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Ericsson Mobile Health Value Proposition for Mobile Network Operators

Helsinki Metropolia University of Applied Sciences

Master's Degree (Master of Engineering)

Degree Programme in Health Business Management

15.3.2014

Metropolia

Author Title Number of Pages Date	Risto Pekkarinen Ericsson Mobile Health Value Proposition for Mobile Network Operators 72 pages + 9 appendices 15 March 2014
Degree	Master's Degree (Master of Engineering)
Degree Programme	Degree Programme in Health Business Management
Instructor	Thomas Rohweder, DSc (Econ), Principal Lecturer

The purpose of this Master's thesis is to understand what is the value of the case company's certain product to its primary customers.

The case company has a long history in telecommunication as phone manufacturer and wireless networks vendor. Now the case company among many other companies is seeking for new business opportunities from vertical industries such as utilities, security, transport, media and healthcare. This thesis studies a mobile health product concept which belongs to the healthcare vertical.

This Thesis follows an action research approach, where four best practices of customer value proposition creation are taken from the literature, compared and then applied to the case company context, guided by the comments and analysis derived from the theme interviews. Therefore theme interviews were the primary source of data in this thesis. Altogether six case company managers and customer managers were interviewed to get their views on the existing and new customer value propositions, e.g. case company brand in healthcare, as well as the functionalities of the case company's mobile health service.

The data analysis was conducted according to a qualitative research approach, and the output of the analysis was a proposal for the new customer value proposition of the mobile health product. This proposal was analysed and validated by the case company's mobile health key stakeholders. Based on this analysis, the final proposal was then created.

Keywords	Mobile health, network operators, healthcare technology

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1 Introduction

This thesis concentrates on the customer value proposition of the case company's mobile health product. Customer value proposition is an important element of business models and can support the sales. This thesis is undertaken according to an action research approach and the researcher of this thesis works for the case company. This Section outlines some basic information about the company and the product in question.

1.1 Case Company

The case company is the world's leading provider of communications technology and services. Ericsson enables the Networked Society with efficient real-time solutions that allow us all to study, work and live our lives more freely, in sustainable societies around the world. More than 40% of the world's mobile traffic passes through the network equipment supplied by Ericsson, and the networks that Ericsson supports for operators serve more than 2.5 billion subscribers (Ericsson 2012).

The case company has a vision that there will be 50 billion connected devices by year 2020. This can be achieved only by creating totally new kind of business models to new business areas and by being part of the value chains that Ericsson has not yet been part of before, traditionally known only as a telecom networks vendor company. These new business areas, verticals, can be divided roughly to Utilities, Automotive, Media and Healthcare. Figure 1 below shows the new business areas envisaged by the case company for the future.

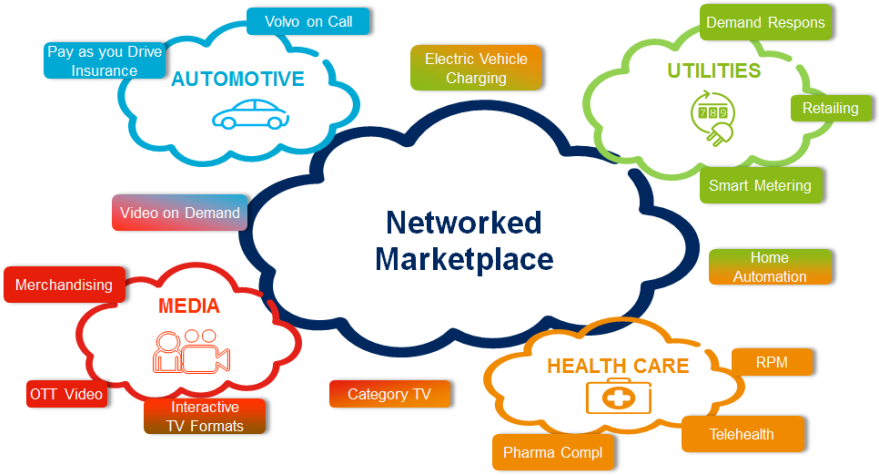


Figure 1. The Networked Society eco-system (Ericsson 2012).

As seen from Figure 1, the networked society eco-system is large and offers business opportunities for many various stakeholders.

1.2 Mobile Networks Vendor as Part of Healthcare Value Chain

When examining healthcare more thoroughly, it can be seen that it is a complex area to work in. Due to the nature of healthcare business, it is highly regulated and consists of several different public and private stakeholders. The case company represents the telecom sector which is relatively new in this ecosystem, offering solutions and services under the terms telehealth and mobile health (mHealth), which term will be used in this thesis. Figure 2 illustrates the vision of the complex structure of the new healthcare by the case company.

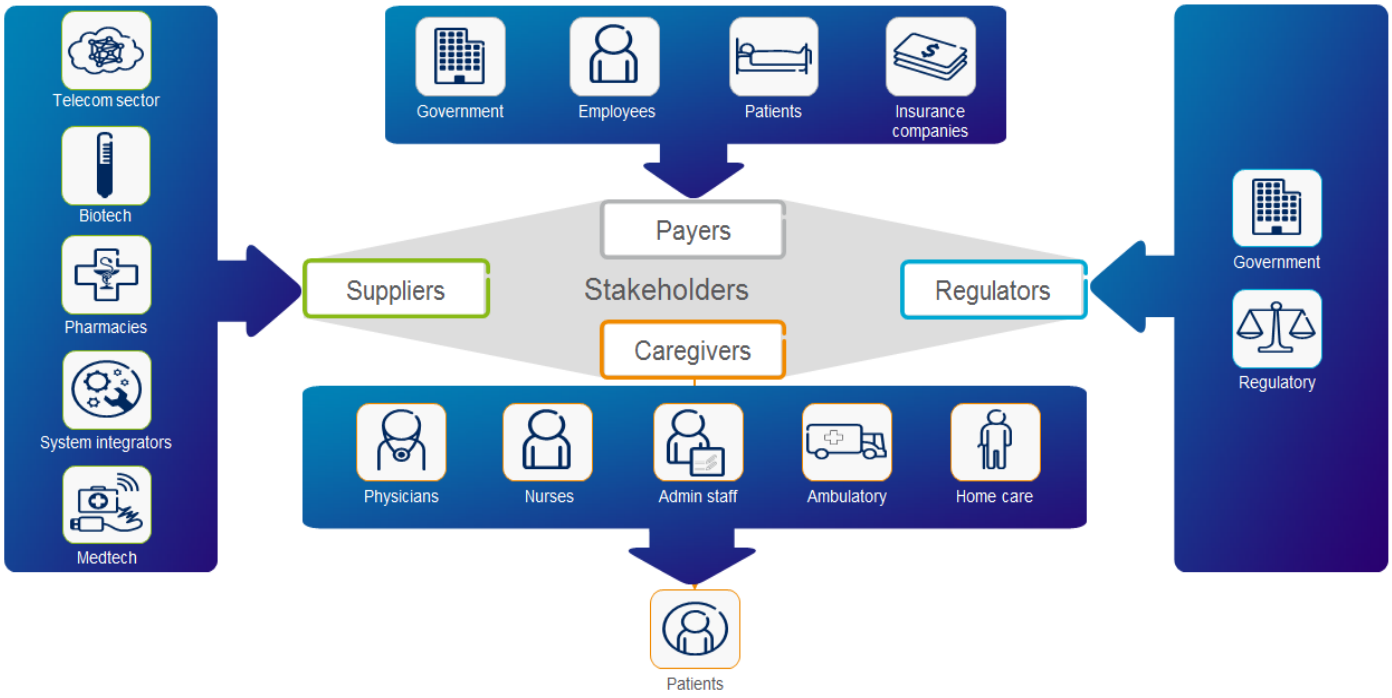


Figure 2. Healthcare eco-system (Ericsson 2012).

As seen from Figure 2, the case company sees itself as part of the telecom sector but when looking deeper into the project level, it can be noticed that the role of the case company is perceived as a much wider. In this thesis the meaning of mHealth is a system which at the simplest includes a mobile phone, medical sensors and a backend

system. Figure 3 below shows the mHealth value chain of a mHealth project with its stakeholders.

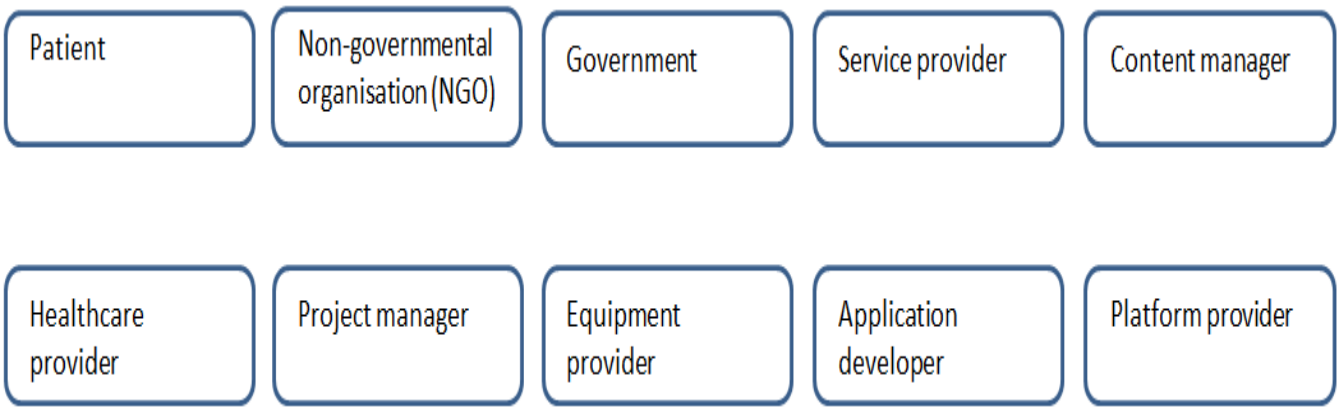


Figure 3. mHealth value chain (Bradbury 2012: 22).

