types of network contexts and interdependencies will be present also in less complex industrial processes. There are also many examples of more complex "industrial" processes and network contexts, providing challenges for both small and more resourceful suppliers of mobile solutions. Here are two very different examples:

Example 1: Interdependencies in the internal "production chain" for healthcare services

How can the "logic" of the "production chain" associated with healthcare services be described and what are the implications for the sales, implementation and use of new wireless applications? This is of course a question with many answers depending on type of healthcare activities and wireless application. Let us just point at one concrete example concerning hospital patients and the control of their use of pharmaceuticals. One of the central "logics" in this situation is how to coordinate activities and create concordance in information exchange, communication and work processes between, physicians, nurses, pharmacists, other hospital personnel e.g. medical experts in medication committees), and also the patients themselves. Together hey participate in developing the recommendations for what medicines the patient should use under different circumstances based on functionality, assortment, price etc. Creating concordance is important both in order to control that the right combination of medicines are taken (effectiveness including safety), and that this is done in the most economic way, avoiding e.g. waste (efficiency). From this follows that the introduction a new wireless application for e.g. hospital pharmacists for more rapid access of pharmaceutical and patient information during rounds at hospitals will be highly connected to the activities performed by the other actors in the internal production network. One of the benefits of a wireless application in this context would actually be to enable efficiency in the interactions with the other professional groups, and the patients, at the hospital. Communication and understanding between different professional groups at hospitals can be improved with the help of wireless applications, given that these internal interdependencies between the many professionals involved are recognized. The next step, would be to introduce adapted versions of the mobile information system and device to the other professional groups (and even patients!), and also integrate these with the necessary back-office systems, in order to make the mobile applications suitable for the healthcare production processes at the hospitals.

Example 2: Interdependencies in the chain of building construction processes

How can the logic of the chain of activities connected to complex building construction processes be described and what are the implications for the sales, implementation and use of new wireless applications? One of the central problems associated with and characterizing the building construction processes concern revisions, and the handling of unanticipated events. Quick access to necessary information, involving a large number of enterprises, is needed to be able to solve constantly emerging revisions of work plans. As stated by Löfgren (2005): "With a large part of the management team stuck at their computers, several hours per day, a lot of on-site production leadership, coordination and organization are lost, resulting in deficiencies of the production process…also there is a waste of productive work hours when construction management staff has to carry out administrative work of construction site activities and meeting notes twice…". The use of mobile computing devices in complex

building construction processes will involve a large number of different enterprises and work professionals: architects, entrepreneurs, suppliers of all kinds, transportation firms, different professional groups at the construction sites, back-office personnel of the building construction firm, and more. Hence, mobile computing devices and applications can in very many different ways enter this complex production chain and constellation of firms: the mobile solution can enable more effective on-site administration of construction activities (e.g. reducing inefficient paper-work), it can enhance real-time risk management and collaborative problem-solving in construction projects, and can facilitate improved on-site presence, involvement and leadership of production management (e.g. through making information management and project communication mobile; Löfgren 2005, ibid).

The two examples indicate one important thing: the introduction of wireless applications in one professional group/division like in the healthcare example above, or in one organization, like in the building construction example, will affect and be affected by the group's or organization's embedded position in a wider production network. This has important consequences for how enterprise customers for mobile applications are analyzed and segmented.

3 User Environments and the Enterprise Customer

The emergence of mobile data services combined with more complex ICT solutions involving the core business operations of the enterprise customers, has radically changed the demand put on operators to understand the logics of their enterprise customers' business operations.

Within each industry there exist a wide variety of *industrial logics*, working practices and business operations. The traditional separation into industries (Sw. branscher) is problematic since it hides the fact that production and communication processes connect organizations in different industries, into systems or industrial networks. One of the most important ideas presented in the chapter is that we can approach the enterprise market by looking at different types of *user environments*. We argue in the chapter that within an industry (or company) there may be many different *user environments* that are complex and consist of nets of interconnected users. In addition, user environments in different industries have unique characteristics. The chapter introduces eight such user environments. One of the conclusions from the discussion on user environments is that by analyzing and utilizing the similarities and complementarities between activities and resources *across user environments*, suppliers of wireless applications can take advantage of scale economies in their enterprise markets. One of the major challenges for suppliers of wireless applications is to develop routines for transferring, adapting and using experiences (as well as the actual applications) *between user situations*, irrespective of whether they are more narrow (vertical) or general (horizontal) in character.

3.1 Introduction

Firms in information and communication technology industries (ICT) acknowledge the growing importance of the market for wireless services and applications for enterprise customers. How new wireless technologies are implemented and used in different types of organizations is increasingly becoming a central strategic market issue for suppliers of new mobile enterprise solutions, but also for the enterprises adopting the new technologies. Matching the mobile offerings to the specific problems, needs and operations of specific customer organizations in specific user situations is a critical, managerial and practical problem in the emerging enterprise markets for mobile solutions.

Understanding the inner workings, operational, and industrial logics of the enterprise customers is becoming one of the most central, strategic issues for ICT suppliers. The products, services, advice, knowledge, adaptations, logistics etc. that are part of a mobile offering can differ substantially between different enterprise customers. Matching the technical aspects of mobile offerings to the specific problems and needs of specific customer firms in specific user situations is a critical, analytical problem.

3.2 The Enterprise Market for Wireless Services and Applications: Many "Industrial Logics"

One of the research projects included in our study (entitled *Organisations Implement and Use Mobile Solutions – Studies of the Enterprise Market for Wireless Services and Applications*) examined how firms in different types of industries adopt and use new mobile data applications, services, and systems. Users in 20 industry sectors were covered, with one or several cases in each sector.

The study covered the following sectors:

Manufacturing	Pharmaceutical
Consulting	Agriculture
Public Administration	Health
Transportation & Logistics	Construction
Forestry	Media & Entertainment
Security	Insurance
Banking	Education
Research	Energy
Retail & Wholesales	Telecom
Automotive	Other

This broad study of the telecom industries' so called "enterprise market" clearly indicated several things. Firstly, as mentioned in the previous chapter, it is very difficult (even misleading) to speak about one particular enterprise market. Secondly, one reason being the wide variety of *industrial logics*, work practices and business operations between as well as within each industry. Thirdly, the industry division as such is problematic as hides the fact that production processes (and thus communication networks), connect organizations in different industries, into systems or industrial networks. As stated by one of the interviewed managers of a small plumbing company:

> *"I see little use of the new mobile systems and services if they are implemented solely in our organisations. We are so dependent on daily communication with our wholesalers, retailers and other companies. We need to have them on the boat too if we should be able to catch the real value of many of these new mobile offerings."*

One of the main explanations why many of the attempts by e.g. telecom operators to develop their sales of new mobile services to their enterprise customers have failed lies in the fact that many operators have not understood the inner logics of their enterprise customers' business operations. The selling of simple mobile telecom subscriptions and telephones to enterprises was only a rather simple extension of their history in selling fixed line telephony. The introduction of mobile data services and wireless ICT solutions into the very heart and core business operations of the enterprise customers has radically changed the demand put on operators. To develop and be able to sell these solutions operators need to understand the industrial logics of these business operations. Let us point at some general ideas of what a deeper analysis of an enterprise's business operations and "logics" could include:

1. How does the enterprise create value? What are the logics of the enterprise's "business or value creation model"? If new integrated ICT solutions affect the core of the enterprise's business operations, it is reasonable to demand that the supplier(s) of these solutions know or can understand how the solution can support or improve the business operations. How can the new mobile solution support the enterprise customer's value creation in relation to their customers ("the customer's customers")? If we can analyze and understand the logic by which the enterprise customer approaches, provides value to and develops its business with its own customers, there is a big chance that we can adapt the wireless offering so that it enhances the enterprise in these processes.

2. Complementing this, and often in focus of descriptions of positive effects from adopting mobile enterprise solutions: What determines the level of *efficiency* in the enterprise's

present business operations? A central part of the industrial logic of enterprises concerns their ongoing processes of rationalization. Wireless solutions are tools to support the enterprise in these processes, and detailed understanding of the latter is necessary in order to adapt the solution to theses processes

3. A central part of the understanding of the industrial logic concerns the enterprise's role and position in its network of other enterprises with which it interacts and develops relationships. Wireless ICT systems are seldom possible to isolate to e.g. one single unit within the context of an enterprise. The implementation will have direct or indirect effects on the enterprises connected relations.

4. Connected to the value network, are both the internal networks of interaction and communication linking internal functions and units, and the external ditto. Mapping the general internal and external interaction and communication patterns is a difficult part of understanding and analysing the industrial logic, but is often worth the efforts for the supplier of wireless applications.

Coming back to the list of industries in the study earlier mentioned and combining it with dimensions of the industrial logic that characterize different enterprises' operations applied to the industries, we end up with a wide variety of logics, situations and contexts for wireless applications and services. This put high demands on the wireless system suppliers aiming to sell to the enterprise market. All the arguments above are connected to the idea that there is a need to understand the *industrial logics* of each enterprise customer open up for an important strategic question and issue. All suppliers of wireless systems, irrespective of size, have limited resources to develop close and direct relationships with all enterprise customers in all industries.

3.3 Similarities between Industries: User Environments

For the purpose of targeting activities and saving and directing resources suppliers of mobile services and applications might be helped by finding similarities between businesses and combining them into target groups. Although every enterprise situation is unique, certain similarities can be found between businesses, similarities that can be used when experiences are transferred between different industrial situations. For example, based on such similarities between business operations and situations, the Enterprise Market can be grouped into eight identified "user environments" in the enterprise market for wireless services.[18] Among businesses within each of the eight groups, one might find similarities in the industrial logics and user situations for mobile services and applications:

the "craftsman environment"	(plumbing, electrician, painter, bricklayer, etc.),
the "production environment"	(big manufacturing companies, SMEs etc.),
the "trade environment"	(retailing, wholesaling etc.),
the "administrative environment"	(banking, financing, insurance, etc.),
the "consultant environment"	(lawyer, accounting, consulting, advertising, etc.),
the "transportation environment"	(taxi, road/express delivery, etc.),
the "utility environment"	(electricity supply, water supply, gas supply, etc.),
the "institution environment"	(social and health care, education etc.).

Drawing on insights from particular user situations, some, but far from all, experiences can be transferred between different user situations within a "user environment". For example, in a craftsman like business environment, it is possible to find similarities between the work

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[18] Based on a study at Ericsson

situations, communication needs, value drivers etc. among small pluming firms, painters, electricians, and other similar craftsman and service firms. For suppliers of mobile solutions this is important as parts of the mobile offerings, and some knowledge and experiences, can actually be transferred, applied and taken advantage of *between user situations*. By analyzing and utilizing the similarities and complementarities between activities and resources connected to different types of customers/users, suppliers of wireless applications can take advantage of scale economies in their enterprise markets. In connection with mobile applications, vertical (more narrow user segments) and horizontal (general applications for a large number of users) segmentation is presented as a segmentation strategy (discussed below). An important strategic market and marketing issue more seldom discussed in this connection are the challenges for suppliers of wireless applications to develop routines for transferring, adapting and using experiences (as well as the actual applications) *between* user situations, irrespective of whether they are more narrow (vertical) or general (horizontal) in character.

This, in turn, connects strongly to the size and general market strategy of the supplier. The telecommunication industry has since the 1990s seen the emergence of big international telecom operators developing broad, "generic" applications like e-mail, positioning applications etc., covering broad set of enterprise segments. At the same time, we have seen the emergence of a large number of small, highly specialized, entrepreneurial firms successfully competing on the enterprise market with highly specialized applications aimed for narrow customer segments, often confined to only one of the "user environments" above. An example of such an entrepreneurial company is ePocket Solutions:

> *ePocket Solutions ASA is the Norwegian company that was established in 1985 and has developed mobile pocket solutions since 1996. Their The software HandyMan was aimed for small craftsman firms and within a few years time over 800 craftsmen and 200 companies in Norway used the HandyMan program. Initially, the company aimed to develop general mobile applications for mobile work. Among the first enterprise areas that were among the potential users were transport, garbage collection, elevator or the electro installation business.*

> *However, ePocket decided to focus on wireless applications and tools tailored for electricians. The idea was to go for enterprise activities and business operations that involved much paper work. The HandyMan tool was developed to manage e.g. memos, time usage, and stock of materials. The first version of the mobile application was for electricians and was launched in 1999. In 2000, the plumber version of Handyman was launched.*

For suppliers of wireless applications, being involved in one or several "user environments" with mobile applications, one marketing challenge will be the same: how to learn about the single customer and user situation, including the customer's communication situation, application of wireless services, internal organization and resources, internal technologies etc. – and *how* to make use of that knowledge when adapting to other customer relations within the same type or in different user environments.

3.4 "User Environments" and Its Implications for Suppliers' Business Models

In the following chapter we will take a step over to the supply side. Given the picture of the enterprise users outlined in this chapter, what are the implications for the supply side actors? Three issues stand out as particularly important for the suppliers of mobile systems: [1] Most user environments are complex, consisting of nets of interconnected users. The two complex sectors and application markets studied in this project, the building construction industry and public safety services, has clearly demonstrated the complexities involved; [2] User

environments in different industries have unique characteristics, as have also different user situations within the same type of user environment. In other words, rather than clear cut "segments" we are dealing with unique situations; [3] The mobile solutions developed and implemented are often complex systems requiring the cooperation of several, sometimes many, suppliers of components to this system.

Under the circumstances described above it becomes difficult to retain the old ways of doing business (i.e., according to the principles used for the consumer market). Not least will it be hard to maintain the old, often stable, business models. The idea of sustainability, in terms of stability of business models need to be replaced. In chapter five, we will elaborate on the idea that companies actively engaged in the mobile enterprise market need to think on business models as *adaptable*. We will argue that the conception of *sustainable* in terms of *stable*, might even be detrimental to companies trying to position themselves in the complex and dynamic networks of buyers, users, suppliers etc.

4 The Value Concept and Value Creation

The chapter discusses and inquires into the concept of value – what it means in the context of wireless offerings for enterprise customers. It is proposed that we need a wider perspective on value. This wider perspective includes a stronger emphasis on the fact that groups of actors together create values for customers, and others and we employ the view of networks of connected, value creating actors - *value constellations* – as a framework. The chapter also argues that when analysing value creation in enterprise markets for mobile offerings, we need a *dynamic* perspective on value and value creation. It is important to recognize that customer value in the context of relationship, value is a dynamic concept; value is created and changed over time as a result of an ongoing series of transactions. Two forms of values can be identified with mobile services: 1) the added value for the customer of the product or service itself and 2) the value of the relationship between the buyer and the seller. We also discuss value creation as an interactive process over a period of time that involves the provider, possible partners and also the buyer/consumer. With the support of detailed experiences from *user involvement* in a case from the forestry industry, the chapter is concluded with a discussion on the importance of mode, intensity, and purpose of user involvement.

4.1 Creating Values for the Enterprise Customers and Other Stakeholders

Mobile devices and services should create *new values* for enterprise customers. The notion of value has increasingly been discussed by researchers and practitioners.[19] However, there is little agreement in the literature on what constitutes "value" and "customer value" (Payne and Holt 2001). Value and value creation processes have been viewed from the perspective of the individual consumer, from the perspective of organizations' internal value creation processes and value creation toward customers, and, increasingly, also from an interactive perspective including both organizations and customers. And, as stated by Lindgreen & Wynstra, although value is an increasingly relevant concept, many firms cannot define value or measure it. There is thus a general need, for any offering to customers, to examine and define what value is, how it is produced, how it is delivered and consumed, and how it is perceived by different customers.

Relatively little is known about the kind of new value that is created from mobile offerings, and how it changes over time[20]. With mobile offerings, as with any product offering, it is possible to distinguish between two forms of values: the value of the products/offerings and the value of the actual relationship between buyer and seller (e.g. of a mobile solution). Following different suggestions for value analyses[21], three important areas for understanding value are proposed, namely: how value analysis is realized by customers, how value analysis can be brought into the development of offerings, and how values actually are delivered in various value constellations to customers. Hence, the creation and consumption of value involves more than only a single supplier and a single customer, but most often several stakeholders.[22] In addition, when offerings are seen in the context of long-term supplier-customer relations, customer value becomes dynamic. Value is created and changed over time in a series of transactions.

What does the concept of value mean in the context of wireless offerings for enterprise customers? It is proposed that we need a *wider* perspective on value. Firstly, this wider

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[19] For reviews of the concept see Payne and Holt, 2001; Khalifa, 2004.
[20] A promising framework for discussing such values is presented by Chen & Nath (2004).
[21] Lindgreen & Wynstra (2005)

[22] Payne and Holt, 2001

perspective includes a stronger emphasis on the fact that groups of actors together create values for customers, and others. Normann and Ramirez (1993) describe such networks of connected, value creating actors *value constellations*. Secondly, when analysing value creation in enterprise markets for mobile offerings, we need a *dynamic* perspective on value and value creation. In line with e.g. Payne and Holt (2001), who state that "it is important to recognize that customer value in the context of relationship value is a dynamic concept; value is created and changed over time as a result of an ongoing series of transactions" (p. 171). Both aspects are exemplified below.

4.2 Values of Wireless Applications

Chen and Nath (2004) has outlined a framework for the impacts of m-business applications in terms of time, mobility, relationships and location leverage on value – value described in terms of efficiency, effectiveness and innovation. Kotler (1972) and Kotler and Levy (1969) brought forward the transaction as the exchange of value between two parties. This exchange could include goods and services as well as time, energy and feelings (ibid.). Much literature on customer value has focused on the *value of use*, i.e. it is directly related to the consumption event (Payne and Holt, 2001). Holbrook (1994) argued that benefits and sacrifices are valued based on the experience of the consumption. Some scholars have emphasized the situation of use as the context during which parties interact. Woodruff and Gardial (1996) suggested that consumers can gain value just by owning a product. Research on customer value can contribute an understanding for how individuals experience e.g. benefits and sacrifices of mobile offerings in organizational contexts. Important for mobile services and applications is that *technical, temporal and spatial value dimensions* can be perceived as important parts of customers' perceived value of services (Heinonen 2004). It can be assumed that an important part of the "new" customer values created in the use of new wireless applications concern aspects of time and location. (In the next chapter, we will bring up for special attention the mobility concept and how it may be linked to changes in various temporal dimensions of organizational behaviour.)

Paavilainen (2001) argues that corporate mobile applications cannot be measured in the same way that consumer applications are evaluated. He argues for two different approaches towards corporate measurements; value analysis and technical analysis (p.132). For example, a mobile corporate e-mail application can and should be measured in terms of value analysis (user satisfaction, changes in organizational behaviour e.g. faster decisions, increase in productivity), and in terms of technical analysis (speed of the service, number of active users, capacity to serve present users, cost of upgrade). Technical analysis is for obvious reasons most often simpler and more straightforward to measure and keep track of. Putting figures to the "softer", and more difficult to measure, customer values are a challenge when dealing with corporate mobile applications. Ramirez (19999, influential, co-productive view of value presents another powerful way of approaching the area of value production in business contexts. The main points on the ways that values are actually co-produced by different business actors can be applied to the area of mobile corporate applications (p.61):

4.2.1 Value creation is synchronic and interactive (in "value-constellations")

The full value of any mobile enterprise requires some kind of joint action between firms and/or organizations. Every product and service development process in the field requires value creation involving interaction between a supplier and the buying organization. In many cases, the process to develop values from new enterprise solutions require interaction and synchronization between several interacting suppliers on one side and several interacting, interconnected firms on the buyer/user side. The building construction industry is one example. For a work leader at a building construction site to be able to capture the full values

of using new wireless device specially adapted to her work routines at the site, it often requires interaction and (technological) integration with the work routines and ICTs of the central building construction firm, with architect firms, with supplier firms to the site, etc. Similarly, for the firm developing and supplying the software that goes into the work leader's portable device, maybe in the role as "system integrator", the creation of value is highly dependent of interaction and synchronization with other firms on the supply side.

4.2.2 Some managed values cannot be measured or monetized

The multidimensional and complex nature of wireless services, applications and whole systems for enterprise customers makes some managed values difficult to measure or put monetary values to. To some part this has to do with the complex nature of "experiences", i.e. the subjective way in which every single user experiences the use of the mobile application. Consumers are not the only ones to benefit from various experiences from the use of various wireless services and applications. Users in various business functions meeting each other in different B-to-B or other inter-organizational settings also value various "experiences" from using the applications, experiences which can different between users and sometimes can be difficult to describe a measure. Hence, wireless applications in business settings can to different extents be connected to "experiential computing".