As seen from Figure 3, in this value chain the role of the case company is extended to include a wide range of activities. The roles vary from equipment provider and application developer to service provider and project manager.

1.3 Business Problem, Objective and Outcome

The case company has a vision that globally there will be 50 billion connected devices with in the next 10 years, as seen in Figure 4 below. This will be a major change since until now communication has been mainly between human to human, such as voice calls. This vision will be much more than normal communication and entertainment; it will connect societies and transform every aspect of our daily lives. New applications and usage models are fast emerging with machine to machine (M2M) communications leading the way. Unlike human to human communications, M2M is often characterized by frequent transmissions of small amounts of data between devices and the network. More importantly the essence of M2M lies within the business processes of the industries leveraging the technology within their value chains.

The connected world will redefine and transcend the traditional boundaries of ICT and industry verticals are rising to take the stage. Research suggests that industries at the forefront of adopting and offering M2M are utilities, government, transportation, health, education and finance. Growing numbers of M2M initiatives have already taken place

around the globe, from smart meters and emergency services solutions to connected busses and remote healthcare (Ericsson 2010).

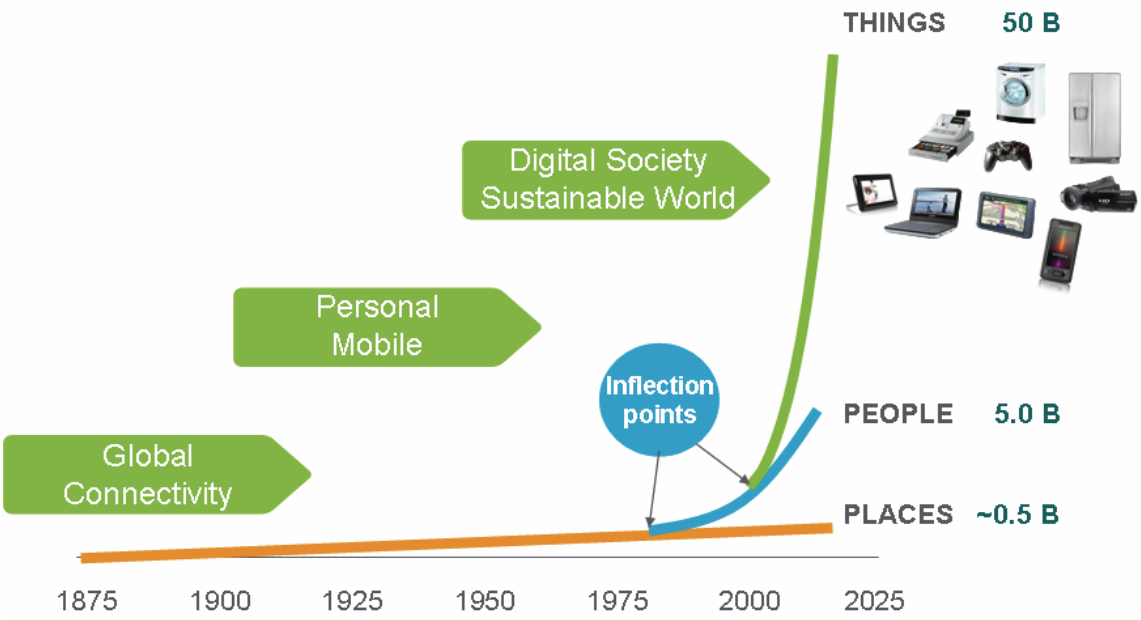


Figure 4. Towards 50 Billion connected devices (Ericsson 2010).

As seen from Figure 4, the development of the number of connected devices is expected to be rapid when going towards year 2025. Despite all future forecasts every successful product and service needs a strong value proposition. The case company is entering a new market, a completely new business area. Even the industry itself is new and rapidly developing. There are defined business models but those are also under constant pressure. Since pricing is tight, the provided added value to the customer is the key to success.

> Strategy is based on a differentiated customer value proposition. Satisfying customers is the source of sustainable value creation. Strategy requires a clear articulation of targeted customer segments and the value proposition required to please them. Clarity of this value proposition is the single most important dimension of strategy (Kaplan and Norton, 2004: 10).

Mobile Health has not been very long in the case company's product portfolio and therefore there are not that many experiences from mHealth projects either. Ericsson Croatia acquired the mHealth product in 2008 and has developed it since. There have been trials and demos but the business has not been booming, anyway following the

overall market situation. Ericsson is known for its clear strategies, a company that leads the way in its field of business. As Kaplan and Norton (2004) also state that value proposition is the single most important dimension of strategy. However, Ericsson Mobile Health (EMH) does not have a clearly stated value proposition to its customers and that leads to the objective of this thesis:

What is the value of Ericsson mHealth services to mobile operators?

Therefore this Master's thesis defines a clear customer value proposition of Ericsson Mobile Health to Mobile Network Operators. The existing definitions of value proposition are from year 2008 and have to be re-defined and stated more clearly. The customer value proposition (CVP) is aimed specially for mobile operators since Ericsson has made a strategic decision that mobile operators are the primary customers, the way to enter the healthcare value chain. The first contact regarding this thesis was taken with Ericsson Mobile Health Product Development Unit (PDU) in Croatia. The original business problem was discussed with the PDU stakeholders and those discussions also shaped the objective of this thesis

This thesis is written in seven Sections. Section 1 describes the case company and the Ericsson Mobile Health product. Section 2 overviews the research approach, research design and data used in the thesis. Section 3 presents the results of the current state analysis of Ericsson Mobile Health. Section 4 discusses the best practices of building a customer value proposition and conceptual framework. Section 5 describes the actual building process of the customer value proposition and the preliminary proposal as the value proposition. Section 6 presents key stakeholder feedback on the preliminary value proposition and the final value proposition. Section 7 discusses the conclusions of the whole Master's thesis process.

2 Research Approach

This Section describes the research process and methods used in this thesis. The choice of action research method for this thesis is explained together with the key steps of this thesis project.

2.1 Research Design and Process

The research design in this thesis is following the action research approach and therefore it is mandatory to explain the basic philosophy behind action research and also how the concepts reliability and validity link to action research and how this thesis can be argued trough those.

> Action research may be defined as an emergent inquiry process in which applied behavioural science knowledge is integrated with existing organizational knowledge and applied to solve real organizational problems. It is simultaneously concerned with bringing about change in organizations, in developing self-help competencies in organizational members and adding to scientific knowledge. Finally, it is an evolving process that is undertaken in a spirit of collaboration and co-inquiry (Shani and Pasmore 1985: 208).

The definition of action research by Shani and Pasmore (1985) fits well to the case company situation where a problem in the organization is created by the customer value proposition not being clearly defined. In this study, organizational knowledge is used and backed with the scientific process, and the results are improved in iterations, and constantly evolving.

According to Coghland and Brannick (2010), action research is a cycle where first context and purpose are defined, actions are planned, actions are taken and finally evaluated. In this thesis, the business problem and objective were defined, conceptual framework and theme interview questions were formulated, theme interviews were carried out and finally the data from the theme interviews was analysed into a proposal to solve the original problem. This approach also means that the customer value proposition defined in this thesis is not final. After this research regarding Ericsson Mobile Health Customer Value Proposition is completed, the products lifecycle will further develop as long as the product itself is developing.

The research process is illustrated in Figure 5 below:

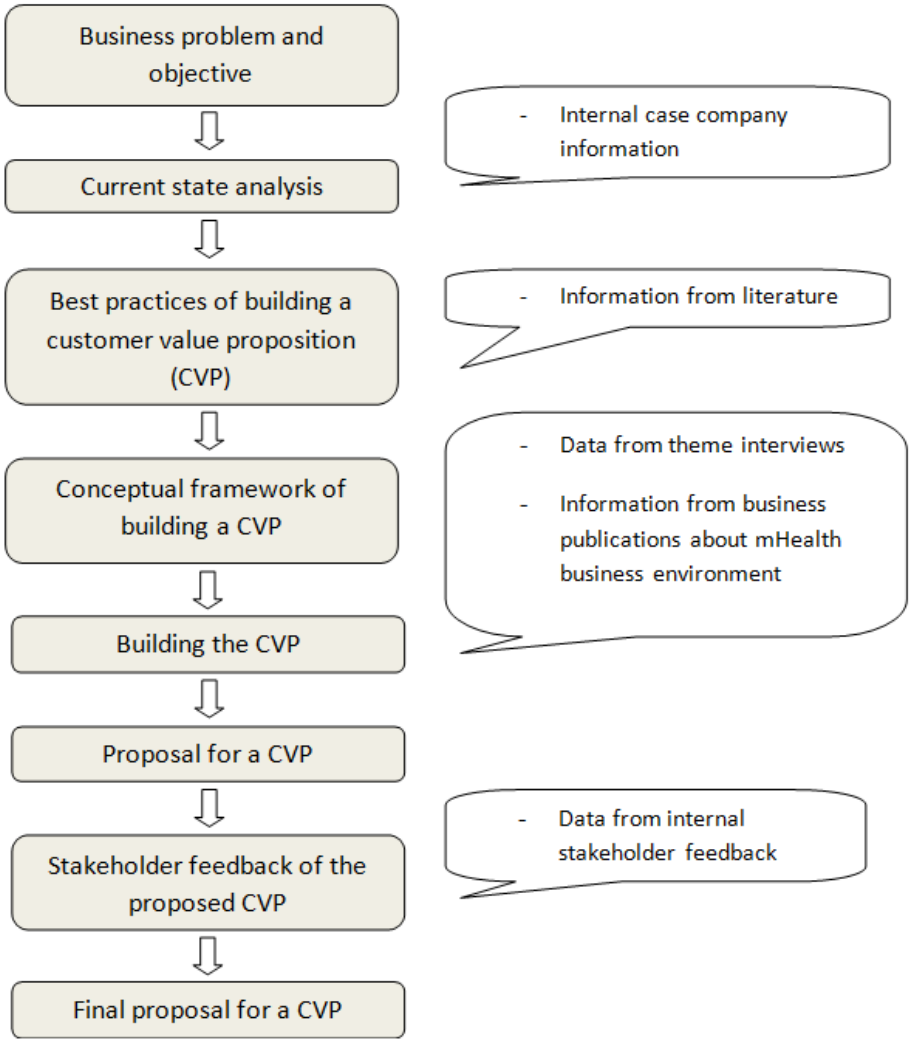


Figure 5. Research process in this study.

As seen from Figure 5, the research process starts with defining the business problem and objective. That is followed by the current state analysis of Ericsson Mobile Health, where the internal information from the case company plays a crucial role. Best practises of building a customer value proposition is analysed based on the literature information. Conceptual framework of building a customer value proposition is formed and based on that the theme interview structure together with the questions is build. The theme interview data analysis is the base for building a preliminary proposition. The

preliminary customer value proposition is then presented to the key stakeholders of the case company and based on that feedback the final proposition is formed.

The research elements in this Master's thesis contain evaluation of external customer and internal Ericsson stakeholder interviews, business model review and SWOT-analysis. The reflections from the stakeholders are analysed separately at the end of the thesis. Those reflections are limited only to management because of the business situation. Larger appliance of the customer value proposition is still difficult due to the small number of active mHealth projects.

2.2 Data Collection and Analysis Methods

Data to this thesis was collected from two main sources: first, the theme interviews, using a framework presented in Sections 4.5 and 5.3. Secondly, the internal knowledge from the previous case company projects (for example in Croatia) and the internal company documents.

The original idea for the theme interviews was that internal and external stakeholders would get the same questions to answer, that would then help comparing the internal and customer views. There were altogether six interviews conducted externally and internally based on the questions in Section 5.3. Since there have not been many projects done yet in Ericsson Mobile Health PDU and mHealth projects in general, all available project stakeholders were contacted and most of them gave their views on this matter. To obtain the most reliable responses, the topic for the interviews was first presented on the phone or via Lync Online instant messaging service and then time was given to the interviewees to response to the questions by email. Due to long distance to the interviewees, face to face interviews were not possible.

3 Current Business State Analysis of Ericsson Mobile Health

This Section concentrates on the essential parts of the case company's mobile health business, business models and the strengths and weaknesses trough SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis.

3.1 Ericsson Mobile Health (EMH)

Ericsson Mobile Health (EMH) is a mHealth platform that enables the delivery of personal or enterprise health and wellbeing services. Using Bluetooth-enabled medical sensors, EMH Gateways and EMH Backend system patient's medical data is made available to medical personnel regardless of location. EMH enables healthcare professionals to objectively monitor patient's physiological parameters in nearly real-time and provide feedback to them by utilizing mobile communications. Areas of EMH application are: a) Chronic disease management, b) Medical triage, c) Enterprise Health, d) Rural Healthcare and e) Wellbeing. Figure 6 below shows a simplified model of the Ericsson Mobile Health Remote Patient Monitoring System.

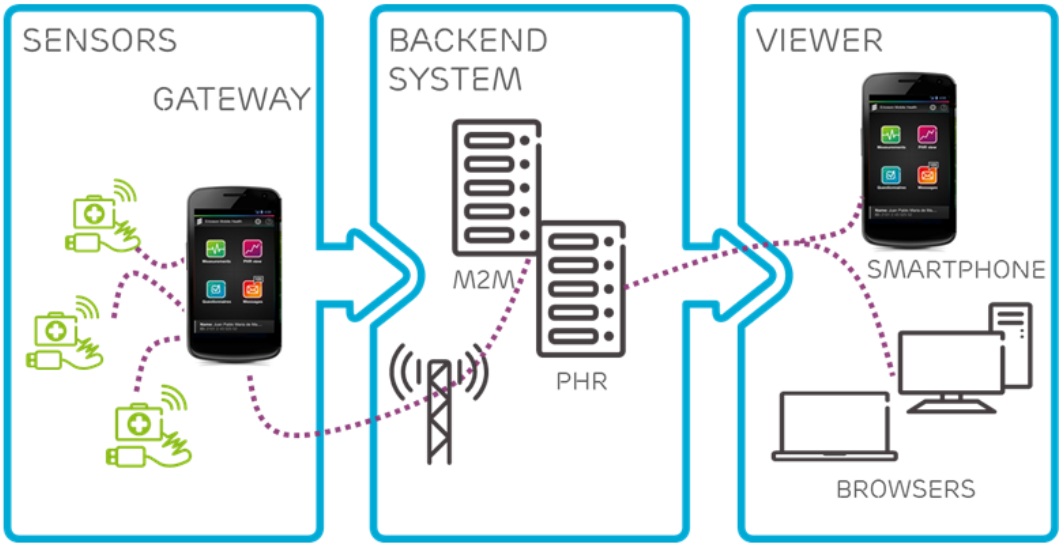


Figure 6. Ericsson Mobile Health Remote Patient Monitoring System (Ericsson 2012).

As seen from Figure 6, EMH Remote Patient Monitoring System solution components are: 1) Medical Sensors, 2) EMH Gateway(s), 3) Backend System (including: a) Personal Healthcare Record, b) Telemetry node and c) eBooking (optional)), 4) Videoconferencing system (optional) and 5) Web viewers (secure web portal).

The mHealth project was started by introducing a vertically oriented solution for remote patient monitoring. Solution consists of several medical sensors, dedicated gateway device for data transmission and application for data access and management for medical professionals. The complete end to end solution is medicaly certified and for this product the organization needed to obtain ISO 13485 certification for medical device production, marketing and sales. Solutions have evolved towards platform for data collection from medical sensors, Android application as gateway and application access to patients as well (Ericsson 2012).

When the case company's mHealth project was started in 2008 the market situation was in the beginning of definition phase. In year 2013 the situation is still almost the same, mHealth markets have not entered to a clear growth. Market potential worldwide for mHealth is ranged from 15 to 20 billion dollars in 2017. This potential has attracted many big companies as well as small start-up companies to develop mobile health and wellbeing products. Mobile operators engagements vary from deep to very superficial involvement in mHealth value chain – some have had divisions and offerings for several years.

The consumer market has not shown any big response to mHealth yet and it is estimated that it will be tied to consumer sports industry rather than health. The short and mid term market barriers for mHealth differ in different parts of world. For US and EU they are mainly focused on: a) not being treated as a priority within healthcare systems, b) adaption of technology among medical staff and patients, c) regulatory and policy issues and d) lack of reimbursment for mHealth services.

Drivers for the case company’s healthcare portfolio creation have been the general changes in the economy, technology and the way that healthcare services are to be organized in the future. There is a demand that the quality of healthcare should be increased but that should be done using a smaller budget than before. The recognized pain points in the current healthcare are mainly linked to the poor exchange of information, fragmented processes and the focus of the treatment being not patient centric enough. This has been a push to take more technology into use in healthcare and the case company has seen this as an opportunity. The case company healthcare portfolio, seen in Figure 7 consists of three parts; Health Information Exchange (HNIS), Hospital

Information Systems (HIS) and Remote Patient Monitoring (Ericsson Mobile Health (EMH)).

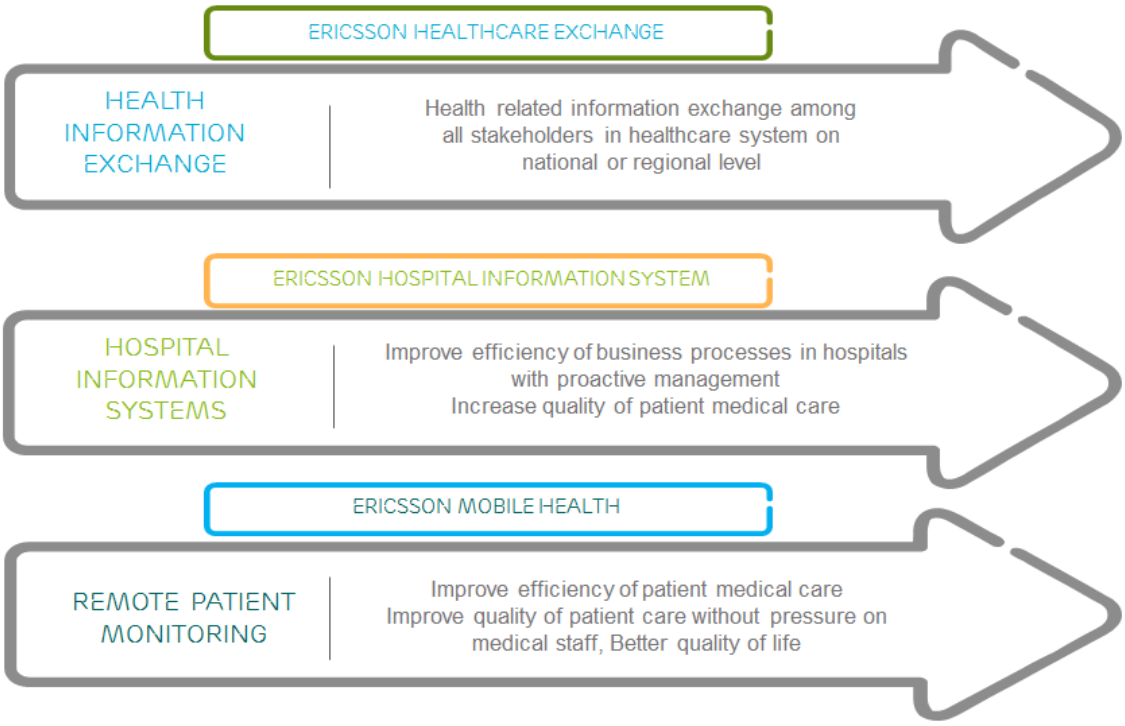


Figure 7. Ericsson Healthcare Portfolio (Ericsson 2012).

As seen from Figure 7 above, the case company's healthcare portfolio offers a wide range of solutions to different needs in healthcare.

3.1.1 SWOT of Ericsson Mobile Health

> An analysis of strengths, weaknesses, opportunities and threats (SWOT), summarises the key issues from the business environment and the strategic capability of an organisation that are most likely to impact on strategy development (Johnson, Scholes and Whittington 2009: 119).

The case company has made an internal SWOT-analysis of its vertical business seen in Table 1. This is analysis covers all the vertical areas but can be examined also trough mHealth in healthcare business.

Strengths	Weaknesses
· Market leader in communications driven solutions. · Strong footprint in operators' business. · End to end management of large complex Telecommunications networks. · Ericsson Brand – neutral Swedish company	· Newcomer with limited footprint. · Access to customers / money buckets (network of sensors). · Verticals specific know how & ICT capabilities. · Competitive environment understanding. · Partners network and sales channels. · Offerings sharpness – what are we offering. · Focus and opportunity qualification. . Breaking into new customers. · Commitment to Partners.
Opportunities	**Threats**
· Countries are taking concrete steps toward economic diversification and toward becoming knowledge economies. · Growing demand for ICT from both the private and public sectors as economic growth depends on technology. · Increasing need for (real time) information sharing and collaboration	· Commoditization of Telco layer · Long sales cycles

Table 1. SWOT - Verticals Strategy Review (Ericsson, 2011).

As seen from Table 1, the case company has a big advantage being the market leader in communications driven solutions. The case company has long lasting relationships with the telecom operators and therefore knows their business. Brand is strong in telecom but not as strong in other ICT. This applies especially to healthcare; the case company is not a vendor that is linked to healthcare technology. Challenges are in finding new sales channels and partners because traditional mobile operator liaison may not be enough. Adapting to new customer business models may also be a challenge, ways or working may vary a lot compared to traditional telecommunication.

Despite the challenges there are huge opportunities what comes to healthcare technology. Both developed and developing countries are investing in technology, the difference is that developing countries absorb the use of technology and new processes faster since there are no old policies on the way. Also the global economic situation most probably speeds up the use of new technology such as mHealth. Behind this is the fact, which was also the driver for the case company's healthcare portfolio: demand to save money and be more efficient. This will not be possible unless technology is taken into use and every part of the value chain commits to use it. A hhealthcare infor-

mation technology consulting company Divurgent has made a general SWOT analysis of the mHealth business, seen below in Table 2:

Strengths	**Weaknesses**
· Huge momentum. · Money flowing in from investors. · Technical talent coming in from other industries. · Growing acceptance of online living. · Smartphones becoming ubiquitous. · Not contending w. large legacy base. · A game-changer toward the 3 Aims	· Interoperability/ Infrastructure. · Quality of data. · Many patients not engaged. · Reluctance of health system to embrace whole-sale change. · Reimbursement for e-visits. · MD's slow to recommend mHealth products to patients.
Opportunities	**Threats**
· Risk-sharing payment models should give home devices a positive ROI. · The "high engagement patients", esp. for social media. · Fast innovation cycles. · Aligns with aging population preferences. · Possibilities are almost limitless. · Developing countries may see most dramatic increase in mHealth use	· May take a while for market to "shake-out" and stabilize. · Intent of large EHR vendors is unclear. · mHealth may not "move the needle" on population health as predicted. · Regulation. · Political environment

Table 2. General mHealth SWOT Analysis (Divurgent 2012: 8).

As seen from Table 2, Divurgent thinks that the biggest strengths of mHealth are good financial situation from investors, growing acceptance of online living and the fact that smartphones are becoming ubiquitous. The biggest weaknesses are seen in the poor healthcare information technology interoperability and infrastructure as well as in the healthcare personnel's lack of interest to recommend mHealth products to patients which leads to patients not being committed.

3.1.2 Ericsson Mobile Health Business Models

In healthcare technology the importance of a suitable business model is highlighted. Because of the complexity of the value chain there must be easily adaptable business models for different scenarios. One definition of business model is:

> The consolidation of a specific set of strategic objectives, the identification of business

> scope and associated market segment(s) and, finally, the mapping of products, alliances, key supporting activities and value-chain relationships and dependencies to achieve financial value (Linder and Cantrell, 2000: 2).

Despite how well the business model suits for the scenario, it is almost useless without full commitment of all the stakeholders in the value chain. The Capgemini Consulting report 'Business Models for eHealth' to European Union from year 2010 says the following:

> The value of eHealth requires that the organisation's stakeholders work together in the same direction and share similar interests and objectives. Therefore, a business model is required to structure and orchestrate these interests, which involves developing appropriate technological tools and implementing supporting processes and procedures that structure the interactions and relationships mapped by a business model (Jansen and Giesen 2010: 13).

The business models are thought to be purely supporting commercial objectives and that applies also to mHealth. However, there are internal and external value creating elements in eHealth/mHealth business models that should be considered. If thinking healthcare organizations as end customers, internal elements can be for example reduction in clinical mistakes, decline in hospitalization time, enhancement of executive reporting or the improvement of the overall image or brand of a healthcare delivery organization. As external elements, there can be things such as a decline in transportation costs or time gain due to the electronic delivery of a specific cure via mHealth (Buccoliero 2008).

The case company has defined three levels of mHealth business models, depending on the complexity and level of engagement as seen in Figure 8 below. The core capabilities business models offers the basic connectivity such as for example M2M or LTE connection and also device management. The mHealth partnership business models offer in addition to core capabilities software, platforms and cloud based services. The full service provider business model has the widest offering. It has all the components from connectivity to software and platforms. It also offers services to for example disease management, lifestyle change support and personal sensors.

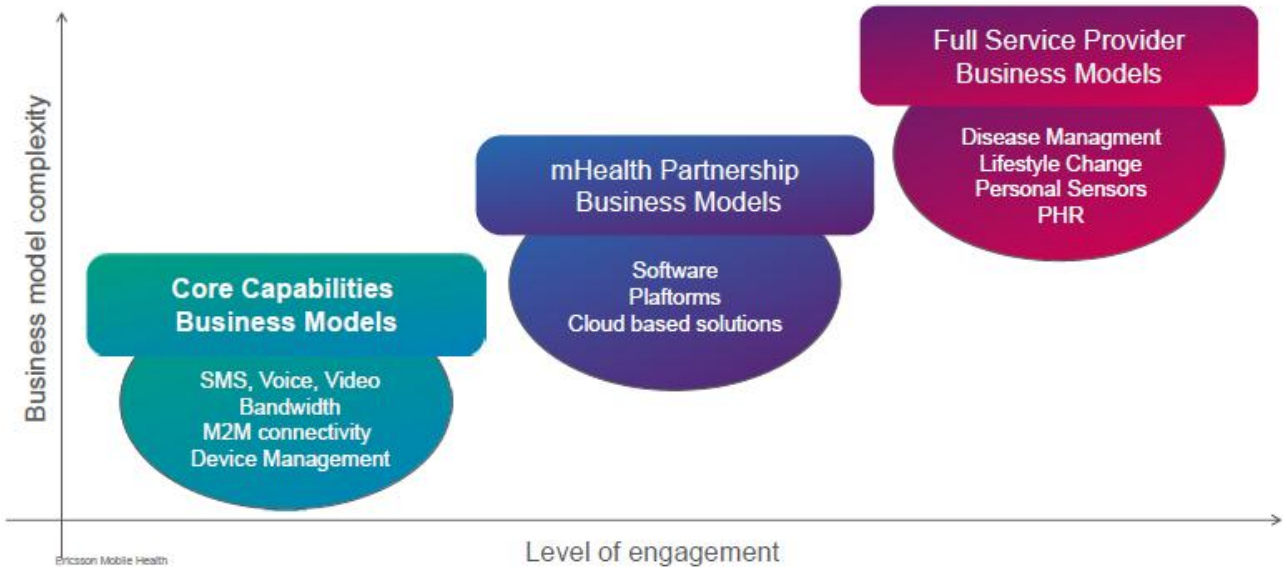


Figure 8. Different Levels of Ericsson mHealth Business Models (Ericsson 2012).