4.2.3 Values are co-invented, combined and reconciled

Unlike the idea o service packages, service bundling and unbundling, values cannot be added or subtracted like simple service or product elements. As values are co-developed and co-invented in value constellations of actors, different actors (users) will combine and reconcile values in different ways. Part of the complication of measuring and putting monetary values to wireless applications have to do with the fact that they are not subject to straightforward processes of "value adding", in its simplest form, "the more the better". From a user point of view, the long term use of wireless applications – in combination with existing information and communication infra structure components in the organization – leads to a constant combination and re-combination and reconciliation of values and value components.

4.2.4 Exchange is the source of utility

A very important distinction and central to the understanding of values of wireless enterprise technologies and applications is the fact that values are established in the long term, exchanges and interactions involving the wireless applications. Hence, how enterprise users evaluate the wireless application is not determined by some static, utility function. Value is not a function of some subjective or objective utility measure. The exchanges and practices of use determine utility and hence the value of the wireless application.

4.2.5 Customers co-create values and value is co-produced over time for both/all co-producers

In comparison and sometimes in contrast to, private consumer segments and applications, it is obvious that enterprise customers are important – often the most important – co-creator of value. In contrast, enterprise customers over time are not consuming or even destroying values created by the suppliers, but are constantly important sources of value creation and development. Different enterprise customers co-create value in different ways (and in different stages of development, implementation and long-term use). And value is not something that is transferred during a short period of time during the phase of transaction, but is a constantly evolving process involving many co-producers, seldom only one supplier of a wireless component and one single user or user group.

4.2.6 Services, interactions and offerings are central units of analysis in value co-production

Enterprise users' various communications *problems* can have several different (ICT) *solutions,* which in turn leads to the development of different *offerings* to the users. These offerings have product, service, experience and other components, which are not static, but develop in the long-term *interactions and exchanges* between users and suppliers. This implies that value creation and development is an interactive process that does not stop with the transactions, but often takes place within the framework of long-term *relationships* between user and supplier organizations.

Building on the process view of value creation, it has been argued that there are basically four universal elements that together constitute how businesses ultimately create value:[23]

- *Origination*: interactive work that generates value from something *new* (products, services, experiences, etc)

- *Execution*: interactive work that generates value from something *done*

- *Correction*: interactive work that generates value from something *improved*

- *Application*: interactive work that generates value from something *used*

As the implementation of new wireless applications and systems to a large extent are aimed at *improving processes* in the business operations of user constellations, it can be anticipated that customer/user values develop in interactions between suppliers and users when: Suppliers and users together draw attention to wireless applications' abilities to devise new procedures and their abilities to deliver operations (more) efficiently. These views and dimensions of value (co-)production are easily transferred to situations where mobile corporate applications and developed, implemented and used. In the following we exemplify by discussing two of the dimensions above: the calculation of measurable, economic values of mobile applications, and value of mobile applications as interactively co-created in value constellations over time.

4.3 Value Creation in Constellations over Time

Mobile technologies' most obvious value contribution is that they help companies to focus on their core businesses. They can be powerful tools for collecting information and handling customer feedback and for spreading information in a quick and efficient manner. Thanks to the abstraction of information enabled by OnStar, GM's wireless application installed in cars and connected to a wide variety of services, GM can monitor any problems with car models. This way, OnStar helps GM increase user value by building better vehicles, and making OnStar a very important part of the GM organization and their long-term strategy. Hence, mobile technology can enhance internal and external efficiency. Costs are often reduced thanks to better accuracy, faster operations and increased efficiency, allowing a stronger focus on core businesses. Examples of gains can be better conditions for communication, information handling, feedback collection and comfort as well as enhanced safety.

To give another example, Symbility, a wireless innovation supporting claim adjusters to work in a more efficient manner. Thanks to the capacity of the software, adjustments can be settled faster than before which enables fast estimations of repair costs. All things equal, adjusters will be able to handle a greater number of errands. Quality will be given a boost as well, since the estimate can be done at the particular location and discussed with insurance holders and perhaps the police or firemen etc. External efficiency, like interaction with repairmen and contractors is also improved.

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[23] Pine II and Gilmore (1999), p. 199

Summing up the value discussion, one important distinguishing factor concerning values of wireless enterprise applications is the fact that the applications need to be developed in co-development in value constellations involving networks of firms on both supplier and the user side. Secondly, wireless enterprise applications – and the values of the applications - *develop over time*, before, during and a long time after the initial implementation.

Hence, value is a process. Mobile innovations can be characterized by their flexibility and perceived complexity. The offering, through its flexible nature, often needs to be adjusted over time to fit the technological interest and knowledge of different users. Different users can also, based on their knowledge and interest, influence both incremental and radical innovations. Some users with very strong technological interest might perceive that their prerequisite for co-creating value will not change. The technological development, as they perceive it, will develop at a rapid pace and they perceive a continuously low level of maturity of the mobile offering. They would have strong objectives for being involved in forming the offering and being part of the co-creation of value process. Suppliers and users can also develop in other directions, influencing the mobile offering and the co-creation of value. Still, strong objectives for involvement, whether functional or personal, may influence suppliers and users to continue their involvement with the offering. The increased maturity of the offering would not stop their involvement.

Taken together, this suggests a dynamic, process perspective on the offering, the value, the value constellation, and on supplier and user involvement, when analyzing the development and implementation of mobile communication technologies in enterprise settings. The intensity of supplier and user involvement during a long-term implementation process will change during the course of the process, and hence also the value of the offering. Developers and suppliers of the system can to a certain extent influence the user's involvement and co-creation of value during different phases of developing a mobile solution, thereby influencing the development of the offering and its value. How, when and how much suppliers and users decide to get involved in the process of co-creation of value can lay the foundation for further steps in the development of the mobile solution and its value. This involvement process can be a prerequisite for influencing the many uncertainties that often are present when new mobile solutions are developed and implemented in enterprise contexts.

In the following chapter we take a closer look into the subject of customer involvement.

4.4 The Role of Involving and Being Involved With the Enterprise Users

4.4.1 Co-Creation of Value and User Involvement in Wireless Enterprise Solutions

One of the central management implications for e.g. mobile operators aiming for a more profound involvement in the enterprise market, concerns the role of user involvement. Building on a study and paper published during the course of the project, we here sum up some of the major implications concerning the role etc. of user involvement.[24] The text reports on a study of the implementation of mobile systems in a company, Graninge, in the forestry sector.

The study investigated the purpose, intensity, and modes of user involvement during the development of wireless solutions for enterprise customers. The overall question guiding the study was: How are different users involved in the development of wireless solutions for enterprise customers? More specifically, customer involvement was viewed as a process with different steps and phases, in terms of their reasons for being involved, the intensity of their

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[24] Andersson, P. et al (2008), "User involvement in the development of wireless applications in supply chains of the forestry industry", International Journal of Mobile Communications (forthcoming)

involvement, and the way they are involved. In relation to the mode of involvement, the distinction between user commitment and user participation results in a subtle but important clarification. The difference between the activities performed and the subjective psychological state of the users is helpful for describing the inverse proportionality between these two factors in relation to the intensity of involvement. Finally, the purpose of user involvement was described as a learning instrument that helped Graninge to reduce the enabling, commissioning, and impact uncertainties.

4.4.2 Mode, Intensity, and Purpose of User Involvement

This section discusses some more detailed experiences from user involvement in the Graninge case from the point of view of mode, intensity, and purpose of user involvement, in that order.

Mode of user involvement: The involvement episodes described above represent different characteristics in terms of how users are involved in the development of new mobile services. Some of the six modes of involvement described by Alam (2002) were used in the Graninge example. The project team at Graninge both surveyed user observations and performed focus-group discussions with the machine operators. One result was that functionality to support salary reports was added to the system after developing the prototype.

However, user involvement did not always consist of specific and well-defined activities such as meetings or interviews (cf. Alam 2002). For example, emotional support might be at least as important as other types of participative activities. Therefore, the visionaries at Graninge injected new life during the initial phases of the process without becoming directly involved in specific aspects of the project.

An important distinction between different modes of involvement emerges here. We can describe user involvement as the activities that users perform during the process (e.g., prototype feedback) or as a subjective psychological state of the users (e.g., the role of visionaries). The distinction between user participation (activities performed) and user commitment (relevance of a solution to the user) introduces a subtle but important distinction regarding the characteristics of user involvement.

This distinction has not been completely ignored. Barki and Hartwick (1989) introduced a similar idea, by describing involvement as a subjective psychological state that reflects the importance and personal relevance to its user of an issue (psychology), of a product (marketing), or of one's job (organizational behaviour). Hwang and Thorn (1999) used the term engagement to refer to the combination of user commitment and participation components. In our opinion user involvement describes the combination better because it is a more general term and is already established within the research community. Particular users can participate or be committed, or both, in which case they will contribute more to the innovation process. However, the role of particular users may change during the process, as discussed in the next section.

Intensity of user involvement: We now consider the second aspect of user involvement. Users can be more or less involved in the innovation process. Gales and Mansour-Cole (1995) and others described how in certain situations customers appear to become involved more in the later stages of development, whereas others point to the usefulness of early involvement (Neale and Corkindale 1998). This lack of agreement may be due to the definition of user involvement being too broad. Thus, the distinction introduced above between commitment and participation may also be useful for explaining the intensity of user involvement.

The intensity of involvement has mainly been discussed in terms of user participation. For example, Lettle et al. (2004) described how a high involvement meant that users took over functions, playing the role of developers and co-developers in the process. However, we

observed that the intensity of involvement varies during the process, shifting between commitment and participation in an inversely proportional relationship. There are indications from our case that the importance of user commitment is greatest in the early stages of the process, then decreasing during the design and implementation phases before transforming into participation. Finally, both commitment and participation stabilize during the usage phase.

Initiation phase (high commitment and low participation): During the quest-for-mobility phase at Graninge, ideas about how to utilize wireless data communication in the supply-chain management were discussed. At this early stage, awareness and emotional support for future developments were given a higher priority than the actual activities in the process. The workgroup during the initiation phase envisioned the opportunity to let machine operators to order diesel and spare parts directly when they were in the forest, although no specific activities were taken in this direction.

In this sense the low participation but high commitment of the users can be interpreted as the reason for not involving them (cf. Lynch and O'Toole 2004). We found that their participation was reduced, but not to zero. Instead the focus relied on getting their commitment. This explains why Lynch and O'Toole (2004) found that suppliers also gave various reasons for not involving the users, as described in Section 3. All these factors are participative in nature, and are not related to commitment.

Design and implementation phase (decreased commitment and increased participation): We also observed that the commitment decreases in the subsequent phases during the design and implementation phases. One possible explanation for this is the risk of project escalation. Constant additions to the functionality of new systems may threaten project deadlines, with such additions in the Graninge case stemming from the eagerness of users to improve the system. This illustrates the trade-off between freezing configurations in order to meet deadlines and handling the requirements of continuous changes. For example, in Graninge several add-ons were never implemented because of time restrictions. A lower level of commitment should help to minimize escalation risks, and the presence of too many visionaries during the design and implementation phase may increase the risk of missing deadlines due to new ideas being suggested continually. One solution to this problem is implementing a strict versioning policy from the beginning.

iii) Usage phase (commitment increases to avoid dissemination problems): Once the system is installed, users can train themselves via word of mouth. However, this practice is often impeded by the users themselves being mobile and hence often alone when help is required. Machine operators work alone in the forest and their lack of socialization opportunities represents a challenge for the managers since this impedes the communication of best practices to their colleagues. Moreover, this can decrease the level of user participation. For example, unlike office workers, Graninge forestry workers have no one to help them in case of trouble. Therefore, the requirement for increased commitment during the later phases of the process was necessary in the Graninge case.

A consequence of their increased commitment from the cases was the fact that for many of the users this meant their first contact with the IT era. The project leader at Skogforsk tells with pleasure one story from a machine operator who commented for one of his colleagues that he now felt himself a part of the IT-society. SKINFO had enhanced his status. He felt he had been upgraded. The work was made more interesting for machine operators. What probably raised their user commitment most was the fact that the workers became part of the IT era.

Purpose of user involvement: Lynch and O'Toole (2004) found a number of factors among suppliers to involve customers/users such as their expertise, the reduction of risk and/or costs, close geographical proximity, etc. Alam (2002) mentions other reasons such as reduced cycle time, user education, rapid diffusion, improved public relations and long-term relationships.

In our case, the main purpose of user involvement can be described as a learning process in which the suppliers and customers attempt to improve abilities and reduce uncertainties at different levels during the development of mobile solutions for enterprise customers.

It is important to acknowledge that the purpose of user involvement changes during the development process. One reason to involve users in the implementation phase of the process is due to their expertise (cf. the ambassadors at Graninge), whereas the involvement in later stages of the process may increase the acceptance of the installed application (cf. the competitions between forest districts). This is less likely to be due to close geographical proximity when mobile workforces are involved.

User involvement generally represents a learning process that reduces uncertainties at different levels. Earl (2003) categorized the ambiguities and uncertainties of complex, IT-related ventures into three general categories: (i) enabling uncertainties, concerning the scope of the new technology, (ii) commissioning uncertainties, concerning the functionality of the new technology, and (iii) impact uncertainties, concerning various implementation aspects of the technology. We now describe the learning issues connected to these three levels of uncertainty.

i) Enabling uncertainties: What can technology do?: Generally speaking and according to the discussion in the Graninge case, the purpose of user involvement during the early stage (quest-for-mobility phase) was related to reducing the uncertainties of what technology can do. The introduction of new mobile technologies aroused uncertainties among the users concerning their functionality. In our case where the users were, by definition, already highly mobile, the enabling uncertainties were often related to the efficiency improvements that could be gained from the new telecom-based mobile technology. The project managers therefore asked the local companies to develop a business case that identified the main drivers for implementing wireless technologies. Adopting the terminology of Ford (2002), due to lack of in-depth knowledge of the various "user logics" in different industrial settings, suppliers often expressed (implicitly and explicitly) a certain degree of application uncertainty. In more mature cases (i.e., where the suppliers were able to build on experiences from prior projects involving the implementation of new mobile technologies), user involvement increasingly included explicit economic calculations of the benefits, in terms of the increased efficiency attributable to the new mobile technologies.

ii) Commissioning uncertainties: Will technology work?: During the design and implementation stages, the involvement focused on aspects related to reducing the uncertainty of the technology working. By employing its various abilities, for example its problem-solving ability, the supplier can affect various abilities of the customer. One observation from cases involving more complex mobile system development projects, such as in the forestry example of Graninge described here, user involvement appears more in the form of intense, long-term collaborative developments. The customer, the users, and the supplier did not have sufficient in-depth knowledge about the problem or the (technical) solution to the problem. However, the problem-solving ability of the suppliers, the demand of the users, and the involvement of the actual users all improved as they learned about the use of the new technology. Moreover, the users had for a long time fed back information about demand to the suppliers, which significantly reduced the supplier's uncertainties concerning feedback on the application of the new type of mobile system being offered.

iii) Impact uncertainties: Will users adopt it?: The user involvement in the later stages of the process focused on diffusing the applications among the users; that is, encouraging the users to adopt it. There exists considerable uncertainty among the suppliers of mobile solutions concerning the transfer of application experiences from one type of industry and user (involvement) situation to a new company operating in a different industrial setting. Therefore, it was important to determine how application experiences of the mobile offerings from one user context could be transferred to another industry and user context. Finally, in summarizing this section it is important to stress that the user involvement varies greatly and cannot be described consistently along the entire process. The approach taken here was to analyze the different phases of the process. Our investigation of the mode, intensity, and purpose during the process revealed that user involvement can be described as a combination of commitment and participation components, that there is an inverse relationship between the intensities of commitment and participation, and finally that uncertainties can be reduced at the enabling, commissioning, and impact levels.

5   Towards Adaptable Business Models

Behind the interest in finding new *sustainable* business models lay the challenges from a number of new emerging trends in the telecom sector. In this section we elaborate on the idea that companies active in complex enterprise market for mobile services need to think on business models as *adaptable*. We argue that the general meaning of the term - "capable of being adapted or of adapting oneself" – can be transferred to include also business models. The reasoning is taken one step further, arguing that ideas about "sustainable" in terms of "stable", might even be detrimental to companies actively trying to position themselves in the complex, dynamic networks of buyers, users, suppliers etc. involved in e.g., construction processes, major public safety operations, and the like. In one section, we also argue that special attention will be drawn to the revenue sharing part of business models. In a broader, long-term perspective revenue models (as the business model in its totality) for mobile enterprise systems require flexibility, need to be more and more user-determined and will most likely be more application-centric. In an illustrative discussion of how to create growth with services and shift business models, against the background of digitalization and changes in information and communication technologies, two concluding cases describe how a shift in business models can be achieved.

We argue that suppliers (and users/buyers) that were early out to capitalize on some stable attributes when developing new wireless applications for the enterprise market could, in some rare cases, manage to create "new" types of business models that generated revenues and met the emerging value requirements of the enterprise customers. However, the two complex sectors and application markets studied in this project, the building construction industry and public safety services, has clearly demonstrated the difficulties of sticking to ideas of sustainability, in terms of stability of business models.

Our discussion of adaptable business models is structured as follows: first we elaborate very shortly on the widely used concept, "business model". Next, with the help of Kaplan (2001), we put the business model concept in a broader context, arguing that it needs to be seen in a more dynamic perspective, empirically as well as conceptually/theoretically. Thereafter, we elaborate on the question whether "new" business models are needed when approaching the enterprise market, connecting to the introduction of this project report and the positioning of the project. The argument might be that what are needed are business models that are adaptable, and in the next step, business models where *the adaptability is made sustainable.* Ways to approach this view of business models are discussed in the final sections, where we also try to include our four "type" situations/models, models dominated by the Captain, the Dyad, the Small Entrepreneur, and the Loose Value Network.

5.1 The Business Model Concept – A Widely Accepted Idea in Practice and in Theory

The development of information and communication technologies has resulted in the emergence and proliferation of new concepts, and one of the most – perhaps the most – widely used concepts in this context is *business model*. The development and implementation of new wireless applications as any ICT system will often be, it is argued, associated with the development of "new business models". The frequent use of the concept in combination with the many formal, practical and theoretical definitions of the concept makes it difficult to create one coherent view of what it means, what is included in the concepts, and what the purpose is of applying it. We will not go into that discussion. Rather, we will take a pragmatic standpoint. This means accepting the fact that among practitioners the business model concept is being used when discussing central dimensions of the business for mobile enterprise services and applications: how to create a value offering to customers, how to create long-term ("sustainable") revenue models, how to create new cooperative constellations with other

suppliers, and more, depending of what variables that are included in the definition. These and other issues are surfaced when new businesses are created in the wireless enterprise area. Hence, when relating to the concept, it is done so because some of its components are in fact related to issues *of practical importance for companies* involved in the process of developing new business operations in the area of wireless applications for enterprise customers. In addition, it is also very often one of the sources of problems, conflicts, tensions and inertia. The problem of developing complex, wireless solutions for complex operations like a building construction process lies sometimes not so much in the technology but rather in the process of developing, in various constellations, new business models to support the solution. As expressed by one of the participants of the project representing a major incumbent mobile operator: "We do not have so much problems coming up with the ideas and develop new systems and offerings for the enterprise market together with other companies. The problem is that the innovation process often stops when it comes to the stage where the business model is to be developed, and the sad thing is that today the process seems to fail earlier in the process."

Among the many definitions of the concept, some dimensions and variables appear to be more recurrent, for example: *the value to customers of the offering provided, the customer segment, the constellations (sometimes called "value constellations") of actors cooperating around the offering, the roles and the actors in the activity network, and the revenue model and cost structure*. Some of these will be brought up in the discussion below. Likewise, the driving forces behind new business models can be many. In the area if ICTs, it is argued, the use of the business model concept can help the formulation of different renewal possibilities, options for increased efficiency and effectiveness, and be a way to put the single companies' offerings into a broader value offering context. It can be a tool for actually changing the business, and/or making it more flexible and adaptable to new business situations. This will be discussed below .One of the major advantages of the business model concept is connected to the fact that information and communication offerings to customers must be seen in a wider context of components and offerings, empirically as well as theoretically. Before we move on, we will show one way of putting the business model concept into a broader theoretical framework, which in turn leads to the conclusion that the concept needs to be seen in a broader and much more dynamic perspective.

5.2 Putting the "Business Model" in a Conceptual Context[25]

5.2.1 The Theory of Business

Following research, every manager of every firm must continually confront the same set of issues, albeit expressed in somewhat different terms.[26] Instead of asking why firms exist and what their central purpose is, a manager or director must focus on the profit motive, personal satisfaction, carrying on the tradition, or making any other group of stakeholders' content. Instead of asking why there are differences in the scale, scope, and types of activities between firms, a practitioner focuses on what customers it should have, what products it should sell and what technology and skills it needs. Instead of asking why there are performance differences among firms, a practitioner focuses on how survival, growth, and competitiveness of the firm can be ensured. Taking a popular managerial stance, Drucker (1994), using the term theory of business instead of theory of the firm, indicates the close relationship between the managerial perspective and theoretical perspective. Drucker suggests that a theory of business consist of three questions or assumptions that must be answered simultaneously by

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[25] This discussion builds on Kaplan, M. (2002)

[26] Conner, (1991) and Holmstrom and Tirole, (1989),

managers. First, there are assumptions about the environment of the organisation: the society and its structure, the market, the customer, and technology. Second, there are assumptions about the specific mission of the organisation. Third, there are assumptions about the capabilities needed to accomplish the mission of the organisation. The theory of business is a conceptual and intellectual idea and vision about what the firm is and can do for its customers and other stakeholders. It is firmly linked to the entrepreneurs or managers who create and manage the firm as they search for an opportunity to formulate novel ideas on how to make money. The theory of business is closely related to the birth and the early period of the firm, but can and does also change over time.

5.2.2 Business Models in Context

As entrepreneurs and managers convert the conceptual theory of the business into practice, the theory of business is represented and manifested by the business model. Using Conner's (1991) terminology, the scale and scope of the firm, or the activities of the firm, would be the closest term. The reason for separating the theory of business and introducing the concept of business model is that there are differences between the desired scale and scope and the actual. The difference between what is vision and what is reality creates a gap in performance. In order to handle this gap, the theory of business can be seen as purely conceptual, while the business model is the actual representation of the activities, actors, relations, channels, and processes that the firm participates in. Timmers (1998) investigates the business model concept and indicates that a business model must contain a description of the sources of revenue, a description of the potential benefits for the various involved actors, and the architecture for the product, service and information flows, including a description of the various business actors and their roles. It is formulated by Hornbach (1996) as "the totality of how a firm selects its customers, defines and differentiates its offerings, defines the tasks it will perform itself and those it will outsource, configures its resources, goes to market, creates utility for customers and captures profit".[27] The term business model is difficult to delimit. A business model is a subset of the network, larger than the channel, since it includes both horizontal and vertical positioned actors in relation to the focal actor. The term has become an accepted term in the ICT industries to describe how a firm operates.

5.2.3 Firm Capabilities

In addition, the link between the theory of the firm and the capabilities of the firm can be explored. Their central argument is that there is an interplay and interdependence between what the firm is and what it knows. The same link is made, but with the introduction of the added layer of the business model, which connects the theory of business with firm capabilities. The business model is considered a manifestation of the theory of business. The business model is understood to be composed of a large set of firm capabilities that the firm has accumulated during its existence. At the same time, this large set of capabilities represents the capabilities presently available to the firm.

5.2.4 Means of Capability Acquisition

The building blocks of corporate strategy are not products and markets, but business processes, and competitive success depends on transforming a company's key processes into firm capabilities that consistently provide superior value to the customer. In addition, companies create these capabilities by making strategic investments in a support infrastructure

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[27] The term business model is similar with the term "business design" which is used by Slywotzky, (1996), indicating the view of the firm as constructed, consisting a many artifacts, people, and processes.

that links together and transcends traditional SBU´s (strategic business units) and functions. In a dynamic capability approach the capability acquisition process itself needs to be understood and analysed. The notion of *means of acquisition* can be adopted, as a useful way to indicate that what is under study is not only dynamic capabilities per se, but the capability acquisition process. That is, by which process, or set of events, actions, circumstances that a firm acquires capabilities, like here for developing, selling and implementing wireless offerings for the enterprise market.

5.2.5 Patterns of Capability Acquisition

The notion of means of capability acquisition is complemented by the notion of patterns of capability acquisition. With patterns is meant by which order that the means of acquisition is used to acquire new capabilities. A framework is proposed below in which the main concept, business model, is put into a context of other relate concepts. These main concepts and the relationship between them should be in focus when we continue to elaborate on the business models in the market for wireless enterprise solutions.

Concept:	Definitions and Proposed Relationships:
Theory of business	The basic underlying rationale for the existence of the firm
Business models	Large organised sets of firm capabilities and a manifestation of the theory of business (see also definition in section 1.5).
Firm capabilities	Critical routines that underpin the competitive advantage of the firm
Means of capability acquisition	Tools the firm use to acquires firm capabilities
Patterns of capability acquisition	The order in which the means of acquisition are used to acquire firm capabilities

5.3 A Need for New Business Models?

Irrespective of what concept we use to analyze and conceptualize the value of offerings, the customer segments etc., there are attributes of the emerging wireless world and its technologies and market characteristics that draw attention to a central fact: firms need to cooperate and establish new patterns of interaction and coordination of activities and resources in order to meet the requirements of e.g. enterprise customers. Behind the increased interest in new business models for mobile services in the enterprise market lies the fact that firms know they have to cooperate to deliver customer value, and revenues need to be shared. This in turn, connects to the fact that wireless solutions appear in parts as disruptive technologies and innovations, with impacts on both the supply and the buyer sides, affecting work procedures and operations as well as business strategies.

Hence, behind the interest in finding the new "sustainable" business models lay the challenges to adapt technologies, inter-organizational networks, and the economy, i.e. the flows of money and revenues. Suppliers (and users/buyers) that were early out to capitalize on these attributes when developing new wireless applications for the enterprise market have in some cases managed to create temporarily stable business models that generate revenues and meet the emerging value requirements of the enterprise customers. However, the "novelty" of these business models can be questioned, as well as to what extent they are - or even should be – stable or sustainable.

Many authors on business models still seem to be pre-occupied by the idea of the necessity to create clear and basically stable (sustainable at least for some period of time) models. Few elaborate on *how to* change the business model (discussed below). Even fewer seem to take an interest in elaborating on the possibility of building business models on both stable and changing elements (mainly in its operational form, but also a communication tool. We might

take this one step further. We could for example argue that to change one element of the business model, e.g. the revenue sharing model, this might only be possible if we have some form of stability in the value net and patterns of partnerships and cooperation. Hence, we need to go deeper into the details on how the various elements of the business model are *interconnected*. Stability in some elements as *a prerequisite* for change in other business model elements might be one aspect of creating adaptability, even more so if he company aims for creating *sustainable adaptability* in its business model. We finish the discussion on adaptable business models below by elaborating on what the adaptability concept actually might embrace.

5.4 Business Models and Wireless Enterprise Solutions – the Role of Cooperation and the Move towards Agile Value Nets

What are the business models related issues that need to be addressed when we approach the business area of wireless enterprise offerings? One of the main issues concerns the need for new models of cooperation, and new views e.g., among operators on the issue of cooperation. As stated by Camponovo & Pigneur (2003) in their elaboration on business models in the mobile era:

"Even without going into a detailed view of the business models of the different actors participating in the mobile landscape, it is apparent that the economic characteristics underlying the mobile business have a profound impact on the adopted business models. In fact, for nearly each player, partnerships with a number of other actors are an important part of their business models, as they are required to overcome the complexity of providing a complete end-to-end solution, which requires many complementary competencies. Furthermore different players require to establish partnership agreements with network operators and device manufacturers, in order to support interoperability of the different solutions (which is required to build network effects) and ensure access to essential proprietary assets (which are a consequence of natural monopolies). It is however worth reminding that the mobile business industry is a very recent one and that the different players are still experimenting with a variety of business models in order to conquer a sustainable and profitable position in this promising industry. What business models will prove to be sustainable is yet to be seen. We argue that business models that explicitly address mobility, network effects and natural monopolies issues and that are profitable to all the different players needed to provide an end-to-end solution will be the most successful and sustainable." (Giovanni Camponovo & Yves Pigneur, 2003. Paper presented at ICEIS'2003 "Business Model Analysis Applied To Mobile Business")

In the mobile enterprise project, with the focus on complex operations and communication involving many actors, this issue becomes even more apparent. For example, the following questions emerged: Who manages the customer interface, i.e. the end-relationship with different enterprise customers, and how are the marketing activities towards the customers shared between suppliers? What are the central actors in the value constellations connected to different enterprise customers and what roles do they have in relation to the activities and resources for e.g. controlling the necessary infrastructure, the creation of service and software content, the creation of hardware, and more? What are the important communication, interaction and contact patterns between the actors of the value constellation, including both suppliers and inter-connected customers? Hence, one of the central socio-economic variables of the business model definition, i.e. the single company's role and position in the net of cooperating firms, becomes central.

However, rather than adhering to established models and views of cooperation, like in models of rather fixed *supply chains* (or value chains), we need a more flexible view and models for

approaching these co-operations. One concept that brings in the idea of such co-operations being possible to partly manage and design (strongly debated in research on interorganizational networks) is "value net". The term has also been linked to the emergence of digital tools and solutions to support such interorganizational cooperation nets. Bovet (2001) defines its: "A value net is a business design that uses digital supply chain concepts to achieve both superior customer satisfaction and company profitability. It is a fast, flexible system that is aligned with and driven by new customer choice mechanisms […] it is a dynamic, high-performance network of customer/supplier partnerships and information flows. (p.2). While the traditional supply chain idea gives a picture of: one size fits all, arm's length and sequential, rigid and inflexible, slow and static, (and analog), the new value net idea builds on five different characteristics:

- Customer-aligned
- Collaborative and systemic
- Agile and scalable
- Fast flow
- Digital

The question is how these ideas about dynamic value nets can be incorporated in the business models of e.g. operators, other suppliers, and also in the business models of the nets of connected enterprise customers? "Collaborative and systemic" means adhering to a behaviour where companies engage suppliers, customers, and even competitors in a unique network of value-creating relationships, and where each activity is assigned to the partner best able to perform it in that particular situation. In addition, significant portions of operational activities can often be delegated to specialist providers, and the entire value net is often founded on collaborative, system wide communication and information management (Bovet 2001). In our case, the enterprise market for mobile systems, communication technology thus gets a double role; as actual content and "offering" to the enterprise network (the "customers", and as the "tool" which supports the organization of the value net (including both "suppliers" and "customers"). Moving towards agile value nets becomes challenging in more than one respect:

- Firstly, how can new operations and principles be developed for managing the design of constantly new *(inter-) organizational value nets*, each new net adapted to at least partly new situation?

- Secondly, how can *technologies be developed and adapted* (more open, modular, etc.) to support both the agile value net processes, and at the same time be an important part of the "value offering", as here, when new mobile enterprise applications are in focus?

- Thirdly, connected to the two previous dimensions, how can one of the most difficult and central parts of business models – *the financial and economic parts* (revenue sharing models, pricing models, cost sharing models etc.) – also be made more agile, as part of these dynamic value nets, and maybe also supported by the technology?

Although difficult and complex, the evolution of mobile systems and content, especially in the enterprise market, makes it necessary to address these questions. How can business models be made more adaptable and agile?

5.5 Developing Adaptable Business Models

A key factor, linked to Bovet's (2001) characteristics of value nets is "agile and scalable", similar to the term adopted here, "adaptable". Below, we will comment on the term. Although

little discussed, a few other authors have studied actions for changing and adapting business models (see Pateli & Giaglis (2003) for a review). However, they argue that "this is a relatively new area with intense interest for further investigation but only a few references" (p.332). Some authors have approached the area, trying to identify options for changing and improving the current business model (Ericsson & Penker 2000; Mahadevan 2000; Linder & Cantrell 2000; Gordijn & Akkermans 2001; Osterwalder & Pigneur 2002; Verkasalo 200?). It can be observed how the interest here is drawn towards the change and shift, i.e. transformation of business models, shifting from an old established model into another, being reshaped e.g. by the development of the mobile industry. Formulating guidelines, describing steps, and in general sense specifying actions to be taken for changing the business model are briefly brought up in these discussions.

Linder & Cantrall (2000) also tries to classify different "change models", based on the degree to which the core logic of the company changes (see Figure 5).
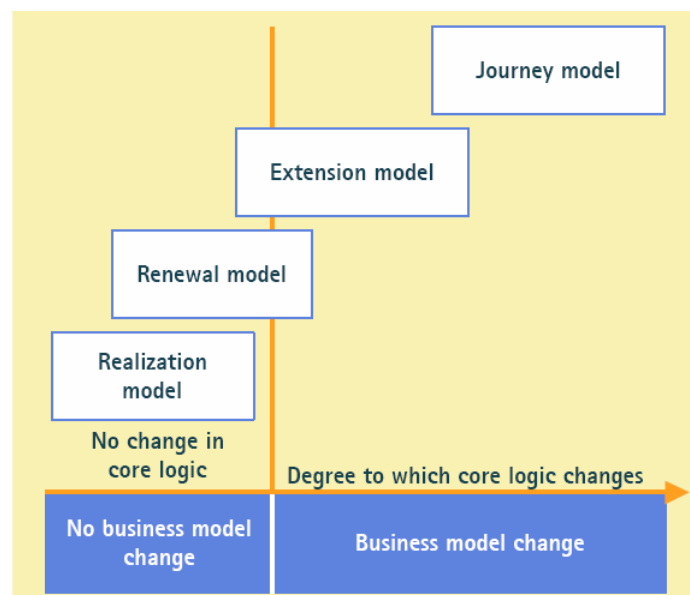
Figure 5. *Change models as characterized by Linder & Cantrell (2000)*

As defined by the authors, realization models do not change a company's operating models renewal and extension models can, and journey models do. Listing a number of ways in which firms can change parts of or their entire business model (see Figure 6 below), they argue that change models are important: "A change model is the core logic for how a firm will change over time to remain profitable in a dynamic context" (p.10).
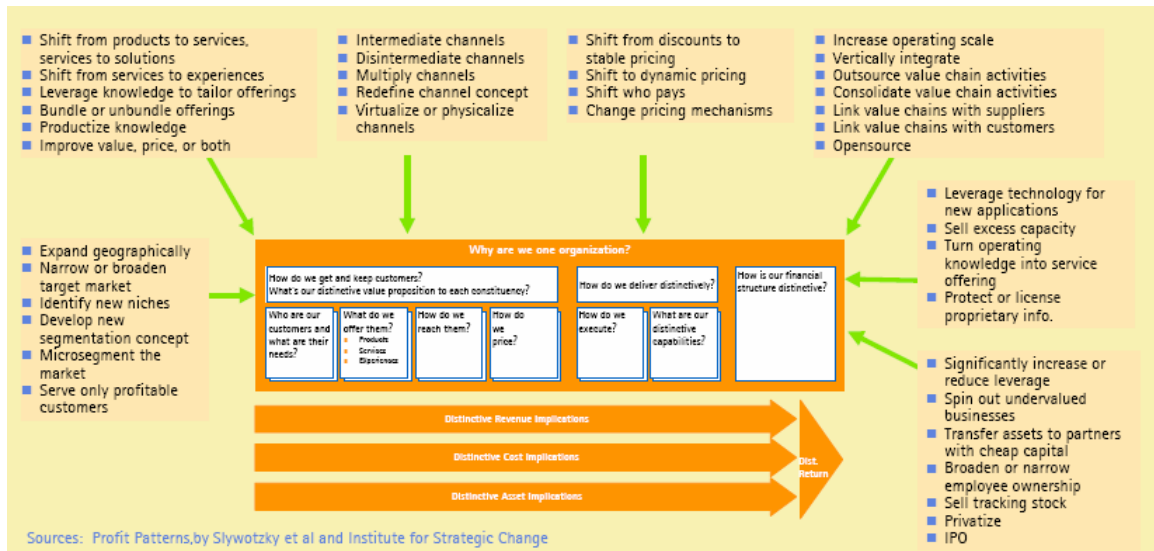
Figure 6. *Ways to change business models (Linder & Cantrell, 2000)*

5.5.1 Changing and transforming the business model when focusing on the enterprise market

One starting point for discussing the market for enterprise mobile services would be to consider the need for change and transformation of the existing business model. Combining Linder & Cantrell's idea with our own empirically induced actor or network models (i.e., where the business model is linked to the Captain, the Dyad, the Small Entrepreneur, the Loose Value Network) we get a number of options for thinking about change of business models, focusing on the type of central actors/actor constellations driving the business model change and degree or type of change:

	1."Realization"	2."Renewal"	3."Extension"	4."Journey"
"Captain"	Ex1		Ex 3	
"Dyad"				
"Small Entrepr."		Ex2		
"Loose Value N"				Ex 4

With a *realization* model companies try to maximize the returns from their existing operating logic, exploiting the potential of their current operating logic in order to grow. It represents the least actual change of the business model.

It might be argued that many mobile operators today act as traditional incumbent Captains, relying on its existing model using e.g. geographic expansion as the basic strategy to realize its (consumer service) mass market business model. When expanding into the enterprise market, this is based on the same business model logic.

When companies change their business model through *renewal* they attempt to revitalize their product and service platforms, brands, technology bas, cost structures, to counteract competitive forces that drive down margins. The firm aims for renewal of the business model by leveraging its core skills to create a more competitive position and model.

Translated to the enterprise market for mobile systems, we often find small, innovative firms with specific skills in this situation. The Small Entrepreneur often builds its business model on an important specialized competence or skill connected to a technology sometimes

combined with a profound knowledge of certain customer groups. For example, we see the emergence of a number of small companies specialized in developing software for mobile devices used in the operations of specific craftsman companies in the building construction sector. This include companies supplying software and in combination with hardware for e.g. small plumbers. Building on their profound knowledge, these specialized suppliers of mobile services and devices often follow a renewal strategy by using their core skills to expand into similar operations and user segments like painters, electricians etc. Not seldom, these small specialized firms are able to develop very strong positions as suppliers due to their specialized technology based of closeness to the users and their core operations.

Companies use an *extension* change model when they expand business to cover new grounds. This means also sometimes changing parts of the business model. The company stretches its operating model to include new markets, new value chain functions, and product and service lines. New business lines do not replace but add to existing operations. Extension models frequently involve forward or backward integration.

In a mobile enterprise market context, a major telecom operator and/or some of the dominating Captains in specific user environments might employ an extension change model by joining forces, moving from a Captain to a Dyad based business model. For example, a major building constructor might join a telecom operator in a strategic alliance to exploit some a specific mobile communication solution used in connection with large building construction projects, exploiting the developed solution together into new projects and markets.

Journey models take a company to a new business model. Unlike the other change models the company moves deliberately to a new operating model, and does not return. It might mean moving from a basic local market model to become a truly global operation, it might mean migrating up-market or down-market, e.g. from price competition to a service-based preference or vice versa.

In the market for mobile enterprise solutions we might anticipate for example public safety services based on new combinations of wireless and wireline technologies to embrace a new public business model. His would be based on a loosely coupled network of suppliers and users, forming new actor constellations for each new public safety situation, based on new open technologies enabling this formation process.

One question that emerges from this typology is how it connects to ideas about adaptable business models? One way to interpret this might be that firms with adaptable business models would be flexible enough to be able to move between these types and situations, without loosing its core skills. Or, the core skill would reside in the ability to build this adaptability into its operations.

5.6 Notes on a Central Part of the Business Model: The Revenue Sharing Model

There are many different definitions of business models and different authors have different ideas of what factors that should be included.[28] One important question and issue emerges when approaching business models for the mobile enterprise market: If user situations, and the supplier situation, are complex, involving many cooperating (and competing) actors, how should the revenues streams be organized and shared? Furthermore, if we assume a need for business model adaptability in these types of market situations, how can this specific factor

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[28] Eg. Lind (2003) in his review suggest the following generic list: Value proposition, Market segment, Firm organisation and value chain, Cost structure and profit potential, Firm in the value network, and Competitive strategy

and dimension of the overall business model be made more adaptable? Assuming a number of ways to charge the mobile enterprise users - how can adaptability in revenue models be built into the business model? For example, how can the following options be part of this flexibility?

- Subscription based revenue streams
- Pay per use
- Advertising
- Brokerage, Infomediary, Merchant
- Direct-to-customer
- Affiliation
- Community
- etc.