The different levels of the case company's mHealth business models seen in Figure 8 are presented in a more detailed level in the following Section. Also the roles for the case company and for the mobile operators in each business models are defined.

Partner Business Model is presented in the Figure 9 below:

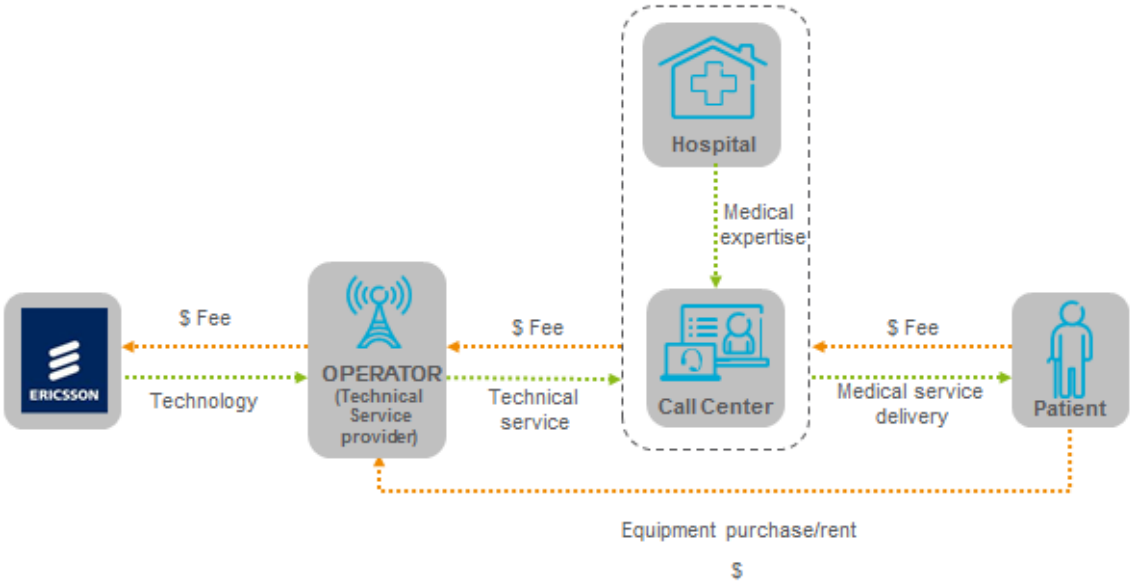


Figure 9. Partner Business Model (Ericsson 2012).

In the Partner Business Model seen in Figure 9 the mobile operator acts as service enabler and marketer providing healthcare services in partnership with healthcare or-

ganizations. To deliver the service to the end customer (patient), the mobile operator needs to form a partnership with: a) medical call center (contact point and service delivery towards patient), b) hospital (hospital will deliver medical expertise for each patient – call center being the interface between the patient and doctor). The roles for the mobile operator and for the case company are presented in the Table 3 below:

Operator roles:
• EMH backend application hosting so that hospital does not need to worry about any HW/SW maintenance (hospital is using the system from the cloud). • Medical sensors sales to patients. • Service marketing.
Ericsson roles:
• EMH platform distribution and maintenance. • EMH platform/Android app localization or market adaptation (if needed). • Medical sensors (3PP) sales to operators.

Table 3. Partner Business Model roles for Operator and Ericsson (Ericsson 2012).

The roles for the mobile operator and for the case company are designed according to the principles shown in Table 3 but the service financing can vary from out-of-pocket payments to reimbursement models with insurance companies. Money flow can go through operator that will pay for the provided services to hospital and call center, or it can be organized as shown in the Figure 9 above.

Full Service Provider Business Model is presented in the Figure 10 below:

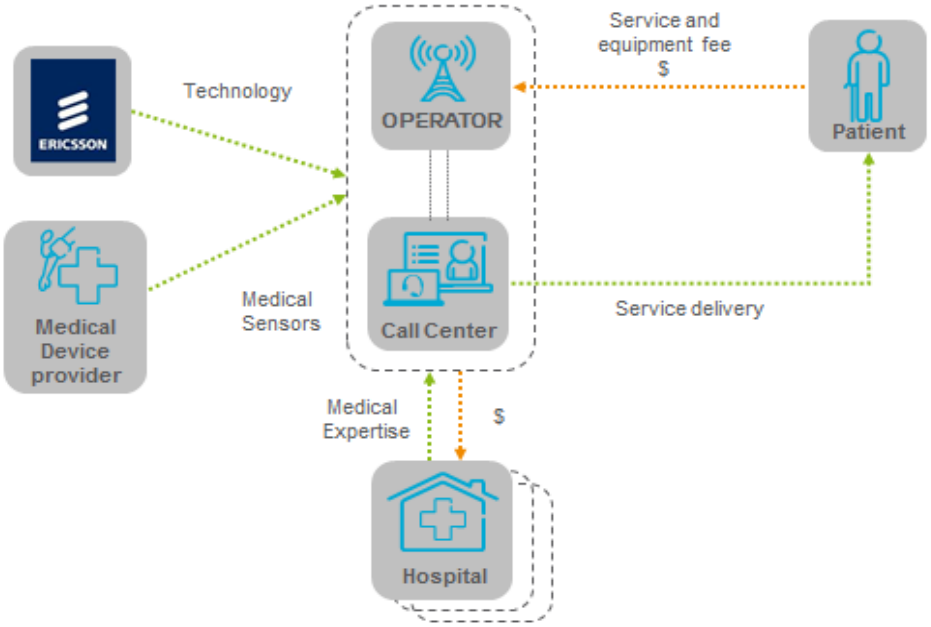


Figure 10. Full Service Provider Business Model (Ericsson 2012).

In the Full Service Provider Business Model seen in Figure 10 above the mobile operator acts as service enabler and marketer, providing value added wellness and wellbeing services to existing or new customers. If the mobile operator wants to provide healthcare services they will have to partner with hospital for medical expertise. The roles for the mobile operator and for the case company are presented in the Table 4 below:

Operator roles:
• EMH backend application hosting. • Call center set-up and call center services • Medical sensors sales to patients. • Service marketing.
Ericsson roles:
• EMH platform distribution and maintenance. • EMH platform/Android application localization or market adaptation (if needed).

Table 4. Full Service Provider Business Model roles for Operator and Ericsson (Ericsson 2012).

As seen from Table 4 above the mobile operator has the biggest role in this business model.

This type of business model can be used for wellness/wellbeing services, in which case a partnership with the hospital is not mandatory. The mobile operator will market this service as differentiating factor against other mobile operators (value added services). Service delivery financing is based on out-of-pocket payments.

Hospital Chain Business Model is presented in the Figure 11 below:

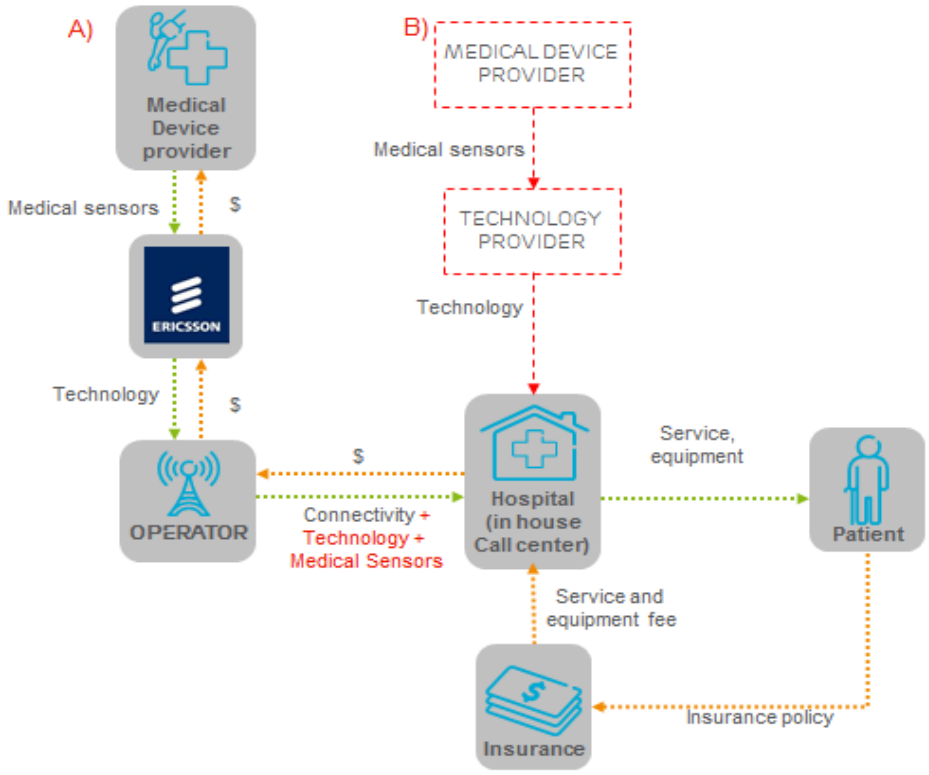


Figure 11. Hospital Chain Business Model (Ericsson 2012).