The mobile operators focus is on how to choose revenue model when exploring ways to generate revenues from mobile enterprise content and from communication among enterprise customers. Content providers to the mobile enterprise market focus on figuring out the best revenue model for delivering its content through the mobile channel. And the enterprise users and customer increasingly take a larger role in determining the mobile content, thereby taking a larger interest in cost, pricing and payment flows. In a broader, long-term perspective revenue models (as the business model in its totality) for mobile enterprise systems require flexibility, need to be more and more user-determined and will most likely be more application-centric.

How the adaptation of the revenue model will develop depends on several things, for example the role of the mobile operator, the role of the other suppliers and intermediaries, and the role(s) taken by the user(s)/customer(s) in different user environments. For example, if the operator decides to take a more distant role and become a mere provider of connectivity, e.g. charging a periodic fixed fee or pay-per-use, it is likely that the adaptation of the revenue model connected to the mobile enterprise content will be taken over by some kind of integrators, brokers or specialists, maybe in close cooperation with the user(s).

On the other hand, a mobile operator might try to go the opposite way, adapting the revenue model to a much more traditional position (consumer market position) controlling many elements: mobile enterprise applications, content, network, services etc. Revenue streams are adapted to the operator's own value creating structure, and although the operator might offer variety (subscriptions, pay-per.-use etc.), it its mainly offered in terms of standardized pre-packaged payment models to the enterprise end users, and standardized revenue sharing models to the content suppliers (like e.g. the I-mode business model).

Between these two models (connectivity provision" *vs.* "walled garden") there will be intermediate possibilities for revenue sharing for the operator, probably attractive enough. And these three versions for the mobile operator are not exclusive, e.g. adaptability in parts means creating variety. The question is rather how to operationalise this variety and adaptability of the revenue models, and secondly, early in the product development and service packaging process make them an integral part of the packaging of the offering to the various segments and user situations on the enterprise market. For a more elaborated discussion on "how to approach the term adaptable", see Appendix 1.

5.7 Two illustrations of shifts in business models (Sawney et al 2004)

In an illustrative discussion of how to create growth with services and shift business models, against the background of digitalization and changes in information and communication

technologies, Sawney et al (2004)[29] describe among other examples how GM Onstar and Kodak shift business models in two different ways. In addition, they argue that such changes should be adapted to the customers' activity chains. Company growth and change and shifts in business models can then be achieved in two basic ways:

- Temporal expansion: growth and change from services that add new activities to a primary activity chain

- Spatial expansion: growth and change from services that add new activities to an adjacent chain

Moving from the old system before digitalization, Kodak has created services designed to help customers "manage and share memories" using digital photography. The company found ways to add significantly to its interaction with customers. A big part of the reason for Kodak's success in its shift of business model is its deeper presence within the customers' activity chains (Figure 7)

Illustration 1: Change of Business model – Temporal Expansion by Kodak
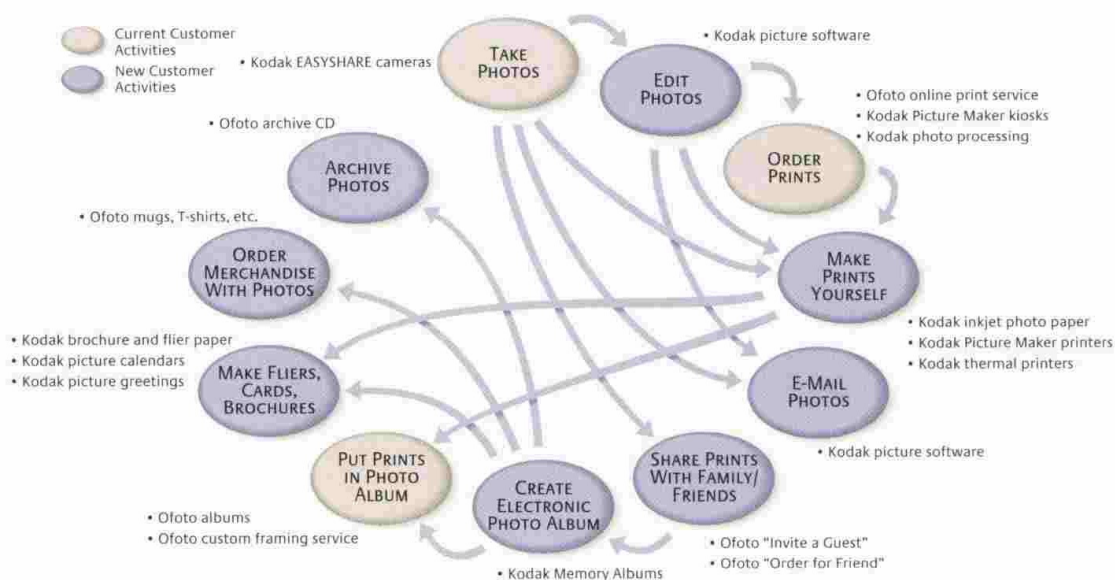
Figure 7. *Change of Business Model – Temporal Expansion (Sawhney et al, 2004)*

A different shift in business model, spatial expansion, is exemplified by GM Onstar (Figure 8) and how it has leveraged its core automotive business to offer new service platforms for adjacent activity chains in the customers' operations. The OnStar (partly wireless) platform helps customers with tasks related to car ownership: emergency services, dispatch, stolen vehicle location, roadside assistance, remote diagnostics, route support, convenience and concierge services. With the help of technological platforms GM Onstar has managed to link tightly chains that appeared to be unconnected, and from this also shift is business model.

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[29] Sawhney, M. et al (2004), "Creating Growth with Services", *MIT Sloan Management Review*, 45(2), 34-44

Illustration 2: Change of Business model: Spatial Expansion by GM Onstar
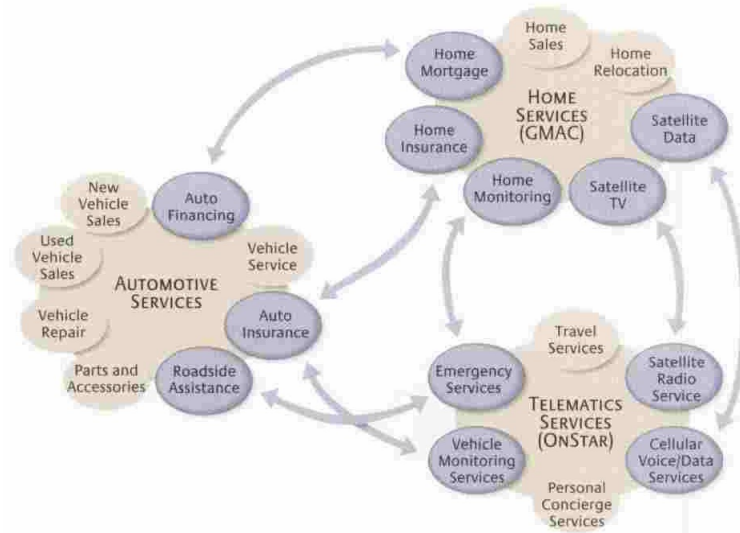
Figure 8. *Change of Business Model – Spatial Expansion (Sawhney et al, 2004)*

6 Implications for the Integration and Technical Domains

A central argument made in this report is that growth-enabling mobile enterprise services are to a large extent coupled to more diverse relationships, in the form of value networks connecting actors involved in the delivery and use of mobile services, as compared to earlier, vertical business models which will which in turn will affect both the integration and technical domains.

The effects for the integration domain are variable and depend on the interoperability requirements of the underlying value added service but also on required quality of service (QoS) levels which can be assumed to be more stringent for the enterprise market as compared to the private market. QoS requirements also have a significant affect on the technical domain as the enterprise service must be engineered to fulfill stipulated requirements service level agreements. One aspect of such requirements is the required capacity of underlying communications networks.

This chapter summarizes how changes to the mobile enterprise service market are likely to affect both the integration and technical domains. We start this chapter by describing, in general terms, the implications that affect the integration domain followed by an analysis of implications for the technical domain. It should here be noted that there are interdependencies between the two domains resulting in implications that relate to both the integration and the technical domain. We end this chapter with conclusions and motivations for further research.

6.1 Implications for the Integration Domain

In earlier chapters of this report have mainly focused on changes to the relationship domain for future mobile enterprise services, developed and delivered through value networks. Those changes will also affect the integration and technical domains, individually and collectively, in the drive to enable services and information to cross organizational and geographical boundaries. A key term here is interoperability which can be defined as[30]:

> *"the ability of two or more systems or components to exchange information and to use the information that has been exchanged."*

Such interoperability will in our context rely on the ability of communications and information systems to exchange information in a manner that makes it possible to extend mobile enterprise services across operator and organizational boundaries. For the relationship domain, business and technical process interoperability complement the more technical aspects that we focus on here. Table 4 gives some examples of interoperability-driven aspects that affect the creation, delivery and maintenance of mobile enterprise services. As the creation of future mobile enterprise services within value networks often will cross organizational boundaries within the integration domain, it becomes necessary to formalize agreements that stipulate how the development, implementation and testing of new services shall be organized. At an early stage, it becomes necessary to consider billing and charging practices which are coupled to the underlying business model for the enterprise service. The technical systems normally used for charging and billing in operator environments are highly complex and a significant portion of the overall development effort can be attributed to the development of specialized functions for a new service. In a value network setting, there are several different charging models that might be used and on several different levels. For

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[30]Definition from the IEEE: Interoperability can also be given a broader meaning and include social, political and organization factors. As we in this chapter are largely describing technical implications, we have chosen the more limited, technical definition of interoperability.

example, if one operator is responsible for the collection of usage statistics and converting those statistics to billing information, a systems integrator might receive a portion of that revenue each month of which a smaller percentage is then given to a software company licensing information security software to users.

Table 4 Examples of interoperability-driven implications on technical systems and integration practices during the creation, delivery and maintenance of a mobile enterprise service.

Aspect	Implication
Service creation platforms and practices	Agreed processes for system and service architecture development
	Creation of a network-wide test environment
Service delivery platforms and practices	Agreed and specified information formats and interfaces at technical and organizational boundaries
	Trust and information security monitoring and control in value networks
	QoS monitoring and control with agreed and specified exchange of QoS-related information
Service support platforms and practices	Charging and billing practices and implementation
	Organization of customer service
	Maintenance and repairs

In the sections below, we expand on three implications derived from Table 4 which are likely to become important components in the successful creation of future mobile enterprise services.

6.1.1 Standardization and Openness as Integration Enablers

The new applications also include real time access to and integration with the production and business support systems of the enterprise. How deep into enterprises support systems the users are allowed to access is up each enterprise to decide. Different enterprises are certainly customers to different support system vendors. How to interconnect and integrate the different enterprises support systems however is complicated and delicate and needs if at all desirable a joint effort and agreement between the vendors. As a first step common interfaces to certain information could be standardized. Noting the existence of different types of ICT systems of different partners there is a need to standardise among others also the information format to be used in common activities.

In the same way as the present services such as voice telephony, SMS etc. are open and operator independent it is necessary that the new services are so. Different enterprises being customers to different operators must be able to cooperate and when they do so they then have a need to exchange information and to communicate with each other. Therefore applications, protocols and interfaces have to be highly standardised and open. In the same way as the operators today offer voice services, SMS and data services to their customers the operators in the future offer the new open services. In case of an operator specific service the operator in its offer to an enterprise has to agree to open the service also to partners of this enterprise. From practical and economic point of view only a small number of variants can exist if a wide spread use is expected. Segmentation of the users as mentioned in section 2 is then necessary.

6.1.2 Quality of Service in Mobile Enterprise Services

The de-regulation of the telecommunications market transitioned national monopolies to a free market environment. Before this transition, the process which state-owned operators

delivered services with associated quality levels were influenced, strongly or weakly, by societal goals and cost. The long-term evolution of QoS levels will now be set by market expectations, detailing the premium different user groups are willing to pay for QoS-differentiated services together with technological factors.
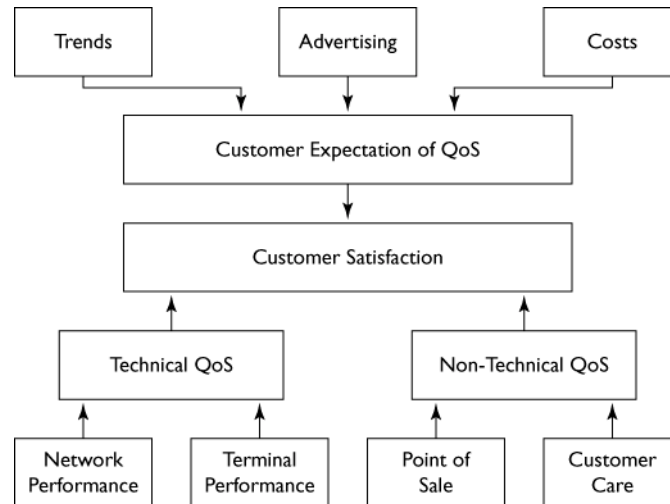
Figure 9. *Figure 1 QoS, the collective effect of service performance which determines the degree of satisfaction of a user of the service, is determined[31] by technical and non-technical factors together with user expectations. The technical factors include network access, service access, integrity and retainability.*

In a commercial setting, quality of service requirements have to be complemented with QoS attributes and associated metrics to be included in service-level agreements between a service user and provider. Such service-level agreement will be more complex to manage in value network as several actors will be responsible for characteristics of the delivered service. For services delivered through value networks, the network performance component of technical QoS (Figure 9) will not always be attributed to one single actor and the service delivery network can in many cases be subdivided into segments under different ownership domains. Customer care can in a similar fashion also be composed from representatives from a larger number of actors.

6.1.3 Trust and Information Security in Value Networks

Traditional, vertical mobile services are normally considered as being very secure as mobile networks are managed and controlled by knowledgeable operators who place a high significance on this aspect of their service offerings. In complex value networks, the number of actors that influence the security of a mobile enterprise service can grow. With the relatively closer integration of actors in such value networks, the need to protect information and business processes from intrusion, tampering or otherwise unwanted actions will increase.

Consider authorization and authentication which are only two aspects of providing a secure service. Authentication usually refers to the verification that a user, device or system is who he, she or it claims to be and authorization involves measures to only allow access to resources to those who have necessary permissions. In mobile enterprise environments, where actors and the connections between them, organizations and technical systems might well be

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[31]ETSI TS 102 250-1 V1.1.1, Technical Specification Speech Processing, Transmission and Quality Aspects (STQ), QoS aspects for popular services in GSM and 3G networks, October, 2003.

variable, it becomes a challenge to provide a flexible means for authentication and authorization without imposing undue burdens on users or technical systems. Information security as a whole is also very much dependant on user behavior which will require that real-time monitoring and control methods are considered during the systems integration period. It also becomes necessary to implement procedures making it possible to respond to security alerts by applying patches to known vulnerabilities in an orchestrated fashion throughout the entire value network.

6.2 Implications for the Technical Domain

Mobile computing is going to become a tool in the enterprises work processes. For this to happen, trust is required in a number of quality of service (QoS) parameters such as capacity, availability, safety, and integrity. We even believe that enterprise customers require quality of service guarantees. Below two aspects of quality of service, guaranteed data speed and risk of not getting access (blocking) and their consequences on capacity are studied. These two aspects are the most important and the requirements have to be satisfactorily met for the wide spread use of mobile services for enterprises to happen.

6.2.1 Number of Potential Users and Demand.

All employees are potential users. The number of enterprise customers in Sweden is given to be 1,879 millions year 2008. These customers are employees of a large number of enterprises of different sizes, from a few up to several thousand employees. The users are normally concentrated in fairly small areas, less than one square km but can also be spread over several square kilometres. Enterprises are frequently collocated. Therefore a figure of a few thousand potential users per square km in industrial areas is likely.

6.2.2 Applications

As is mentioned in section 1.2.1 the present revenues come mainly from basic communication services such as voice calls, SMS, voice mail and to a small degree from mobile data access. While the revenues from voice calls are expected to decrease the revenues from new applications are expected to increase. These new applications include access to internet, e-mail, databases, and transfer of files, images, video, maps and other data.

6.2.3 QoS Driven Capacity and Dimensioning

From section 1.2.1 we can derive the average number of minutes of use for each enterprise customer to be 244 minutes per month. These are voice minutes. Converted to amount of data this means about 24 MB per month. Regarding mobile data the average amount of data per active user per month is about 10 MB year 2008. From the table we can see that the number of enterprise users of mobile data, the proportion of subscriptions with active users and the average amount of traffic per active user have increased very rapidly between 2003 and 2006. This increase is expected to continue. The above figures are to be regarded as a floor. Furthermore the amount of traffic per user varies very much from user to user. So the average amount of data per user is not a good measure. The future services as mentioned above require much higher amounts of data to be transferred. As an example one single uncompressed image with 5 megapixel resolution requires 15 MB. A craftsman can need to download several such images with even higher resolution to be able to solve a certain problem. Figures from fixed internet indicate several GB per customer per month. It is therefore realistic to believe that at least some of the mobile users have traffic of that order of magnitude.

The aim of the calculations below is to show the implications on capacity when quality of service in the form of guaranteed data rate and availability is offered.

The capacity of a telephone services is normally expressed in Erlangs. For data this measure is not directly applicable. The overall data capacity of a base station is measured in Mbit/s. With some modifications also the required capacity of a base station can be calculated by using methods used for telephone traffic.

The things we have to define are user data rate and blocking rate. The total traffic load per user can be derived from the amount of data the user is transferring per month. One figure often used is 3 GB (100 MB per day). Below such a user is named standard user. We assume that the users are broadband users requiring a certain data rate (e.g. 1 Mbit/s, 256 Kbit/s or 100 Kbit/s). A standard user is then using the transmission link in average 800, 3125 or 8000 seconds per day respectively. Let us further more assume that the traffic is concentrated over a few (3) busy hours. From these figures the average traffic load per user during such a 3 hour period can be derived dividing the average transmission time by the number of seconds in three hours. The calculated figures are 0,074 E (Erlangs), 0,289 E or 0,74 E respectively. We have to note here that one Erlang in the case of voice is one ongoing voice call while one Erlang in case of data is one ongoing data call at a certain rate.

Before we can calculate what kind of for all users fully accessible capacities are needed we have to assume an acceptable call denial rate (blocking rate). In voice telephony 2% is often used. We adopt the same figure here.

The necessary capacity of a base station to serve a fairly small number say 10 average users out of all the potential users as indicated above, under the assumption that busy hours coincide which will be the case for a substantial part of the users, is now calculated. The total offered traffic load for the three data rates is 0,74 E, 2,89 E and 7,4 E respectively. By using Erlang B tables we find that the capacity need for the base station is > 3, 1,8 and 1,3 Mbit/s respectively for the three data rates. With 2 % blocking the carried traffic is 0,98 times the offered traffic. Now the carried traffic expressed in amount of data can be derived by multiplying the carried traffic in Erlangs by the respective data rate. For all three cases we achieve 0,72Mbit/s. By dividing this figure by the necessary capacities for each rate a figure for the throughput efficiency is achieved. The figures are < 0,24, 0,4 and 0,57 respectively. The figures for 10 and 100 standard users are shown in tables 5 and 6 below.

Table 5. Necessary capacity of a base station and throughput efficiency for different user data rates for 10 average users.

User data rate	1 Mbit/s	256 Kbit/s	100 Kbit/s
Total traffic	0,74 E	2,89 E	7,4 E
Necessary capacity	>3 Mbit/s	1,8 Mbit/s	1,3 Mbit/s
Carried traffic	0,72 Mbit/s	0,72 Mbit/s	0,72 Mbit/s
Throughput efficiency	< 0,24	0,4	0,57

Table 6. Necessary capacity of a base station and throughput efficiency for different user data rates for 100 average users.

Data rate	1 Mbit/s	256 Kbit/s	100 Kbit/s
Total traffic	7,4 E	28,9 E	74 E
Necessary capacity	13 Mbit/s	9,7 Mbit/s	8,6 Mbit/s
Carried traffic	7,2 Mbit/s	7,2 Mbit/s	7,2 Mbit/s
Throughput efficiency	0,55	0,74	0,83

From the table above we can draw some quite interesting conclusions. The necessary capacity to serve 10 standard users is higher than 1 Mbit/s (1 –3 Mbit/s). 1 – 2 Mbit/s is about the capacity one HSPA carrier can provide in average over the base stations service area (about 1 sq km). The number of users base stations with different capacities can serve for different user data rates is shown in the table 3 below. We see that the number is dramatically reduced for the highest data rate. The probability of blocking on such a base station in the 10 user case is shown in table 4. This table shows that a normal base station with capacity of 1-2 Mbit/s cannot give a satisfactory service to 1 Mbit/s data rate customers. The blocking rate is too high.

The necessary capacity is more than 2.3 times higher in the 10 user case caused by lower trunking efficiency when the user data rate is 1 Mbit/s compared with 100 Kbit/s for the same amount of data and the same quality of service. This causes a cost penalty when higher data rates are used in addition to the penalty for higher data rates arising from the link budget. It is thus better from cost point of view to use increased capacity to add more users than to offer the users a higher data rate. On the other hand new services may require higher user data rates and that is what mobile broadband is about.

To serve 100 users about 10 Mbit/s is required. Several HSPA carriers are needed. In this case about 1.5 times higher capacity is needed when 1 Mbit/s as user data rate is used compared with 100 Kbit/s.

Table 7. Number of users served at different data rates.

Average base station capacity	1Mbit/s	2 Mbit/s	5 Mbit/s	10 Mbit/s
User data rate 100 Kbit/s	6,7	17	55	120
User data rate 256 Kbit/s	1,4	5	17	42
User data rate 1 Mbit/s			2,3	6,7

Table 8. Probability of blocking for the 10 user case.

Average base station capacity	1Mbit/s	2 Mbit/s	5 Mbit/s
User data rate 100 Kbit/s	0,1		
User data rate 256 Kbit/s	0,19	0,002	
User data rate 1 Mbit/s	0,40	0,14	0,001

We now go back to a situation with more than one thousand users per square kilometre. Of those, some are high end users consuming several GB per month. The proportion of those is likely to increase. It is obvious that only a fraction of these can be served simultaneously at guaranteed data speed and availability by base stations of the present sizes i.e. $1 - 2$ Mbit/s. Methods for handling the traffic e.g. prioritisation, scheduling etc have then to be investigated and developed so that the rest of the users can be served. Such methods require possibilities to supervise and control the traffic in particular when several enterprises are using the same base station. Each enterprise is to obtain what it pays for. The charging for this kind of traffic may be based on the data and blocking rates that are guaranteed to the users rather than on amount of data alone. Flat rates may be used. Higher guaranteed data rate costs more. The total capacity of a base station may be divided into two parts, one part reserved for traffic with a certain quality of service and the second part used for less demanding traffic of best effort type. Of course the price will differ between the two cases.

6.3 Conclusions and Motivations for Further Research

This report largely presents the operator as a key actor in the creation of services or value networks. We have previously commented on the gradual convergence between traditional IT services, in the form of software, hardware and network services offered to an organization from an IT service provider, and communications services mainly coupled to the incumbent operators. In the creation of future mobile enterprise services that involve a higher degree of integration to the value network actors' internal systems and processes, it might well be that the operator role is moved changed from the center in the value network and is forced to adapt a more limited role as an a interchangeable provider of basic communications services. In the future, we expect to see both instances where one or even several system integrators serve as the principal actors for the creation of new services, and cases where different forms of network capabilities can add significant value to a mobile enterprise services emphasizing the role of the operator. At this stage, it is difficult to predict the resulting balance between these two options necessitating motivating future research.

For enterprise use of mobile services quality of service guarantees are likely to be a requirement. Guaranteed high data rate and maximum probability of blocking implies very high base station capacities or already for only a few users. Methods to handle the traffic so that different requirements of many users can be met have to be investigated. To show the technical implications we have used simplifications. We have not looked at what happens when a mix of different data rates is applied. We have furthermore regarded the capacity of a base station to be some fixed figure regardless of the distribution of the users over the base stations coverage area. Future work has to include studies without those simplifications.

7 Implications for the Relationship Domain

Returning to the outset and the basic idea - i.e. to better understand the enterprises, the professional users, and their practices, but also what happens with mobile enterprise services in the hands of the users - we get a new perspective to complement the often technology-focused view of the new wireless world. A general implication derived from the results of our research concerns the need for an integrated, systemic view of consumption, distribution and production processes of the new wireless world. Technological factors – which are so important in this context – should be considered an integral part of the user and the business processes tying together the networks of actors involved. Studying technologies in the light of the users and what they value, it is argued, will shed new light on "things" like 3G, DVB-H, RFID etc. In fact, technology loaded concepts as such might even be irrelevant, from a value and user practice perspective.

The challenge is to better understand - from the view of the *Enterprise Customer* – how communications and work practices can be improved with the help of new mobile enterprise services by analysing: [1] their existing problems, needs, uncertainties and value assessments; [2] critical events in their operations and communication processes; [3] their customer relationship and own value creation process. How well the stakeholders, e.g., mobile network operators, service providers and system integrators, can master those tasks will determine what benefits they can expect to realize from serving the mobile enterprise market.

7.1 Analysing and understanding the Enterprise Market for Wireless systems

7.1.1 Segmentation principles reconsidered

The traditional way of segmenting the market according to simlar characteristics of individual users (e.g., age and occupation) can be a powerful tool when analysing and targeting the private consumer market. However, our studies suggest that a mere transfer of the models applicable to the consumer market into the analysis of professional user is insufficient. Although we agree with the view of blurred boundaries between private and professional life, we still claim that value creation in an organizational context bring new complexities into the scene.

(1.) From customer segments to customer portfolios of enterprise customers. Adopting traditional market segmentation practices from "traditional" consumer market analyses is not enough, or might even be highly misleading for suppliers involved in the provision of mobile devices and applications. Rather than segmentation, suppliers need to analyze and understand in-depth their enterprises communication patterns, information needs, position and role in their production systems, and more. This means a move towards an understanding of various broad and general customer segments to understanding in-depth each customer's "mobility needs" in the supplier's *customer portfolio*. (Such a customer portfolio of important customer relations might include both direct customer contacts and "intermediate" customers like system integrators of various parts of mobile solutions for the enterprise.)

(2.) Acknowledge interdependencies and complementarities between (mobile) customers. Suppliers of mobile applications also need to move from a focus on the similarities between groups of enterprise customers to a focus on the specific needs of single enterprise customers, and on the complementarities between enterprise customer relations. Although every user situation is unique, parts of the knowledge and experiences in a particular user situation can be used, transformed and transferred to other user situations. Finding a system that allows such analyses and transfer of user situation knowledge is crucial for enterprise suppliers' efficiency and effectiveness in their market operations.

(3.) Understanding the position of the mobile user groups in the wider "production" processes. No introduction of mobile applications in any enterprise context will be efficient if there is not a basic understanding of the role and position of the user of the wireless application in its "production" system context. Hence, suppliers need to broaden the scope of the analyses of the single user group/enterprise to the broader network context in which the new mobile application is to be implemented and used. This means a shift in focus towards analyses of the various "production logics" characterizing the work situation of different mobile users in different contexts, including e.g. internal and external communication and interaction patterns, value creation logics, and the logics for increasing the efficiency in existing work processes.

(4.) Acknowledge the differing degrees of maturity of users in their use of wireless applications. In traditional, consumer based market segmentation it is common to separate the market into new/existing customers and whether these should be approached with new or existing product offerings. On the enterprise market for wireless applications we need to acknowledge the fact that there will be differing degrees of "maturity" of users of wireless applications, including a variety of existing "ICT situations". Some parts of enterprise organizations have by tradition always been highly mobile, although the underlying technologies have changed and developed over time (e.g. fieldwork personnel). There will be a high degree of maturity in the use of some types of ICT technologies, and the replacement of old for new wireless applications require specific modes of selling, negotiating, implementing etc. Other user groups might be highly mature in the use of other types of ICT technologies in their work operations, but are challenged by the implementation of new wireless technologies. Finally, there will be user groups which are very late adopters of new technologies in their operations. Usually suppliers will be challenged by the fact that all types of user groups might be found in the same enterprise customer organization. Linked to this is also the fact that, different enterprise organizations and user groups will show very different degrees of maturity and professionalism in their purchasing and procurement behavior connected to the process of acquiring and implementing new wireless applications.

7.1.2 Analysis of User Environments and Critical Events

In previous chapter we argued that mobile network operators, system integrators and other service providers aiming for growth in the mobile enterprise market will have to understand more about the the logics of their enterprise customers' business operations and working practicies. What is more, they need to understand how production and communication processes connect organizations in different industries, into systems or industrial networks. The question will then be how can they aquire this knowledge and intelligence - we claim that that *user environments* and *critical events* should be the foundation for and level of analysis when trying to better understand customers' (and their value networks) requirements and demands for mobile enterprise services

Analysing user environments is an important and challenging task:

1. Most user environments are complex, consisting of nets of interconnected professional users (in value networks).

2. User environments in different industries have unique characteristics, as have also different user situations within the same type of user environment. In other words, rather than clear cut *segments* we are dealing with unique situations.

3. User environments can be "generic" across different industries, suggesting that by studying user environments we can compare working practicies and business

processes across industries and take advantage of scale economies in the development of mobile enterprise services.

4. The mobile solutions developed and implemented are often complex systems requiring the cooperation of several, sometimes many, suppliers of components to this system.

Although user environments in different industries have unique characteristics, we conclude that by analyzing and utilizing similarities and complementarities between activities and resources across user environments, suppliers of wireless applications can take advantage of scale economies in their enterprise markets. Hence, among the major challenges will be to develop routines for transferring, adapting and using experiences (as well as the actual applications) between user situations, irrespective of whether they are more narrow (vertical) or general (horizontal) in character.

7.1.3 Understanding the Customers' Value Creation Process

The process of developing, implementing and starting to use new mobile services will most likely be associated with various uncertainties on the supplier as well as the buyer sides, especially when technologies are new and the applications fairly unknown. These uncertainties can also be expressed as a number of gaps between the suppliers and buyers - between technology suppliers' and users' uncertainties and abilities. Bridging these gaps is a major managerial implication.

The customer and the customer's customer both face a number of uncertainties, and they both have a number of abilities to handle these uncertainties on both sides. The users' own customer relations are in many cases affected by the introduction of new wireless communication technologies, sometimes contributing to the users' own value creation processes. For example, a user organization applying wireless information and communication systems in their field operations may experience many uncertainties concerning the applicability of this system: What role does the new wireless information and communication system have in the overall interaction and communication with the customers? Does it improve efficiency in interactions and communication with the customers? Does the new system contribute to increase the effectiveness and output, i.e. to the value created for the end customers? In short, does the use of the new system contribute to the user's own business development?

Hence, understanding the customers' value creation process is an important issue. The focus is on how the introduction of new mobile technologies can bridge the gap between the customer/user organization and its counterparts (e.g. customers) so that new value is created.
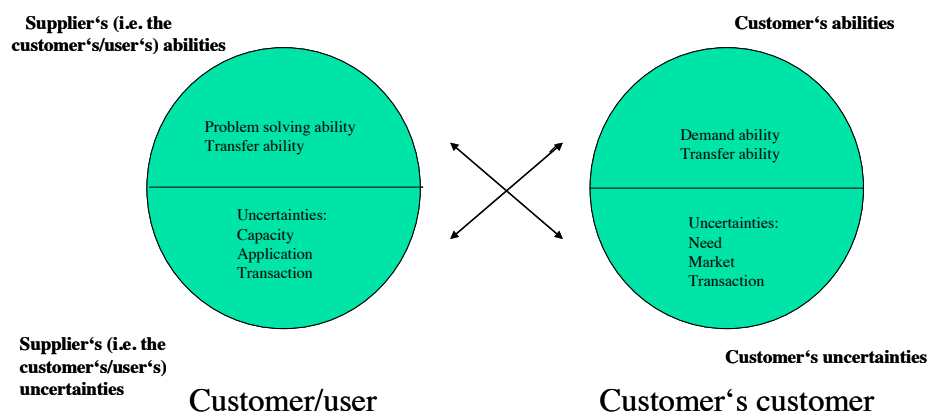

Figure 10. *The gap between the customer/user and its own customers as starting point for business development (building on Ford, 2002).*

7.2 Creation of Joint Value and Common Development Processes

7.2.1 Building the value network between suppliers, partners, and customers.

Another challenging task, adjacent to the idenification of gaps between the customer/user organization and its counterparts described above (see 7.1.3.), concerns the gap between the suppliers of the new wireless telecommunication technologies and the enterprise customers.

Part of this gap is the ability of the different service providers and suppliers to understand and solve problems for a customer/user that faces challenges in applying new communications in work processes. As suggested in Ford et al (2002), this brings into focus the interactions of the supplier with the customer and the various uncertainties and abilities that are part of this interaction.
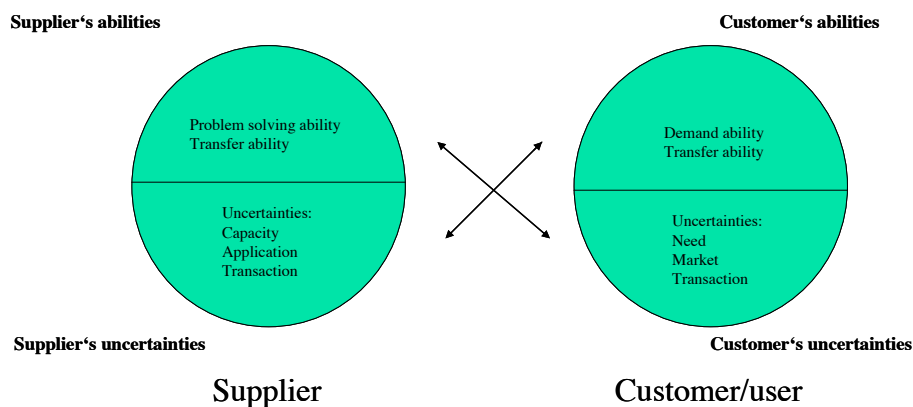
Figure 11. *The supplier - customer/user gap (building on Ford, 2002).*

Suppliers can face uncertainties concerning the capacity of their wireless solutions, the areas of applications of their solutions, and whether they have the ability to deliver the solution to the customers ("transaction uncertainty"). Customers/users on the other hand may experience uncertainties concerning their actual need for the new wireless application, whether it will solve certain problems in the work and communication processes in the user organisation. They also face uncertainties concerning the market, e.g., whom are the future suppliers of mobile enterprise services, and to what extent the supplier can support the transaction and transfer of this solution into the user organisation. Abilities relate to the suppliers' general problem solving ability, the customers' demand ability in relation to the new mobile solution, and the two sides' transfer abilities. Matching abilities and uncertainties on both sides is one of the major challenges when bridging the gap.

7.2.2 User Involvement

The nature of wireless applications for enterprise customers puts focus on value creation as an interactive, process over time.[32] Hence, a central implication for e.g. mobile operators aiming for a more profound presence in the entreprise market, concerns the role of user involvement in the development of new mobile enterprise services. Although user involvement is an important issue independently of the technology being studied, our research has shown that it is especially important in connection to wireless technologies for the following reasons:

- the *novelty of the technology* makes user involvement a central issue. In fact, during the early phases of their development, technologies are formed in close collaboration with

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[32] Normann and Ramírez (1998) and Gummesson (2000)

the users. As technology matures the technology commoditization process shifts the locus of development from users to vendors.

- the *invalidation of the unity of time* and place represents another specific characteristic of wireless technologies. This general feature enables the development of systems that make usage more easily monitored reducing work freedom. Workers have to adhere to the fixed pace as the reduction of inventory buffers makes workers increasingly dependent on work-flow time-sequencing that is governed by the technology employed.

Furthermore, the experienced value is a trade-off between benefits and sacrifices in the customer's interaction with the offering (Holbrook, 1994). Changes in the offering thus also influence the value process. The professional end-user might experience greater value from mobile services that he/she has co-developed, not solely because they fit functional needs better, but also because this *involvement in itself offers value*.

The purpose of user involvement was earlier described as a learning instrument that helps to reduce the enabling, commissioning, and impact uncertainties. However, as illustrated in the study and in line with Magnusson (2003), how users are involved influences the outcome of the development of innovation processes. The reason for being involved, the intensity of involvement, and the way customers are involved will influence the outcome, i.e. the co-produced value.

There are indications from our case studies that the importance of user commitment is greatest in the early stages of the process, then decreasing during the design and implementation phases before transforming into participation. Finally, both commitment and participation stabilize during the usage phase.

7.3 A need for *adaptable* business models

The development of new mobile enterprise services challenges deeply rooted models of doing business, such as our expectations about the stakeholders to be involved and the way to share created value. Contrary to traditional services, it appears more difficult to predict exactly who will benefit what (and in what circumstances) from developing, providing and using new communications services. Although difficult and complex, the evolution of mobile services and content, especially in the enterprise market, makes it necessary to address the question of how business models can be made more adaptable and agile.

Increasingly enterprises engage suppliers, customers, and even competitors in a unique network of value-creating relationships, where each activity is assigned to the partner best able to perform. This is true both for the providers of new services and the customers supposed to apply and use these services in their business operation.

This move towards value nets becomes challenging in more than one respect: [1] how can new operations and principles be developed for managing the design of constantly new *inter-organizational value nets*, each new net adapted to at least partly new situation? [2] how can *technologies be developed and adapted* (more open, modular, etc.) to support both the agile value net processes, and at the same time be an important part of the "value offering", as here, when new mobile enterprise applications are in focus? [3] connected to the two previous dimensions, how can one of the most difficult and central parts of business models – *the financial and economic parts* (revenue sharing models, pricing models, cost sharing models etc.) – also be made more agile, as part of these dynamic value nets, and maybe also supported by the technology?

Hence, mobile network operators and other service providers in the market still need to work out how the future business models and revenues streams should be organized and shared.

How the adaptation of these business and revenue models, respectively, will develop depends on several things, for example the role of the mobile operator, the role of the other suppliers and intermediaries, and the role(s) taken by the user(s)/customer(s) in different user environments.

We have argued that the idea of sustainability, in terms of stability of business models needs to be replaced. Actors actively engaged in the mobile enterprise market need to think on business models as *adaptable*. The conception of *sustainable* in terms of *stable* might even be detrimental to companies trying to position themselves in the complex and dynamic networks of buyers, users, suppliers etc.

8   Suggestions for Future Research

The present project has been exploratory, with the aim of identifying new research questions and methods of potential relevance from enterprise as well as societal perspectives. As there are no plans for any immediate follow-up project, the list of suggestions is quite extensive and forward looking. Some of the issues might actually be addressed in the near future as part of specific research proposals. Others are more generic, and even a bit "exotic", at the present point in time. It remains to be seen which of these "candidate areas for future research" the stakeholders will select.

The common denominators for the following research proposals are: each idea came up during the project work, it was, however, not possible to cover these ideas within the envelope of a one-year project. In sum, we herein suggest a menu of issues to tackle, from which to pick and choose from time-to-time.

8.1 Introduction - Challenging Conventional Truths

The pressure for greater profitability in an era of rapid technological advances leads, not surprisingly, to different misperceptions about the impact of wireless technologies on individuals, businesses and industries. A number of truths have evolved from these misperceptions. These include the idea that everything must happen in real time; mobility as the next big revolution; we need to constantly increase bandwidth in order to make use of mobility services; spectrum is a scarce resource; video over wireless is the Holy Grail; 1G, 2G, 3G,…, nG, follows according to a law of nature; et cetera. A number of these truths can now be reconsidered, for example:

Anytime, anywhere connection. One widely accepted conception during the early days of the development of mobile telephones was that wireless communications "must" provide us with anytime, anywhere on any device connections. However, sometimes "best effort" is good enough, and can be provided at a far lower price. Higher costs than required inhibit the take-up of the services and remind us that pricing is still a critical issue for future mobility. Pricing and costs play a larger role than expected. The issue of pricing and trade-offs will be therefore a topic for research.

Mobile operators have more capacity than they know what to do with. Another truth relates to the previous example that always-connected solutions are not cost efficient always. There seems to be agreement that mobile operators have more network capacity than they know what to do with. However, video applications eat up bandwidth and shift Internet's asymmetric topology (higher throughput downlink than uplink) into more symmetric patterns. The bandwidth available in the ether is scarce by comparison with what can be provided by fiber and our endless ability to manufacture and lay more and more of it.

An illustration: present usage of (voice) telephony in Europe is a matter of 150 min per month. This can be translated to a mere 15 Mbyte per month. Even the download of five MP3 songs per months beats this figure. Traffic volumes in the fixed networks are already a matter of 1.5 Gbytes per month, i.e., 100 times higher. Is this possible to match in (any) pure wireless network? This is also an issue for research

Wireless services as standardized applications. So far, it seems like if the legacy from voice telephony has unduly spilled over to other applications. One derived truth when discussion shifts towards wireless data applications is the impression that these are also standardized services. The new wireless world looks bound to provide an ever increasing number of different offerings, rather than any single and uniformed service carried by any single kind of network. Thus, the shift towards innovation is coming to wireless. What has happened is that

technology has developed rapidly and mostly in innovative ways. The days of voice revenues are gone and data communication is much wider and presents a more thrilling landscape ahead. This may not enable the use of standardized power sockets as in the electricity industry but will require integration and tailoring to specific needs and situations.