In the Hospital Chain Business Model seen above in Figure 11 hospitals are in a central role, providing healthcare services - using technology and connectivity provided by partners. The roles for the mobile operator and for the case company are presented in the Table 5 below:

Operator roles:
• EMH backend application hosting so that hospitals does not need to worry about HW/SW maintenance (hospitasl are using the system from the cloud). • Medical sensor sales to hospitals.

Ericsson roles:
• Distribution and maintenance of EMH platform. • EMH platform/Android application localization or market adaptation – if needed.

Table 5. Hospital Chain Business Model roles for Operator and Ericsson (Ericsson 2012).

As seen from Table 5, in this business model the mobile operator will not market the service towards customers but support hospitals in service delivery (usually private hospital chains or policlinics) and enable them to market this service towards their patients. The mobile operator can provide this type of service to multiple hospital chains and thus leverage on economies of scale with the goal of lowering their fixed costs and lowering the service price. In most cases each private hospital is closely connected to a private or public health insurance that will pay for the healthcare services out of premiums paid by the patient.

Subsidized Services Business Model is presented in the Figure 12 below:

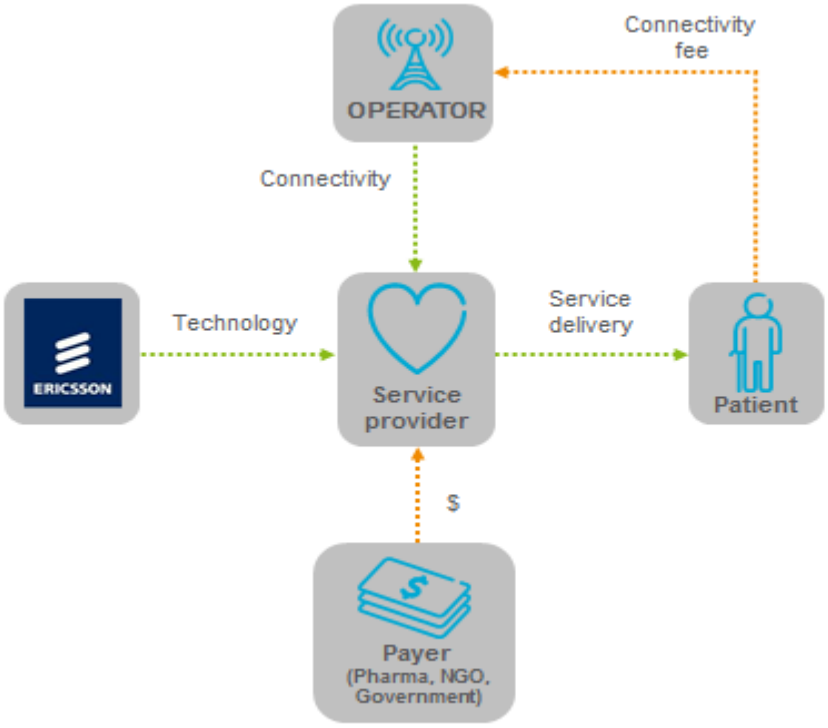


Figure 12. Subsidized Services Business Model (Ericsson 2012).

The Subsidized Services Business Model seen in Figure 12 is suitable for example when the payer (pharma, government or NGO) is financing the development and implementation of mHealth solutions that enable delivery of various healthcare services. Customers are charged only for connectivity since the service is financed by the payer. The roles for the mobile operator and for the case company are presented in the Table 6 below:

Operator roles:
• Connectivity for service delivery.
Ericsson roles:
• Distribution and maintenance of EMH platform. • EMH platform/Android application localization or market adaptation (if needed).
Service provider roles:
• EMH platform hosting. • Service delivery to patients. • Service marketing.

Table 6. Subsidized Services Business Model roles for the Operator, Ericsson and the Service provider (Ericsson 2012).

As seen from Table 6 above, the role for the mobile operator is minimal and in addition to previous business models there is a role for the service provider. Following services can be provided using this business model: a) medical education and information (for example STD, maternity) b) medication supply and adherence monitoring c) basic health access for rural areas d) national health data collection/monitoring (epidemiology).

Connectivity Partner Business Model is presented in the Figure 13 below:

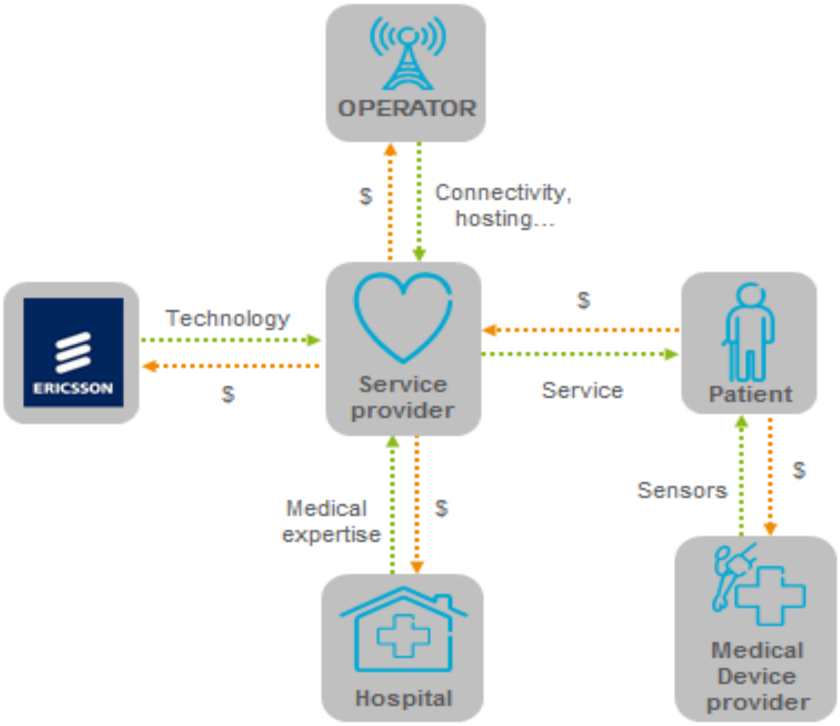


Figure 13. Connectivity Partner Business Model (Ericsson, 2012).

The Connectivity Partner Business Model seen in Figure 13 is suitable for example when the service provider is partnering for technology connectivity and medical expertise to deliver the mHealth service. The roles for the mobile operator, for the case company and for the service provider are presented in the Table 7 below:

Operator roles:
• Providing connectivity for service delivery.
Ericsson roles:
• Distribution and maintenance of EMH platform. • EMH platform/Android application localization or market adaptation (if needed).
Service provider roles:
• EMH platform hosting. • Service delivery to patient. • Service marketing.

Table 7. Connectivity Partner Business Model roles for the Operator, Ericsson and the Service provider (Ericsson 2012).

As seen from Table 7, the mobile operator takes care of providing the connectivity and the case company together with the service provider takes care of the rest. Patient needs to buy the medical devices directly from device distributer and pay for the service to service operator separately.

3.1.3 Ericsson mHealth Business Model Analysis

The case company has made a thorough analysis of the mHealth business models, including external and internal factors that impact to the business. The external factors business model analysis is seen in the Table 8 below:

		Positive	Negative
Market	How attractive is the market? (Size, Growth, Characteristics, etc.)	• To be 15-20 billion dollars in few years time. • Still not reached growth phase, high potential.	• Overflow of solutions and suppliers. • Steady progress of market. • Entering new segment. • Different barriers for different geo-markets.
	What implication do the market trends have on the business model?	• Aligned with shift of segment toward end users/consumers.	• As in early phase the business model components will change with time.
Competition	How does the business model contribute to competitive advantage and differentiations?	• Brand company. • Reputation in ICT complex systems. • Ability to make strong joint ventures. • Capability to invest in new areas.	-
	How does the business model perform compared to the competitors business models?	• E2E capabilities.	• Many players in the market competing each others, with new, but respectable competitors.
Customers	How well does the business model meet the customers' needs and expectations?	• Perfectly matching end users wish to have single supplier providing E2E superior services • Reliable partner	• Establish reputation in healthcare solutions

Table 8. Business Model Analysis for Ericsson mHealth - External Factors (Cordial Business Advisers 2012).

The external factors business model analysis seen in Table 8 has three areas; market, competition and customers. These can be seen as a part of Porter five forces analysis, shown in Figure 14 below.

Figure 14. The five forces concept (Michael E. Porter 1979).

Market analysis by Cordial Business Advisers shows that there is potential for the mHealth market to rapidly grow in few years' time but for now the growth has been very steady. The risk is seen in that there is already a lot of solution suppliers in the market and that the market area is completely new for the case company. There are also barriers depending on the geographical are, for example regulations regarding healthcare technology. Business models are seen to be aligned with the current market trends, where the focus is in the consumers. However, business models should be able to adapt to the chancing market trends.