Mobility is freedom. Another truth seems to be that mobility represents freedom. The effects of technology on temporality are important. Mobility alters interdependencies and the compressing of time and thus altering the order of things. Mobility often changes interaction patterns bounding its users to the new requirements of the communication channels. How people are affected by these processes is also an important issue for research.

Tele- and datacommunications, media and entertainment convergence. "Convergence" has been a much touted trend for some years. Previously separate industries (data- and telecom, media, entertainment, etc.) can potentially draw on the same technological base and use the same means of data transport (whether wireless or wire-bound) in order to achieve cost savings. However, the empirical observations points in the quite opposite direction: the closer to the end-users, the more of increased divergence. Given increased speeds and capacity (and hence costs) there is a need to more closely match also individual user needs and requirements. Any new technical offering has rather to be carefully tailored to work together with already existing systems, or at least provide a credible migration path to the new from what is already in daily use. Even if some firms (like Apple with its I-phone) have a claim to deliver a digital version of the Swiss army knife, capable for a number of services previously demanding a number of separate gadgets, the jury is still out. Other manufacturers, like Nokia, are instead launching specialized gadgets like a handset geared for internet browsing only, and many users might still prefer to use a mobile phone as a phone (no more, no less).

These truths are intriguing. They present a potential that being realized may boost the wireless industry in terms of benefits and value. Simultaneously, these truths represent a risk when the gap between expectations and reality widens so that mobility represents a broad and all-inclusive concept being applied to everything from devices to users and applications. The risks of the wireless industry failing to take into account the mythical aspects of these truths have been largely ignored in the expansion of recent years. The reason seems to be related to the lack of connection between two focal concepts; *mobility* and *value*. If value is not created and/or is envisioned as something that "society" is benefiting from, then the thud of failure is hypothetically going to become more frequent and increasingly costly when mobility is of low value or no value at all. What the experiences of these aspects from the research project mean for the present and for future mobility at the individual, organizational and industrial level of analysis should be in focus of further research and future research programs.

8.2 Candidates for Further Research

8.2.1 Understanding and Measuring Value Creation – the Need for New Tools

An issue akin to our believes and arguments that "wireless" will have a transformational potential on the ways in which organizations will communicate and organize their future business processes, is the ability to measure and assess mobile enterprise services based on the value they bring. The way value creation is measured will, of course, vary depending on the nature of the organization. A number of organizations would for example benefit from improved information exchange, between individuals, organizations and technical systems to increase our society's ability to save lives and property from terrorism, natural disasters, accidents or other events."

The problem is, however, that we lack adequate knowledge about the skills, models, and methods required to capture and analyze data on how mobile services benefit value creation

within and across organizations (i.e., within the value network). We thus recognize a need for future research on models to determine customer value and to test initiatives (e.g. new product ideas) that have a potential to increase it.

Furthermore, it is most likely that mobile network operators have to shape (or at least be part of) an ecosystem of service providers and suppliers of user-friendly devices to provide seamless mobile enterprise services. Even though some applications and services can be developed relatively quickly – the challenge is how to bring them to the market in a way that delivers promised value to customers and is profitable for all other stakeholders in the ecosystem (see The Integration Domain[33], Figure 2 in chapter 1).

Most of the tools for business and service development we are familiar with are "engineering" types of tools. When it comes to understanding organizational dynamics and the complexities of value creation in value constellations current tools appear rather limited. Among the key questions are: *How is value created* and *how can it be shared between the stakeholders?*

In current work we have tried to bring some new knowledge and ideas on, what we have called adaptable business models. This can be considered a start on a research agenda we believe have more to bring.

8.2.2 User Environments *vs.* Horizontal Solutions

Enterprise data solutions are commonly perceived as too complex and difficult to replicate. This is argued to be one reason why mobile network operators have focused their efforts and growth strategies on commodity (voice) services.

While definitions vary by authors, horizontal services are usually thought to be designed for a mass market and enable design of products and services with limited or no industry-specific customization. Conversely, vertical solutions are more complex and often need to be tailored for each industry and integrated with enterprise applications (e.g., CRM or ERP)[34]. Based on our studies we argue that *user environments* and *user situations* should be the level of analysis when trying to capture and understand enterprises' need and demand for future mobile services (not least for the potential of understanding customers' requirements on mobile services serving value creation in value networks).

This view might make one to think of rather industry-specific needs, i.e., vertical solutions. The question is thus - how (if) can we understand and transform user environments and situations to meet a broader mass of market?

The matter bears reference to the prospect of translating user environments into "generic" requirements. Following our previous arguing, "generic" bear reference to the prospects of translating user requirements into the lowest common denominator on all the different domains i.e., the service relationship domain, the service integration domain, and the technical service domain.

8.2.3 Service and System Performance Guarantees

In the more complex value constellations that result from striving towards future growth in the mobile enterprise service market, the number of actors that are involved in the creation, operation, use and evolution of services increase. Each enterprise within the public and private sectors will rely on both routine, administrative information exchange, to which low or moderate QoS requirements can be associated and mission-critical information for the

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[33] The Integration Domain is made up of operators, system integrators, service providers, but also the customer.

[34] See also previous discussion on segmentation principles in section 2.3

protection of business interest, property, lives or other interests, where quality of service is essential. An important growth factor will be the ability of mobile services to fulfil the comparatively higher quality of service (QoS) requirements of enterprise users.

Current methodologies to analyze and describe QoS attributes are largely suited for basic services, where one customer is dependant on one and only one service provider. In complex value networks, it becomes much more challenging to design and operate services where the collective QoS level is determined by the actions of a large number of actors. It is also necessary to arrive at specific service level agreements that can be communicated to and agreed on with a customer, and which capture a significant added value from a customer perspective. We therefore see a need to develop methodologies that extend current QoS frameworks to multi-actor relationships serving both as design goals or tools and as components of commercial agreements thus serving as components of future growth.

8.2.4 Maturing Customers and Maturing User Behaviour

It is clear that we now have a unique situation in the developed world in that a significant part of our wealth is located with an aging population. The use of new ICT technologies and the great interest that for a long time has been drawn towards the frontline users of the younger consumer generation will need to be complemented with an increased interest in the needs of and values associated with the various niches of the enterprise market. The idea that it is the consumer market that will drive the future market development needs to be scrutinized and challenged. Yes, there are individuals applying the new mobile services also in organizations, however, important values of new services and systems need to be viewed and analyzed from and organizational perspective. Maturing customers and customer segments bring in their experiences from using mobile services into their organizational contexts, and the consequences of this needs to be studied. This includes, for example, deeper research into ICTs in healthcare processes; the needs and behaviour of for example the elderly in relation to new technologies implemented in these processes is an important market issue for the future and a challenge for future user oriented research. Hence, we need research that connects the individual consumer with organizational contexts, but also much more research which takes the organization as starting point for analyses of user behaviour and value creation.

8.2.5 Organizing Complex Value Constellations

The two focal case industries in the project have shown that a whole network ('value constellation') of firms can and need to be involved when new wireless enterprise systems are implemented in complex organisational situations: in healthcare situations as, in building construction processes, and in new access provisioning situations. Both the supplier and the buyer sides often involve more than a single supplier and buyer. When new wireless information and communication systems are implemented in industries and public systems, with complex production and operational structures and processes, a large number of interacting parties will be involved and affected on both the supply and the user side. The organization of complex value constellations and business development processes and the systemic complexities when new wireless solutions are implemented should be the study object of much detailed research and empirical studies in the future.

8.2.6 Demand Driven Business Development and Creation of Dynamic Business Models

Studies of how new "business models" develop, i.e. the new logics for sharing the pie among the suppliers involved in putting together and implementing the new wireless information and communication systems, should be the focus of research. Studies of the development and organisation adaptable business models in demand driven value constellations should be part of such research. The starting points for demand driven mobile business development can

vary, e.g.: starting from customers' existing problems, needs, uncertainties and value assessments, starting in "critical events" in customers' communication processes, and starting in the customers' customer relationship and *the customers' own value creation processes*. Such demand driven business development processes should be the focus of in-depth studies. Furthermore, what are the business models related issues that need to be addressed when we approach the business area of wireless offerings? Following the lines of the business model discussions, the following issues could be addressed: What kinds of wireless offerings are offered to different customers and what are the values of these offerings to the customers? What billing mechanisms, sources of income, and models for sharing revenues are used in relations to different customers? Who manages the customer interface, i.e. the end-relationship with different customers, and how are the marketing activities towards the customers shared between suppliers? How are the central actors in the value constellations connected to different customers and what roles do they have in relation to the activities and resources for e.g. controlling the necessary infrastructure, the creation of service and software content, the creation of hardware, and more? What are the important communication, interaction and contact patterns between the actors in the value constellation, including both suppliers and inter-connected customers?

8.2.7 Entrepreneurship and the Creation of New Enterprises

The new wireless world opens up for entrepreneurship and the creation of new enterprises. Some of these start-ups also develop central positions in the new value constellations providing enterprise customers with integrated, mobile offerings of various kinds. Who these actors are and what their interests and impacts are going to be is very much a research issue now and will be a research issue for the future. How do these new firms create new business in the market for wireless applications, what different types of businesses and strategic focus do they develop, what roles do they take as system integrators?

Telecommunications is not a closed club, where anonymous insiders decide what standard is going to be established at what continent and on what timeframe this will happen. One of the reasons, and perhaps the most important one, for this change of practice is scarce knowledge, not least in the area of customer knowledge. New actors are most likely necessary for a healthy development of the telecom sector. Who these actors are and what their interests and impacts are going to be is very much a research issue now and will be a research issue for some time in the future.

8.2.8 The Enterprise Market and Business Development in the New Media Landscape

The contemporary media landscape is rapidly changing due to new technologies. We are in the midst of a period of profound technological change. New media are created, dispersed, adopted, adapted, and absorbed. The introduction of new media technologies sparks business development and experimentation, and new media technologies have lowered barriers to entry into the marketplace. Traditional institutions which controlled innovation have declined in influence. The result has been the diversification of media production. Old and new media collide, e.g. as a result of the introduction of new technologies some of which are wireless. It is in the established industry actors' economic interest to move any successful media content from one delivery system to another in order to maximize profit and broaden market potential. At the same time, the new technologies open up for new emerging industry actors and consumers to control the new media content. And technologies allow also enterprise customers to take almost any media with them wherever they go, employing various means of "visual communications". The media landscape is increasingly become more networked where media technologies are interconnected so that messages flow easily from one place to another and from one person to another, and media content flows fluidly across national

borders. Studying the emerging business development processes in this new landscape should be a central topic for future research, also on the enterprise market.

8.2.9 The Enterprise Market and the Organisation of "The Internet of Things"

The enterprise market already has experienced various effects of the new emergence and spread of RFID technology. The International Telecommunication Union (ITU) calls this and associated techniques and phenomena as the emerging "Internet of Things". Developments are rapidly under way to take RFID and similar phenomena an important step further. Various mobile transceivers will be embedded into a wide array of additional gadgets and everyday items. This will enable new forms of communication between people and things and between things themselves – we are moving towards the connectivity of *anything*. It is argued that connections will multiply and create an entirely new dynamic network of networks, the Internet of things (ITU). Studying the opportunities, challenges - and concerns – of this emerging development should be the productive focus point of research in the future. This could also be linked to more detailed studies of RFID technologies' role associated with the growing importance of M2M applications in different user environments of the enterprise market.

8.2.10 Converging and Diverging Technologies, Business Networks and Markets and the Role of the Regulator

Another issue for future research concerns the behaviour of established telecom actors and of their regulatory agencies. Given the control, and in many cases outright ownership, of telecommunications actors by the nation state, the dynamics of these public agencies and their subjects induced either by environmental change or internal change have been an interesting story for more than a decade, and hypothetically will continue to be so in the next decade as well. Regulators are facing important and difficult questions and issues when technologies, business networks and markets converge and diverge over time. Policy issues and policy work in the ICT sector is becoming more complex. Against the background of the complexity of the enterprise market (complex patterns of cooperation and competition, connected technologies, international user conglomerates etc.), research should direct attention to this observation and to how this complexity is also reflected in business and the market behaviour of industry actors.

8.2.11 Beyond Organizational and Value Constellation Mobility – Learning Niche Business Modelling or Staying with Voice Telephony?

Summing up, at organizational level, especially in commercial organizations, the question of costs is never far from the surface. Given the history of the telecom industry, characterized by being under public control either directly or indirectly since inception, and producing and selling a service that it is highly standardized, pricing strategies have not been its forte in the brave new world of data services. Rather business model development, or lack of development, has led to trust problems. The business model practiced by telecom operators is non-transparent and authoritarian, which leads to distrust and non-usage among customers and users of potentially valuable services. In particular the non-transparent and unintelligible pricing strategies of mobile services needs to change if service innovation is not going to stay in a sub-critical state for a very long time. Giving away shiny new telephones has clearly not worked. Pricing is a critical issue in the new wireless world. Unlimited access at flat rates might not be sustainable where there is a capacity limit, but it might be a very good idea to get out of the sub-critical phase that the industry has put itself in. Build-outs (of conventional networks) can prove increasingly costly, and those costs are difficult to recover on the increasingly important *indoor market*. Pricing in relation to extra value creation (compared to other offerings) looks to be more of a sustainable strategy. A degree of convergence between

wireless and fixed networks is one of the options, but the strong hypothesis is that there are no "killer applications". This means that the telecom actors will have to develop knowledge of who their customer is, where the customer is, and what the customer values. The lack of customer concern is a clear indicator that the sector is mentally locked into a previous era of monopoly markets.

The traditional division of the telecom sector, i.e., equipment producer and voice operator, is slowly giving way to other arrangements. The development from one voice telephony service towards many data services rather forces the hand of both partners to include new actors, but regulatory regimes are often not helpful. The "converge" of various telecommunication services amongst themselves and with services and products from other industries such as media and finance, seems more like ham-handed symbolism than substance to date. Despite potentially valuable offerings, traditional business model thinking – development of a new mobile application necessitates a well defined mass-market in one nation state at a time – and traditional business development –potential difficulties been decided on in a standardization committee – the results to date are lacking.

The regulation of the telecom sector has had the purpose of creating a low-cost structure for local voice telephony and high-cost structure for global voice telephony. This regulatory regime is still in place, but it is under increasing pressure from the European Commission and from technical development. The critical discussion is summarized in the illustration below.

Mobility Performance "Truths" and value					
		Value creation at different market levels			
		Individual	Organisa-tional	Value Constellation	Societal
Mobility Performance Truths	Anytime / Anywhere	High Value	Low Value	Low Value	High Value
	Endless Capacity	High Value	Low Value	Low Value	High Value
	Standarized Services	Low Value	High Value	High Value	High Value
	Mobility = Freedom	High Value	Low Value	Low Value	High Value
	Convergence	Low Value	Low Value	Low Value	Low Value

Figure 12. *Mobility performance truths vs. value creation*

8.3 Is there a Need for a Broader Research Program on User Environments, Connected Technologies and Adaptable Business Models?

From a research perspective, the project has been an important step towards combining a technology focus (Wireless@KTH) with a user and business model perspective (Center for Information and Communications Research CIC).[35] Together, both research groups have a solid interest in both theoretical and applied work, and the interaction among the two. Without

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[35] CIC has from it's inception in 1997 had international ambitions in terms of it's research agenda, i. e., publishing results internationally, inviting foreign visitors and participating in international projects. CIC's international activities include a central role in the Global Mobility Roundtable. The Roundtable is a series of global conferences on mobile communication and computing, organized by an international group of visionary researchers and practitioners. CIC is a small institute and has a concentrated agenda limited to activities concerning the adoption by individuals and organizations of new mobile technologies, and activities concerning the viability of new technological options and economical regimes for mobile communication.

theory and methodology research becomes flimsy and mediocre, and without application impulses for theoretical development are lost and research becomes brittle and tenuous. An important consequence of the project is the increased interest in taking the ideas above and create a broader set of studies and research, i.e. suggesting the development of a broader research program.

For further information see separate document: "Proposal: Creating a Broad Research Program with Focus on Organizational User Environments, Connected Technologies and Adaptable Business Models", Andersson. P et al.

9 References

Andersson et al, (2007), Mobile Organizations (forthcoming)

Barnes, Stuart J. (2003), ³Enterprise mobility: concepts and examples², International Journal of Mobile Communications, Vol. 1, No.4, pp. 341 359

Chen, L., Nath, R., 2004. A framework for mobile business applications, International Journal of Mobile Communications 2 (4), 368-381

Chesbrough, H. & Rosenbloom R. (2002), "The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies", Industrial and Corporate Change, vol 11, No 3, 2002

Ford, D. et al, (2002). The Business Marketing Course, Chichester, John Wiley.

Glass,R.M(2002) What's the value of a wireless business? Wireless Business and Technology 2(4)

Johanson, J., & Mattsson, L-G. (1988). Internationalization in industrial systems ‹A network approach) In: N. Hood & J. E. Vahlne (Eds), Strategies in global competition. London: Croom-Helm.

Kaijser, A. (1999). "Den hjälpsamma handen: om den institutionella utformningen av svenska infrasystem." *Historisk tidskrift*(119): 397-424.

Linder, J. & Cantrell, S., (2000), "Changing Business Models: Surveying the Landscape", Institute for

Strategic Change, Accenture, May 24, 2000

Markendahl J, Mäkitalo Ö, (2007), "Analysis of Business Models and Market Players for Local Wireless Internet Access" 6th Conf. on Telecommunication Tele-Economics, Helsinki

Mattsson, L-G. (1987), ³Management of Strategic Change in a OEMarkets as Networks Perspective¹², in Pettigrew, A. (ed.), Management of Strategic Change, London: Basil & Blackwell

Norman, R. and Ramirez, R. (1993) "From Value Chain to Value Constellation: Designing Interactive Strategy". Harvard Business Review, 65-77.

Poulbère, Vincent (2003), Impacts of New Business Models on the Mobile Multimedia Market, paper presented at the 2003 Global Mobility Roundtable, Stockholm, May

Ramirez, R. (1999): Value co-production: intellectual origins and implications for practice and research, Strategic Management Journal, Vol.20 pp.49-65.

Ravald, Annika, Gronroos, Christian (1996), The value concept and relationship marketing, European Journal of Marketing. Bradford. Vol. 30, Issue 2

Turel, O. and Yuan, Y. (2006), Investigating the dynamics of the m-commerce value system: a comparative viewpoint, International Journal of Mobile Communications, Vol. 4, No. 5, pp. 532-557

Valiente, P (2006), Re-Innovating the Existing. A Study of Wireless IS Capabilities to Support Mobile Workforces, Phd thesis at The Economic Research Institute at Stockholm School of Economics.

Varshney, U., Malloy, A., Ahluwalia, P., and Jain, R., 2004. Wireless in the enterprise: requirements, solutions, and research directions. International Journal of Mobile Communications 2 (4), 354-367.

Wrolstad, J., (2002) New wireless tech pushes mobile sales apps, http://wirelessnewsfactor.com

Part II
PROJECT REPORT: Business Infrastructure & Customer Interaction

The second part sums up and gives an overview of the project. It consists of four parts:

The first section gives a condensed overview of the project process. It follows a temporal logic and describes the process steps for each quarter (2006-2008). A list of the major project meetings and scheduled activities is included.

The second section present in abstract forms some of the major results from the perspective of the papers and articles written within and connected to the project.

It is followed in the third section by a short summary of some of the major secondary sources applied in the project. (Some of these sources play an important role in Part I where we use some of these sources to support our future oriented discussions.)

The fourth and final section sums up some of the major implications and issues for future research and investigation. These final implications form the major starting point for the future oriented discussions in Part I.

Content:

1. Summary of the research process
1.1. Project overview
1.2. Quarterly review
1.3. Meetings
1.4. Dissemination of results and effects

2. Major results from papers, articles and book chapters
2.1. List of publications
2.2. Ongoing and planned publications
2.3. Review of some of the results

3. **Secondary sources: major theoretical influences**
3.1 Enterprise customers and user environments
3.2 Value and value creation
3.3 Value nets and value constellations
3.4 User involvement
3.5 Business models

4. Result and implication for future research – towards "adaptable business models"

1   Summary of the Research Process

1.1 Project Overview

The figure below (Swedish original) gives an overview of the project. The two parts ("Business Infrastructure" and "Kundinteraktion") were originally outlined as the two pillars of the project.