As mentioned in the market analysis, there is heavy competition in the mHealth market already and new suppliers are increasingly joining. Although the case company is not known for its healthcare systems, it has a good brand and reputation in other areas of information and communications technology. The case has the capability to invest to its technology development and also make joint ventures with other companies if needed. The strength of the case company is its capability to build end to end systems, providing everything from networks to even user devices in some cases. That isn't anyway a unique advantage, competitors have also similar possibilities. Customer perspective sums up the essential from this external factors analysis. Business models match to

customer needs and the ability to act as a single system provider is seen beneficial. The case company is seen also as a reliable partner but it has to strengthen that reputation also regarding the healthcare systems. The internal factors business model analysis is seen in the Table 9 below:

		Positive	Negative
Strategic Intent	Is the business model aligned with and support the overall strategic intent and vision?	• Aligned with Ericsson high level strategy to have 50BNs connected devices • Support growth of societly/world • Being prime E2E integrator • Reuse and deploy ICT experience & knowledge to conquer new market segments	• Entering completelly new customer in relativelly new industry for the company
The Business Model	Are the different parts of the business model aligned?	• Strong position in eisting components which is to puzzled together with new objects (e.g. processes, customer handling)	• New customer segment in new & young industry (new for the company and young in general)
	How important is the business model from a financial perspective? (Share of revenue, profit, growth, etc)	• This is entering to new market segment /mass market (mainly end users). •Expected to take over market share in HC market, but also to reuse learnings and solutons in neighbouring segment ('telesport')	• Significant investments done, no ROI yet. • Initial Market segment (HC systems) shifted
Business Model Synergies	Are there synergies between this business model and the companies other business models?	• E2E service expertise (highly positioned in ICT services market). • 3 party product/subcontractor handling, license handling • R&D processes • HW&SW development	• End user service • New customers • New purchase and ordering processes

Table 9. Business Model Analysis for Ericsson mHealth - Internal Factors (Cordial Business Advisers 2012).

The internal factors analysis for the case company's mHealth seen in Table 9 goes deeper into strategy and business models. The correct business model is the key in all business, but is even more emphasized in mHealth because of the complexity of the healthcare ecosystem seen in Figure 2.

The case company has a long term strategy that there will be will be 50 billion connected devices in the 2020s. As the use of technology in healthcare increases, it is strategically justifiable to be a supplier of healthcare technology, single supplier or just a small part of the value chain. However the growing number of connected healthcare devices will surely be significant when reaching that 50 billion connected devices target. The same advantages and disadvantages are seen as in the external factors business model analysis. The case company has huge potential to benefit from its history as communications technology supplier but the whole healthcare technology industry is relatively new and also the customer base will most probably change. Although the case company will keep the customer priority in mobile network operators, there will be most likely new ways of working related to healthcare.

Financially the case company's mHealth is expected to take a profitable market share, since it is mainly aimed for consumer mass markets. This can be seen as a change compared to the traditional the case company cash cows which are mobile networks. Though it is forecasted that the mHealth market will rapidly grow in the coming years, there are a lot of investments made but no return on investment (ROI) yet.

Thus, the case company seems to have all the factors needed to succeed in new business areas. It has a strong R&D, working processes and experience from 3PP cooperation. Also the services have been a successful business area. Now only the end user satisfaction is even more critical when talking about healthcare services (Risto, could you please add 1-2 sentences saying that CVP/needs/interests are also need to be specified? It'll make a perfect bridge to the next Section!)

4 Best Practices of a Building Customer Value Proposition

This Section discusses best practices for building a customer value proposition. It also

4.1 Customer Value Proposition: Definition

Terms customer value proposition and customer value are being used quite frequently in today's business and marketing language. Wyner (1997) has stated that these terms are used too loosely and might lose meaning. Wyner (1997) thinks that customer value can be seen as to or from customer, depending on the type of value and if it is product related or non-product related, such as image or experience. Woodall (2003) shares this view saying that there are two dominating meanings of customer value. Value for the customer is either customer perceived or customer received value and then there is value for the firm.

One might think that customer value is only money related. The concept is broader; customers can also perceive value such as time savings and ease of use (Shanker 2012).

> Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performances, and consequences arising from use of that facilitate (or block) achieving the customer's goals and purposes in use situations (Woodruff 1997: 141).

Woodruffs definition above is quite complex and not that easy to understand but still it has all the elements that are commonly related to customer value. Woodruff (1997) is respected and cited in many of his colleague's articles but also criticized. In the following Sections four different views about customer value proposition and customer value are discussed more in detail.

4.2 Customer Value Creation: A Practical Framework

Smith and Colgate (2007) define the concept of customer value and its central status in marketing by referring to Zeithaml (1988), Woodruff (1997) and Holbrook (1994). They

clearly express the need for the design of frameworks that help to understand customer value creation. Smith and Colgate (2007) mention that although there has been development of these frameworks (Holbrook 2005, Ulaga 2003 and Woodall 2004) during the last decade, the problem is that none of those has become more important than the others in the industry and that there is very little consistency between the mentioned theories. They also bring up and interesting point that there is not much written about value creation in strategy literature. This is surprising considering that customer value creation has been a popular theme, as said by Wyner in 1997. Conceptual foundations of value creation are further on presented and referred to by for example Slater (1997) who has stated in his theory of the firm:

> Firms exist to create value for others where it is neither efficient nor effective for buyers to attempt to satisfy their own needs (Slater 1997: 162).

Smith and Colgate (2007) interpret this as an objective of marketing; to achieve personal, organizational and social objectives by creating customer value for one or more market segments. They see that customer value has an important role to marketing despite the lack of actual research from that area.

As mentioned already Smith and Colgate (2007) note that no proper conceptualized framework for customer value exists. Park, Jawarski and MacInnis (1986) have described three customer needs that are related to value; functional, symbolic and experiential needs. These needs underlie value perceptions. That leads to three basic type of value that Park, Jawarski and MacInnis (1986) also suggest. Those are functional value, symbolic value and experiential value. The aspect that Smith and Colgate (2007) see missing from the previous theory is the cost and sacrifice aspect of customer value which is included in their definition.

Sheth, Newman, and Gross (1991) have similar described quite similar types of value which impact to customers. Those are functional value, social value, emotional value, epistemic value, and conditional value. Smith and Colgate (2007) see that these are in relation to the view that Park, Jawarski and MacInnis (1986) have, although defined value types are not totally the same. Also the same cost and sacrifice aspect is missing from Sheth, Newman and Gross (1991).

One of the most recent studies regarding customer value is Ulaga (2003). That goes to more practical level and is easier to understand than the ones presented

earlier in this Section. Ulaga (2003) states that there are eight different value categories in business relationships; product quality, delivery, time to market, price, process costs, personal interaction, supplier know-how and service support. Furthermore Ulaga (2003) has identified three to four benefits that each of those categories could bring. Smith and Colgate (2007) point out that this is a quite comprehensive framework describing relationship value.

Woodall (2003) has five elements of value; balance of benefits and sacrifices, use/experience outcomes, perceived product attributes value as a reduction in sacrifice or cost and assessment of fairness in the benefit–sacrifice relative comparison. Smith and Colgate (2007) think that Woodall's (2003) framework is the most comprehensive of the framework that they studied but has also some limitations. They see that this framework doesn't go enough to details and give examples which make it difficult to use in practice.

Smith and Colgate (2007) summarize their comparison of frameworks by stating each of these frameworks might be used in some context but none of those can be considered as a general framework that can be applied to any business area. All the presented frameworks have valuable parts and by combining those to match the current issue the suitable framework can be found.

4.3 Customer Value Propositions in Business Markets

Anderson, Narus, and van Rossum (2006) state the same as many others have before, customer value proposition is a widely used term but it has no agreed definition. They criticize the overall promise that the term customer value proposition might give; savings and benefits to the customer without proof. They emphasize the importance of demonstration and documentation by saying that even the high value offer could be rejected by the customer without those. Anderson, Narus and van Rossum (2006) also feel that some of the management doesn't see the importance of customer value propositions. In their opinion customer value proposition is just something for advertisements and promotional use, not something that could support the company strategy. Anderson, Narus and van Rossum (2006) argue this based on the research they have done in Europe and in the United States. One of the findings was that there are very little actual customer value propositions that really benefit the customer.

Anderson, Narus and van Rossum have (2006) identified three types of value proposition seen below in Table 10.

VALUE PROPOSITION:	ALL BENEFITS	FAVORABLE POINTS OF DIFFERENCE	RESONATING FOCUS
Consists of:	All benefits customers receive from a market offering	All favorable points of difference a market offering has relative to the next best alternative	The one or two points of difference (and, perhaps, a point of parity) whose improvement will deliver the greatest value to the customer for the foreseeable future
Answers the customer question:	"Why should our firm purchase your offering?"	"Why should our firm purchase your offering instead of your competitor's?"	"What is *most* worthwhile for our firm to keep in mind about your offering?"
Requires:	Knowledge of own market offering	Knowledge of own market offering and next best alternative	Knowledge of how own market offering delivers superior value to customers, compared with next best alternative
Has the potential pitfall:	Benefit assertion	Value presumption	Requires customer value research

Table 10. Three types of value propositions (Anderson, Narus and van Rossum 2006).

All benefits customer value proposition is the most common type according to Anderson, Narus and van Rossum (2006), seen in Table 10 above. Management lists all the benefits that they can think of what comes to their product. This approach seems very optimistic and obviously has some drawbacks. If the management thinks that all the features of their product or service create value for the customer there is a high risk that it is not the case. This is so-called benefit assertion and means that some of the claims may not provide any value at all.

Favorable points of difference are already more realistic type of customer value proposition than the all benefits model. The core idea is that the customer has options and that the offered product or service may not be the best one from all aspects. It is seen that there are favorable points in the in the offering that should be highlighted if compared to some competitor. As Anderson, Narus and van Rossum (2006) mention, the provider must know the customer needs very well in order to emphasize the correct favorable points.