One of the major outlined objectives of the project was to develop methods for modelling and for analyses of complex user and supplier situations. Analyses of User logics and Cooperation Models in the "Kundinteraktion" part did lay the platform for analyzing characteristics of and demands on the underlying infrastructure and subsequently for technology specifications and implementation (mainly in the "Business infrastructure" part).
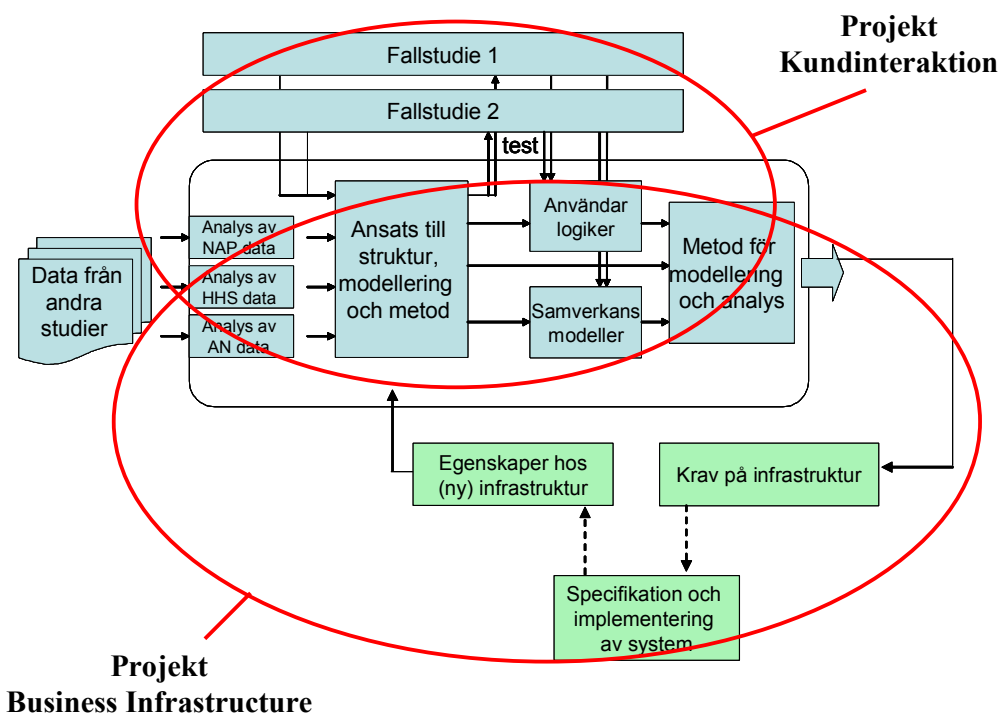
Figure 1. *The research process used as starting point in the project*

As the project emerged, subsequently more emphasis was put in the final part of the project on discussions, analyses and modelling of the business part, i.e. on the development of ideas related to business modelling, including aspects of adaptable business models. Part I of this report reflects this shift in emphasis, dealing with strategic issues including business model aspects.

1.2 Quarterly Review of the Research Process

To sum up the various steps in the research process, we here give a brief quarterly review focusing on the core period 2007-2008:

1.2.1 1Q-2007

During the first quarter the following "start up" activities were performed:

- Definition and start of the project.

- Establishment of cooperation between SSE and KTH and forming two connected projects, Kundinteraktion and Business Infrastructure.

- Organization of workshops for initial mapping of user need and behaviour.

Initial work was done on conference paper, turning it into a forthcoming article, : Andersson et al, (2007), "Mobile Organizations - Mobile Enterprise Innovations: Effects On Work Practice, Organizing And Business Development Processes". It was accepted and included in the International Telecommunication Society conference, Beijing, 12-15 June 2006

1.2.2 2Q-2007

A number of new workshops were organized. Here we did the initial mapping of user need and behaviour linking it to methods for establishing technical requirements.

Two conference paper were prepared and submitted for presentation at LA Mobility Roundtable, Los Angeles, June 2007.

- Andersson, P., Markendahl, J. (2007) "Capabilities for Network Operations and Support of Customers' Working Processes - Work-in-progress"

- Edenius, M., Rämö, H & Andersson, P (2007), "Making Management Mobile", work-in-progress paper" conference

Another conference paper was submitted to The 18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC'07)

- Löfgren, A. Markendahl, J. and P. Andersson,"Providing Mobile Applications to Project Enterprises: Moving from Generic Service Delivery to Unique Content Access in Temporary Context"

1.2.3 3Q-2007

Writing seven book chapters for forthcoming book *Beyond Mobility* (2008), all with links to the Business Infrastructure and Kundinteraktion projects, empirically and theoretically:

Chapter 1.   *A New Wireless World* (B. Thorngren)

Chapter 2.   *Mobile Offerings, Mobility and the Creation of Values from Wireless Offerings* (P. Andersson et al)

Chapter 6,   *The Healthcare Process – A Collection of Parts* (U. Essler & P. Andersson)

Chapter 7.   *Wireless Enterprise Customers: Issues of Temporality and Practices* (P. Andersson & M. Edenius)

Chapter 10.   *Implementing Wireless Enterprise Innovations: Bridging Supplier-Buyer Gaps* (P. Andersson & C. Rosenqvist)

Chapter 14.   *New Business Models - The Case of Mobile TV* (P. Andersson et al)

Chapter 15.   *Beyond Mobility* (Andersson et al)

1.2.4 4Q-2007

During the autumns a number of working meetings were organized with KTH and SSE. In addition, we had follow-up and planning meetings with TeliaSonera were, see section 1.3 .

Two conference contributions (abstracts) were submitted (and accepted) to "17th Biennial Conference of the International Telecommunications Society, Montreal, June 2008".

- Strategic Responses to Mobile TV - A Tele-Economic Study of Value Networks for Mobile TV

- Value added services and new business roles for support of mobile professional users and project working processes

1.2.5 1Q-2008

The work included planning and outlining content and structure of project report, scheduled for May 2008 and planning of workshops with TeliaSonera.

A journal article was accepted to the International Journal of Mobile Communications

- Andersson, P., Rosenqvist, C. & Valiente (2008) "User Involvement in the Development of Wireless Applications in Supply Chains of the Forestry Industry

A new conference paper to ISMB 2008, Barcelona, July 2008 was finalized:

- Essler, A., Andersson, P. "Beyond mobility - New Adaptable Business Models?"

1.2.6 2Q-2008

The work did focus on finalizing the project report. Related to this is preparation and presentation of the final version of the accepted paper to the 17th Biennial Conference of the International Telecommunications Society, Montreal, June 2008

- Andersson, P., Markendahl, J.; "Value added services and new business roles for support of mobile professional users and project working processes"

The work includes planning of workshop with TeliaSonera to discuss results and continuation of the project.

1.3 Meetings

During the course of the project, a number of project meetings, workshops, and internal work meetings have formed part of the core of the project process. Invited guests from the industry have provided important empirical input to the process, including researchers and consultants with a particular focus on our two focal areas: the building construction industry and public safety services. The following lists some of the meetings and steps in the process:

Project meetings with TeliaSonera

2006-11-20 (Conny Björkvall)

2007-02-13 (Conny Björkvall)

2007-06-11 (Cassandra Marshall)

2007-06-18 (Gustav Lindström, Martin Mäklin)

2007-07-04 (telephone meeting with Cassandra Marshall)

2007-10-19 (Gustav Lindström, Cassandra Marshall)

2007-11-16 (Cassandra Marshall, Anders Cajander)

2007-12-13 (Cassandra Marshall)

2008-01-23 (Cassandra Marshall)

2008-02-27 (Anders Cajander)

2008-03-04 (Cassandra Marshall)

2008-03-27 (Cassandra Marshall)

2008-04-24 (Cassandra Marshall)

2008-05-15 (Cassandra Marshall)

2008-05-20 (Cassandra Marshall)

2008-05-26 (Cassandra Marshall)

2008-05-28 (Cassandra Marshall)

2008-06-04 (Cassandra Marshall)

Workshops, internal work meetings, etc

2007-04-03 Brainstorming on public safety operations

2007-04-17 KTH workshop on public safety operations with Eva Lindèn, ÅF

2007-04-26 HHS participation in mobile workers workshop arranged by TeliaSonera

2007-05-07 HHS+KTH workshop on deconstruction of building construction processes

2007-05-21 HHS+KTH participation in mobile workers workshop arranged by TeliaSonera

2007-05-29 SAAB Workshop public safety operations with Jonas Landgren, Viktoriainstitutet

2007-10-12 KTH interview with building construction consultant Dick Söderholm, Aspidistra

Internal project meetings

2007-03-27 Kick-off meeting with SAAB, HHS and KTH

2007-09-26 Planning session HHS+KTH

2007-10-16 Planning session HHS+KTH

2007-11-28 Planning session HHS+KTH

1.4 Dissemination of results and effects

Results from the study have been disseminated continuously throughout the process, in different forms and through different channels. Due to late changes in plans towards the end of project, two planned internal workshops at TeliaSonera where results from the project were to be presented had to be postponed. These are some of the ways in which results have been disseminated:

- Discussions with representatives from the focal industries, the building construction industry. These include e.g., discussion of results in connection with the start-up of new research project a SSE involving building construction firms (Spring 2008).

- Dissemination of results via and discussion of conference papers at industry conferences (Fall 2007, Summer-Fall 2008)

- Dissemination of results via various executive and university courses at SSE, where examples and ideas are brought into the course content.

- The findings from the Bikini project have been very useful also in education at KTH. The value concept and value configurations were a substantial part of the business modeling module in PhD course in Tele-economics that KTH (with support of SSE) was held for the first time 2007 -2008.

- Also for continuing education the Bikini related problems, methods and possible solutions have been proven useful. In an ongoing education program that KTH delivers to TeliaSonera one KTH researcher is coach for one of the teams working with the business case "value added services for a mobile work force". In this course the lecture on "Value configurations" included many examples from both the Bikini project and the Novel Access provisioning project.

- The results have been integrated in subsequent research projects. For example, a newly started research project at SSE ("Service Innovations") will in the initial phases (Spring 2008) draw on empirical results and conceptual discussions in this project.

- The Service Innovation project also brings in methodological ideas, experiences and principles from the internal TeliaSonera workshops (Mobile Workforce) where the mapping of the operations in the building construction industry was performed. The workshop method followed the so called "conversation model" (see figure in Swedish):
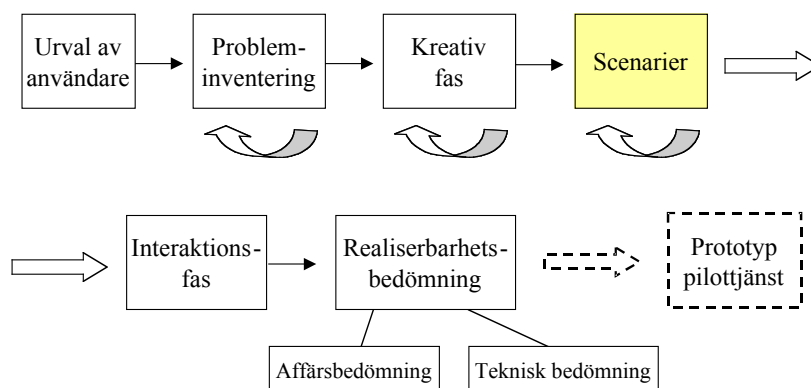
- Many results will be disseminated after mid 2008, into other projects and in upcoming conferences, courses and workshops. Hence, in pipeline is to publish conference papers, journal articles, and maybe also a new book ("Mobile Organizations").

2   Major Results from Papers, Articles and Book Chapters

2.1 List of publications

- Andersson et al, (2007), "Mobile Organizations - Mobile Enterprise Innovations: Effects On Work Practice, Organizing And Business Development Processes", paper reviewed, accepted and included in *the International Telecommunication Society conference*, Beijing, 12-15 June 2006

- Anderson, Markendahl (2007), "Capabilities for Network Operations and Support of Customers' Working Processes", LA Global Mobility Roundtable, Los Angeles, June 1-2 2007

- Edenius, M., Rämö, H & Andersson, P (2007), "Making Management Mobile", work-in-progress paper) for presentation at LA Mobility Roundtable, Los Angeles, June 2007

- Löfgren, Markendahl, Andersson (2007) Providing Mobile Applications To Project Enterprises: Moving From Generic Service Delivery To Unique Content Access In Temporary Context, Special session on Business modeling and business feasibility analysis at The 18th Annual IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC'07), Atèn, 3 -7 September 2007

- Markendahl, Mäkitalo (2007) "Analysis of key capabilities and business role interaction for provisioning of public Internet Access in the local environment, 18th European Regional ITS Conference, Istanbul, 2 -4 September

- Edvardsson, P (2008) "Customer Involvement in New Service Development - An Overview of Methods and Techniques". Working Paper, The Service Research Center (CTF) at Karlstad University.

- Seven book chapters for Beyond Mobility (2008), all with links to the Business Infrastrucure and Customer Interaction (Kundinteraktion) projects:

  Chapter 1."A New Wireless World" (B. Thorngren)

  Chapter 2."Mobile Offerings, Mobility And The Creation Of Values From Wireless Offerings" (P. Andersson et al)

  Chapter 6:" The Healthcare Process – A Collection of Parts" (U. Essler & P. Andersson)

  Chapter 7:"Wireless Enterprise Customers: Issues of Temporality and Practices" (P. Andersson & M. Edenius)

  Chapter 10:"Implementing Wireless Enterprise Innovations: Bridging Supplier -Buyer Gaps" (P. Andersson & C. Rosenqvist)

  Chapter 14:"New Business Models - The Case of Mobile TV" (P. Andersson et al)

  Chapter 15:"Beyond Mobility" (Andersson et al)

2.2 Ongoing and Planned Publications

- Andersson, Markendahl, **"**Value added services and new business roles for support of mobile professional users and project working processes", to be presented at *the 17th Biennal Conference of the International Telecommunications Society*, Montreal, Canada June 2008.

- Book project: "Mobile Organizations" 12 chapters, (work in progress 2008)

2.3 Review of Some of the Results

2.3.1 On user involvement

This study investigated how different users are involved in the development of new wireless applications for enterprises, here focusing on supply chain applications in the forestry industry. This paper analyzes the purpose, intensity, and mode of user involvement when developing new wireless solutions by enterprise customers in close co-operation with solution suppliers. The paper provides a theoretical overview of the research development of user involvement, with a focus on theories and concepts related to customer involvement. An empirical case study forms the foundation for the analysis and discussion. Our investigation of the mode, intensity, and purpose during the process revealed that user involvement can be described as a combination of commitment and participation components, that there is an inverse relationship between the intensities of commitment and participation, and finally that user involvement can reduce uncertainties at the enabling, commissioning, and impact levels.

2.3.2 On mobile enterprise innovations and the effects on work practice, organizing and business development processes:

Based on a research project entitled "Organizations Implement and Use Mobile Solutions – Studies of the Enterprise Market for Wireless Services and Applications", a broad, long-term research program of user oriented business development studies are introduced in the paper. This project and paper examines how firms and other organizations co-produce and create values from new mobile technologies and applications. This is done against the background of the growing importance of the market for wireless services and applications for enterprise customers. The overall research question guiding the explorative study of mobility-in-use in organizations is: How are new mobile technologies implemented and used in different types of organizations? The focus on "How"-questions signals an explorative, focus, where the aim is to develop in-depth knowledge on how different types of organizations adopt, integrate and use new wireless solutions. Focus is on the effects on enterprise organizations' work practices, organizing processes, and processes of business development, when implementing new mobile solutions. The paper takes a co-production view, focusing on the coordination processes between the supply and the buyer side. Theoretically, the paper connects several conceptual and theoretical areas: value and value development [1], the co-creation of value in value constellations [2], user involvement in development processes [3], the handling of technology suppliers' and buyers' abilities and uncertainties during development and implementation processes [4] and various aspects of the characteristics of the (mobile) "offerings". Empirically, the paper draws on 20 different enterprise user industries and settings, grouped into eight identified "user environments" in the enterprise market for wireless services. One illustrative case and user situation is presented, taken from the healthcare sector. The analyses of the enterprise markets studied have resulted in a set of models and conceptual frameworks. This paper reports on some of the major results from this project, and ends with a discussion of issues for further research.

2.3.3 On providing mobile applications to project enterprises and moving from generic service delivery to unique content access in temporary context:

In this paper we discuss how communication systems can be designed considering requirements focusing on the end-user services and the business environment and business logic. We target business users using services supporting work in mobile environments with a temporary project organization. The discussion and analysis will be based on findings from construction projects. These projects are usually temporary, highly mobile and geographically distributed business organizations with common work processes that require close interaction between multiple users and business partners. The analysis starts with characterization of user

behaviour, user environments and project organizations. Communication and mobility in construction projects are described and possible services and business roles are proposed. Examples of candidates to take these business roles are discussed based on capabilities and incentives of these companies.

2.3.4 On how to make management mobile (e.g. in connection with large projects):

The use of mobile phones has become increasingly widespread during the past two decades. Mobile phones have evolved from being used largely for oral communication and information transfer, to handheld devices also used for accessing emails and Internet sites, as well as retrieving and storing all kinds of digital data. Mobile phones are, in conventional research, said to compress time and space, and propel more efficient work processes and organizations. The aim of this paper is to report the finding of an explorative case study how senior managers use mobile communicators in their everyday working life according to new configurations of time and space. A case study based on semi-structured interviews (single events) with 16 top managers in a telecom company. Three different time-space configurations, related to mobile phones, are simultaneously evident in the managers' everyday work. These configurations are related to different practices. Firstly: The managers are looking for meeting spaces, but finding themselves on the move. Secondly: The managers are in a mode of instant evaluation processes. Finally: The managers are implaced in meetings, and also in a space of communication. Findings illustrate how new practices and mobile information technologies live in symbioses that enable new time-space configurations to be reproduced. To understand mobile phone usage related to managers' everyday work we should start an analysis of the practices that allow new configurations of time and space not only to be produced, but also reproduced.

2.3.5 On views of the situation beyond mobility and on new adaptable business models:

In a few years time wireless development may not only link people to each other but soon objects may be part of the new wireless landscape. The ideas of ubiquitous computing, embedded networking, pervasive software, ambient intelligence, etc., describe this current development in glorious ways. Inside such a new wireless world, microprocessors may be embedded in everything from clothing to buildings and footballs. The potential of RFID technology to revolutionize stock management and the retail sector, such as for example the checkout function in shops or the decrease of waste and theft is still with us. Opportunities and risks are significant if linking objects becomes part of our environment. For example, individual tagging of products, leading to the possibility of tracking individual items throughout the supply chain and within the retail store, seems to be around the corner. Suddenly indirect costs become transparent when connected to individuals and objects. However, that journey seems to be a tricky one. It would not the first time future visions remain a mere enchantment. One of the main messages of this paper is that part of the uncertainty ahead can be mitigated by reflecting on the lessons learned so far. One of these lessons is the risk for a gap between expectations and reality. With the large number of scenarios being envisioned, a number of conventional truths evolve. Most of these are typically vendor or infrastructure biased and concern performance and wishful thinking about the future sales. They contain technology which is not yet available even in the medium-to-long term. Quite understandably, therefore, the benefits are usually overestimated and the drawbacks understated. In particular, these stories provide little information about the challenges on the road ahead. We will therefore turn now to some of the "truths" that have evolved from a number of "visions" before we present some of the concluding remarks from the paper. This gap is bridged through a number of critical issues learned along the lines of the individual, organizational and industrial dimensions included in the discussions so far.

2.3.6 From three book chapters on enterprise mobility

The aim of this part is to introduce the reader to examples of how the introduction of new wireless applications and services in various ways can affect organizations.. The first two chapters focus on groups of professional users in different types of organizational contexts. The two final chapters put the new technologies into broader organizational and inter-organizational contexts. Chapter 7, entitled "Wireless Enterprise Customers: Issues of Temporality and Practices", brings up for discussion one specific effect of wireless technologies in work practices within enterprise organizations, how different aspects of temporality are affected when organizations implement and use new wireless solutions in work practices. The chapter puts temporality into the context of wireless enterprise applications and the connected mobility concept. Chapter 8 has the title "Sustainable Value of Mobile ICT in Communication with Mobile Employees" and describes the development of integration of wireless technologies with other ICT and with organisational routines, within the organization of a leading supplier of forklift trucks. The application provides on-line access to administrative applications for close to 1500 service technicians in the European division of the company, all having been provided with mobile access to the company's enterprise resource planning system. Chapter 9 poses a question in the title: "Is RFID (Radio Frequency Identification Technology) the Solution to Inventory Problems in the Retail Supply Chain?". The chapter investigates the potential for mobile technology, in the shape of the new RFID technology, to create value in the retail supply chain. Building on earlier research and an empirical illustration of Wal-Mart's use of RFID for increased inventory efficiency, the chapter discusses how the use of RFID can contribute to value by reducing the number of items that are out-of-stock. Chapter 10, finally, takes a broader look at the enterprise markets for wireless applications and some of the gaps that need to be bridged between suppliers and the buyers in these applications. The chapter is entitled "Marketing Mobile Solutions to Organizations – Managing Supplier-Buyer Gaps" and describes some of the implementation problems and issues that arise when enterprises adopt new wireless technologies, e.g. attempting to realize the idea of "the mobile organization".

3   Secondary Sources: Major Theoretical Influences

The project has, especially in its final phases where adaptable business models are discussed, drawn on numerous sources elaborating on the frequently used "business model" concept. In addition, a number of other sources have supported the empirical and conceptual work. Below are summed up some of the major pillars in this process.

3.1 Enterprise customers and user environments

The project should be seen against the background of the growing importance of the enterprise market for wireless services and applications. In line with this observation, Barnes (2003) reported a shift in attention, with an increased awareness of the radical impact of mobile computing and m-commerce on the enterprise market, implying that "wireless technologies have the potential to transform activities both within and between businesses" (p.342). Barnes, building on e.g. Wrolstad (2002) and other industry sources predicted that corporate demand was likely to drive the wireless market forward, and saw that many applications were developed for wireless enterprise computing. The use of new mobile applications would in turn generate major cost savings for the enterprises.

In a similar vein of reasoning, Varshney et al (2004) saw the growing interest in increasing the usage of wireless technologies in enterprises, giving increasing support for mobility at user, device and applications levels.

Chen and Nath (2004) develop a framework for mobile business application arguing also that organizations that have successfully implemented m-business applications for their workforce have demonstrated that these applications contribute to organizations' operational efficiency and productivity. Glass 2002) is referred to, stating that the wireless business "removes costly and time-intensive delays from traditional business processes".

The many potential, positive effects of wireless technologies in enterprises are a common theme. Varshney et al (2004) sum it up in the following way: "…an organization that is capable of harnessing the power of mobile technologies to automate its business and streamline business processes via mobile applications may reap the benefits of improved productivity, lowered operational cost and increased customer satisfaction. Wireless applications enhance mobile workers' productivity through improved decision making capabilities, less paperwork and reduced cycle times for transactions and billing" (p.356). This paper will focus on one of the potential affects indicted by Varshney et al, namely the effects on "cycle times" and on temporal dimensions of organizational activities in general

3.2 Value and value creation

Chen and Nath (2004) has outlined a framework for the impacts of m-business applications in terms of time, mobility, relationships and location leverage on value – value described in terms of efficiency, effectiveness and innovation. Kotler (1972) and Kotler and Levy (1969) brought forward the transaction as the exchange of value between two parties. This exchange could include goods and services as well as time, energy and feelings (ibid.). Much literature on customer value has focused on the value of use, i.e. it is directly related to the consumption event (Payne and Holt, 2001). Holbrook (1994) argued that benefits and sacrifices are valued based on the experience of the consumption. Some scholars have emphasized the situation of use as the context during which parties interact. Woodruff and Gardial (1996) suggested that consumers can gain value just by owning a product. Research on customer value can contribute an understanding for how individuals experience e.g. benefits and sacrifices of mobile offerings in organizational contexts. Important for mobile services and applications is that technical, temporal and spatial value dimensions can be perceived as important parts of

customers' perceived value of services (Heinonen 2004). It can be assumed that an important part of the "new" customer values created in the use of new wireless applications concern aspects of time and location. (In the next chapter, we will bring up for special attention the mobility concept and how it may be linked to changes in various temporal dimensions of organizational behaviour.)

Paavilainen (2001) argues that corporate mobile applications cannot be measured in the same way that consumer applications are evaluated. He argues for two different approaches towards corporate measurements; value analysis and technical analysis (p.132). For example, a mobile corporate e-mail application can and should be measured in terms of value analysis (user satisfaction, changes in organizational behaviour e.g. faster decisions, increase in productivity), and in terms of technical analysis (speed of the service, number of active users, capacity to serve present users, cost of upgrade). Technical analysis is for obvious reasons most often simpler and more straightforward to measure and keep track of. Putting figures to the "softer", and more difficult to measure, customer values are a challenge when dealing with corporate mobile applications. Ramirez (1999), influential, co-productive view of value presents another powerful way of approaching the area of value production in business contexts. The main points on the ways that values are actually co-produced by different business actors can be applied to the area of mobile corporate applications.

3.3 Value nets and value constellations

What does the concept of value mean in the context of wireless offerings for enterprise customers? It is proposed that we need a "wider" perspective on value. Firstly, this wider perspective includes a stronger emphasis on the fact that groups of actors together create values for customers, and others. Normann and Ramirez (1993) describe such networks of connected, value creating actors value constellations. Secondly, when analysing value creation in enterprise markets for mobile offerings, we need a dynamic perspective on value and value creation. In line with e.g. Payne and Holt (2001), who state that "it is important to recognize that customer value in the context of relationship value is a dynamic concept; value is created and changed over time as a result of an ongoing series of transactions" (p. 171). Both aspects are exemplified in the project. The full value of any mobile enterprise requires some kind of joint action between firms and/or organizations. Every product and service development process in the field requires value creation involving interaction between a supplier and the buying organization. In many cases, the process to develop values from new enterprise solutions require interaction and synchronization between several interacting suppliers on one side and several interacting, interconnected firms on the buyer/user side. The building construction industry is one example. For a work leader at a building construction site to be able to capture the full values of using new wireless device specially adapted to her work routines at the site, it often requires interaction and (technological) integration with the work routines and ICTs of the central building construction firm, with architect firms, with supplier firms to the site, etc. Similarly, for the firm developing and supplying the software that goes into the work leader's portable device, maybe in the role as "system integrator", the creation of value is highly dependent of interaction and synchronization with other firms on the supply side.

3.4 User involvement

The project has drawn on user involvement ideas in the tradition of e.g. von Hippel. It has been argued that exactly how the users are involved influences the outcome of the innovation development of new products or services (Magnusson 2003). This implies that firms on the supply side must adapt their processes of developing new products in order to realize the full potential of user involvement (ibid). User organization involvement, and its many related

concepts, have been described and analyzed from several perspectives. Magnusson (2003) listed several related concepts describing the collaboration between customers (users) and suppliers: customer-focused product development, customer-oriented product development, customer-centered product development, co-opting customer competence, participatory design, joint application design, co-development, and consumer idealized design.

Magnuson (2003) supported analyses that take into account the differences between organizational users and individual consumers. One central dimension that delimits the term "user" when discussing user involvement is that a particular user of a mobile application can be external to the organization being studied. In such a case we refer to the user as a customer and the term includes both individuals and organizational users. However, internal users are considered here as employees. When the customer and the user is the same individual, she or he can be referred to as a consumer.

This distinction has several implications when studying how different users are involved in the development of wireless solutions for enterprise customers. First, the level of accessibility of the users in these categories differs. Employees are generally more accessible to the innovating organization than are its customers. Therefore, expensive focus-group interviews or field experiments can be substituted with workshops performed locally at the organization's head office. Nevertheless, the versatility of usage patterns and contexts in which usage takes place imposes other types of constraints such as the difficulty of directly observing mobile users. Second, the adoption decision differs between customers and employees, in that customers often decide on the adoption of a product by themselves, whereas employees usually adopt new technology based on someone else's decision, such as when managers in a particular organization decide to implement a new corporate e-mail system. Another important distinction is that customers often pay for the usage of a product whereas employees usually get paid whilst using it.

Within an organization, a large number of users may become involved in the final use of the system (depending on its complexity). Although all these can be involved, this is undesirable mainly for practical reasons. For example, untrained users may find it difficult to understand requirements imposed by the system. Thus, one central issue is the choice of who to involve in the development process. Alam (2002) described the purpose, modes, intensity, and stages of user involvement as the four key elements that can help define the choice of who to involve in the development process.

3.5 Business models

In part I of this report, we elaborate in detail on our ideas on "adaptable business models". The discussion builds on a number of previous discussions in the literature on the business model concept. We stop here by summing up only some of our own conclusions from this reading.

The development of information and communication technologies has resulted in the emergence and proliferation of new concepts. One of the most – perhaps the most – widely used concepts in this context is the concept "business model". The development and implementation of new wireless applications as any ICT system should, it is argued, be associated with the development of "new business models". The frequent use of the concept in combination with the many formal, practical and theoretical definitions of the concept makes it difficult to create one coherent view of what it means, what is included in the concepts, and what the purpose is of applying it. This chapter will not go into that discussion. Rather, we will take a pragmatic standpoint. This means accepting the fact that among practitioners the business model concept is being used when discussing central dimensions of the business for wireless enterprise applications: how to create a value offering to customers,

how to create long-term ("sustainable") revenue models, how to create new cooperative constellations with other suppliers, and more. These and other issues are surfaced when new businesses are created in the wireless enterprise area, and many of them are components of formal descriptions of business models. Hence, when relating to the concept, it is done so because some of its components are in fact related to issues of practical importance for companies involved in the process of developing new business operations in the area of wireless applications for enterprise customers.

Several authors have tried to summarize the many definitions of the concept. Some themes/dimensions appear to be more recurrent: the value to customers of the offering provided, the customer segment, the constellations (sometimes called "value constellations") of actors cooperating around the offering, the roles and the actors in the activity network, and the revenue model and cost structure.

The driving forces behind business models can be many. In the area if ICTs, the use of the business model concept can help the formulation of different renewal possibilities, options for increased efficiency and effectiveness, and be a way to put the single companies' offerings into a broader value offering context. One of the major advantages of the business model concept is actually connected to this, i.e. the fact that information and communication offerings to customers must be seen in a wider context of components and offerings.

Why then bother about "business models"? Irrespective of what concept we use to analyze and conceptualize the value of offerings, the customer segments etc., there are attributes of the emerging wireless world and its technologies and market characteristics that draw attention to a central fact: firms need to cooperate and establish new patterns of interaction and coordination of activities and resources in order to meet the requirements of e.g. enterprise customers. Behind the increased interest in new business models in the enterprise market for wireless solutions lies the fact that firms know they have to cooperate to deliver customer value, and revenues need to be shared. This in turn, connects to the fact that wireless solutions appear in parts as disruptive technologies and innovations, with impacts on both supply and buyer sides, affecting work procedures and operations as well as business strategies. Underlying this are a number of central attributes of the emerging technologies and markets:

- New connections between wireline and wireless technologies and new network effects

- Mobile data built on connections between both proprietary and open platforms

- The emergence of new forms of ubiquity, interactivity and connectivity

- Convergence of development, production, distribution & consumption of digital services

- The convergence of industries and the creation of new boundaries

- The digitalization, integration and mobilization of voice, data, audio, text, video/TV and picture applications and services

- The increased effects (including uncertainties of effects) on "mobility"; effects on time-space constraints of new wireless technologies

Hence, behind the interest in finding the new "sustainable" business models lie the challenges from these emerging trends and attributes. Suppliers (and users/buyers) that were early out to capitalize on these attributes when developing new wireless applications for the enterprise market have in some cases managed to create "new" types of business models that generate revenues and meet the emerging value requirements of the enterprise customers. In Part I, we discuss some of the most commonly occurring dimensions of business models, as described in texts, connecting them to our focal area of interest, wireless enterprise solutions.

4 Implications for Future Research

As stated above, behind the interest in finding new "sustainable" business models lay the challenges from a number of new emerging trends in the telecom sector. We stated that suppliers (and users/buyers) that were early out to capitalize on some previously stable attributes when developing new wireless applications for the enterprise market could, in some rare cases manage to create "new" types of business models that generated revenues and met the emerging value requirements of the enterprise customers. However, the two complex sectors and application markets studied in this project, the building construction industry and public safety services, has clearly demonstrated the difficulties of sticking to the ideas of sustainability, in terms of stability of business models. Instead we argue in Part I that sustainability can only be maintained *if business models are made more adaptable*.

Appendix 1:
Theoretical Discussion: How to Approach the Term "Adaptable"?

We have argued above that "adaptable", in the concept "adaptable business models" might be strongly connected to the role and position of the actors in the value constellation. That is, the opportunity to adapt the business model, and create continuity in this process might be dependent on both the way actors change and in the way they create stability in these value constellations. In addition, there might also be some interdependence between both change and stability in these adaptation processes. To deepen the theoretical discussion on these, the appendix brings in a discussion from Andersson (1996).

Variation, Transformation and Interdependencies with Different Forms of Stability

To guide the concluding discussion, we elaborate on the following general proposition when approaching marketing change and the interplay with forces of stability:

> The nature of the relationships between marketing change and forces of stability will change over time as a consequence of the fact that the structural patterns of loose and tight couplings in the moving context change. With a longitudinal perspective, it is necessary to consider different types of change and different types of stability.

To simplify the discussion, we make the assumption that value networks can be either predominantly loosely coupled or tightly coupled. Both types of networks can show open signs of stability, but of different kinds. The loosely coupled net can show *persistence,* promoting, for example, continual variation through localized adaptation and adaptability.[36] The tightly coupled net can show stability by promoting adaptation efficiency and system responsiveness built on a higher degree of centralized control with longer chains of consequences, and system integration with division of work efficiency.

We start the discussion by assuming that during different periods and states of functioning value nets can show different patterns of couplings between units in the organization. Secondly, different periods in a net's development can also characterized by different types of change processes, here simplified to the two concepts *variation* and *transformation*.

Structure: different patterns of couplings

While nets in one period can be characterized by persistence through adaptability based on a high degree of localized adaptation, a later period can see the emergence of a higher degree of stability with more standardized organization solutions throughout the whole value net, a higher degree of centralized control of change processes, and the emergence of more rapid and efficient internal adaptations between units. In the former situation, the organization *persists* through a lower degree of internal integration and specialization, and a high degree of localized adaptation and adaptability. In the latter case, the system moves towards higher internal integration and specified division of work (differentiation), and system *stability* and survival through centralized control and efficient internal adaptation. Hence, in the strategic change process, the basis and characteristics of stability change.

Processes: variation and transformation

Between two periods, the change processes thus can change character. The first period is characterized by change through *variation*, i.e. change through localized, small-scale innovations with a high degree of heterogeneity and self-determination among the local

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[36] See e.g., Weick, K. E., "Management of Organizational Change among Loosely Coupled Elements", in: Goodman, P. S., et al.(eds.), *Change in Organizations*, San Francisco: Jossey-Bass, 1982, pp. 375-408

organizations. More encompassing changes take a long time to institutionalize. The second period (or rather, the later parts of this period) will be characterized by change through *transformation*, i.e. a higher degree of system wide change with longer chains of consequences of change interventions. The transformation - encompassing changes of actor, activity, resource, interaction and normative structures - evolves more quickly during the later stages, within the emerging, more tightly coupled marketing organization.

Interdependencies between structure and process

The simplified picture above of the evolution of the organization can be summed up in a matrix (figure).
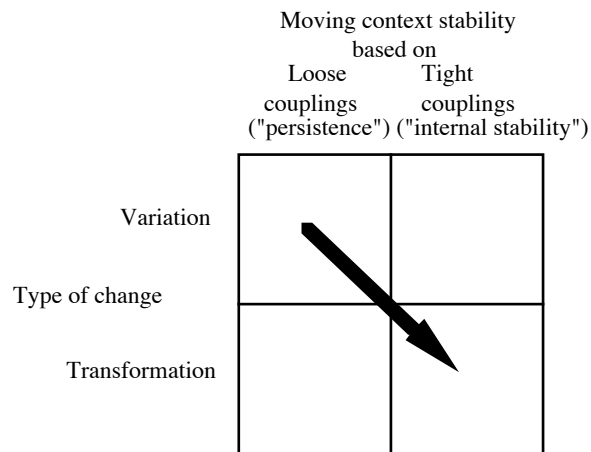
Figure A.1:   *Value net change*

With this simplified view of the change process, the reorganization illustrates the major problem of having to implement, in short period of time, a system wide *transformation* of an organization, having to build *initially* on a form of system "stability" (here: based on "persistence") better suited for change through *variation*. That is, slower change characterized by continuous (small-scale) innovations through localized adaptation, behavioural discretion with self-determination and fairly short chains of consequences of change interventions, and adaptability through e.g. organizational "modularity".

Change: Moving Between Different Interdependencies between Stability and Change

It can be anticipated that the type of change depicted (moving from "square 1" to "square 4" in the matrix) will be difficult; both the type of change and the type of organization structure and stability upon which the change process is based, are changed during the process. This can also be anticipated to be one of the reasons behind the difficulties to create *continuity* in the actual change process. The logics for using the interdependency between change and stability have to be altered as well during the course of the process. It can be assumed that continuity in change processes (i.e. a higher degree of predictability and stability in change contents, change processes and temporal profiles of change episodes over time) is more easily achieved *within* "type 1" or "type 4" situations. Thus, it can be assumed that the prerequisites for introducing change through (long-term) variation with localized adaptation in a loosely coupled situation (1), and a (quick) system wide change with centralized control with longer chains of change consequences in a tightly coupled system (4), are better compared to situations where the underlying principles for interdependencies between change and stability

do not fully "match" ("type 2" and "type 3" situations) or when the underlying principles have to altered (e.g. moving between "type 1" and "type 4" situations or vice versa).

To simplify the picture, when moving from a situation of variation/loose couplings aiming for transformation/tight couplings, theoretically, change agents can attempt a transformation strategy, e.g. implementing many concurrent change episodes in a still loosely coupled system. Alternatively, change agents can focus attention to a certain part of the system, working with a small-step variation strategy, successively creating tighter couplings, and thus prerequisites for transformational changes. Furthermore, change agents in different change episodes might adopt different strategies.

Within this line of reasoning, short-term marketing changes with "concurrent" processes will be easier if performed in a situation where the type of change matches the type of stability/persistence that the system is based on. A "transition" will be more difficult, especially if it involves changing also the underlying logic for (positive) interdependency relations between change and stability in the process. In a longer time perspective, it is likely that change agents and organizations will move between these different types of situations in the "evolutionary" processes of the system.

With a dynamic view of the interdependency between change and stability, change agents will need to cope with trade-offs and "tensions" between the two. When moving towards a more tightly coupled system and a higher degree of transformational change processes, while living in a situation of predominantly loose couplings and change through variation, change agents have to cope with the negative aspects of the latter. That is, change agents have to cope with the fact that actors in the system might have fostered stability through partial resistance to change. Actors might have become used to buffering of disturbances through localized adaptation, to open selection of changes that are permitted to be retained, to little standardization with diversified responses to change, to short chains of consequences of change initiatives in the system, and to relatively little attention directed at specialization and division-of-work efficiency between units (e.g. *between* units).

One way of coping with the process of moving between different type situations is to direct attentions to certain sub-systems of the value net. By concentrating efforts to a chosen part of the system, mobilizing a chosen set of actors into tighter couplings and a move towards more rapid transformational changes, the stability in other parts (based on persistence, loose couplings and partial resistance to change) can provide the (intermediate) stability that is necessary to make the new type of change stick in the organization. Organizations will have patterns of loose and tight couplings, and thus, in order to introduce and stabilize a new type of change process, change agents need to be able to use these patterns of couplings.

Change agents will have to manage change differently, depending on the present situation of loose and tight couplings,[37] and on the type of change that is aimed for. As a consequence, the prerequisites to use stability as a basis for introducing and managing the change process will not be static. Managing change can involve also managing a change of the prerequisites for using stability as a foundation for introducing the change.

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[37]Weick (1982) has suggested that to manage change in an open, loosely coupled system is to adopt strategies such as: 1) concentrate efforts on one or two critical problems, 2) learn the history of an issue, 3) build coalitions to mobilize support, and 4) use the formal system of committee membership and the informal system of discussions and mediation (p.377). (In: Weick, K. E., "Management of organizational change among loosely coupled elements", in: Goodman, P. S. et al (eds.), *Change in Organizations*, San Francisco: Jossey-Bass, pp. 375-408, 1982).