Resonating focus should be the standard for value proposition creation say to Anderson, Narus and van Rossum (2006). The biggest difference in resonating focus compared to favorable points of difference model is the number of points, there may be only one or two most important things where as there could be several in favorable points. Another interesting thing is the concept of point of parity which the resonating focus model may contain. Point of parity maybe needed to win the customer interest and then convince them with other facts.

Anderson, Narus and van Rossum (2006) sharpen the fact that you have to be careful what you promise and this applies very much also to customer value propositions. If you promise too much and fail on those, it will be very harmful for the customer relationship. Therefore researchers say that it is crucial to demonstrate that your value proposition has a real base and that it is also well documented.

4.4 Reinvention of Business Model (Risto, this is necessary to make your headings similar - in a good way)

Johnson, Christensen and Kagermann (2008) stated that a successful company has found a way to create value to customers. That is an emphatic sentence and they open it up by saying that solving the problem has that the customer has is the key to value but it requires a lot of understanding of the whole process. The bigger the problem the customer has, the easier the company can provide value by offering solutions. Their approach to customer value creation is more practical than the previous frameworks. Approach is business centered and the core is the profit formula:

> The profit formula is the blueprint that defines how the company creates value for itself while providing value to the customer (Johnson, Christensen and Kagermann 2008: 3).

The profit formula that Johnson, Christensen and Kagermann (2008) present consists of the following parts: revenue model (price x volume), cost structure (direct and indirect costs, which are dependent on the number of resources that are required), margin model (actions needed to make profit following the volumes and costs) and resource velocity (utilizing resources to support the profit making in a best possible way).

Along with the profit formula, Johnson, Christensen and Kagermann (2008) see key resources and key processes as crucial elements of a successful business model, seen in Figure 15. Key resources are such as people, products, technology, facilities, brand etc. Those are all needed in order to deliver the customer value. Johnson, Chris-

tensen and Kagermann (2008) remind that all the resources are not key resources; there are also generic resources which do not bring any extra value.

Key processes help to succeed in the value delivery as much as resources. Processes are essential to a modern successful company.

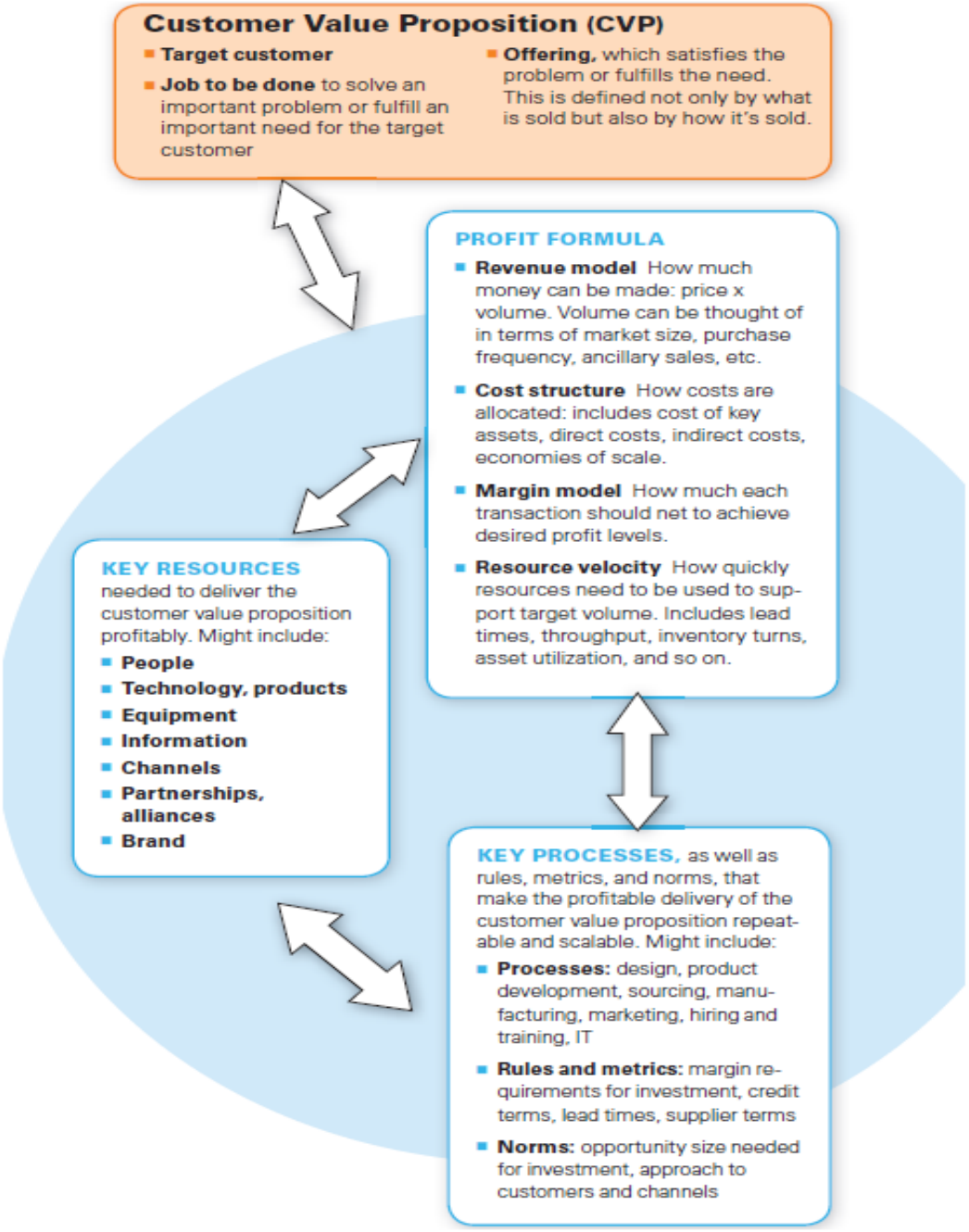


Figure 15. The Elements of a Successful Business Model (Johnson, Christensen and Kagermann 2008).

In this framework seen in Figure 15 Johnson, Christensen and Kagermann (2008) outline what seems like a simple framework for creating a customer value proposition. Although seemingly easy, this model include the key elements of any business model, such as products, sales channels and partnerships. Thus, it attracts by its applicability and the fact that it can be adapted to almost any business, which can be seen as a real benefit.

4.5 An Enterprise Perspective on Customer Value Propositions

The concept of customer value can be exemplified through open source software development (Shanker 2012). This thesis deals mHealth services which are mainly based on well-designed software, so based on that the views from open source development can be seen valuable. Other supporting fact is that Shanker (2012) writes from an enterprise perspective.

Shanker (2012) states that customer value research has typically taken a marketing perspective to understand customer needs. In the open source software the situation is a bit different because there is not much marketing. The software and service itself has to offer the value. In open source software development there are usually no big companies or processes supporting the value creation.

Shanker (2012) goes through the know literature quite well and makes the many cites from Woodruff (1997), Ulaga (2003) and Smith and Colgate (2007). Shanker (2012) rounds up these theories to a table from the value dimensions point of view visible in Table 11:

Researcher	**Value Dimension**	**Context**
Ulaga 2003	Product quality Service support Deliver performance Supplier know-how Time to market Personal interaction Price and process cost	Dimensions of value that apply to manufacturer-supplier relationships.

Smith and Colgate 2007	Functional / instrumental value Experiental/ hedonic value Symbolic/ expressive value Cost/ sacrifice value	Marketing managers perspective that identifies types of value and how an organi-zation can create these types of value.
O'Cass and Ngo 2011	Performance value Pricing value Relationship value Co-creation value	Value offerings from a firm´s view; interpretation of what customers are looking for in the marketplace and what firms provide in response

Table 11. Dimensions of value (Shanker 2012).

Table 11 presents Shanker's (2012) selection of different dimensions in value creation. Since customer value and customer value propositions are as concepts more popular all the time is there also beginning to be more literature about from that area. The basic concepts are written during 1980´s and 1990´s but there are also fresh views from 2000th century. Woodruff (1997) is one of the most cited ones, as well as Smith and Colgate (2007). Both utilize powerful tools and concepts are needed which can be implemented efficiently.

The most surprising fact in the theories presented above was that there is no generally agreed framework for customer value creation available, there is even somewhat disagreement about the definition what customer value is. This lack of ready-made frameworks is most probably the reason why there so few customer value frameworks that really make value to the customer (Anderson, Narus and van Rossum 2006). One aspect is that the lack of knowledge regarding customer value creation and propositions might weaken their status in the eyes of the management. When thinking of creating a customer there are several aspects that needs to be considered. The type of the value proposition must be chosen carefully or it might turn against the supplier (Anderson, Narus and van Rossum 2006).

4.6 Conceptual Framework of Building a Customer Value Proposition

In this study, the customer value proposition theories presented and discussed earlier in this Section were summarized in the model by Shanker (2012). This model has all the key elements presented in value proposition theories needed for value proposition creation. Anderson, Narus and van Rossum (2006) have identified three types of value proposition, presented in the model seen in Table 10 above. It can be said that the approach to value proposition utilized in this thesis coincides with the views of Shanker (2012). The model created by Shanker (2012) can be called *an all benefits customer value proposition*. Following this all benefits customer value model, the present thesis will approach the customer value proposition from the same perspective, to create all benefits proposal that customers will receive. This model is shown in Figure 16 below.

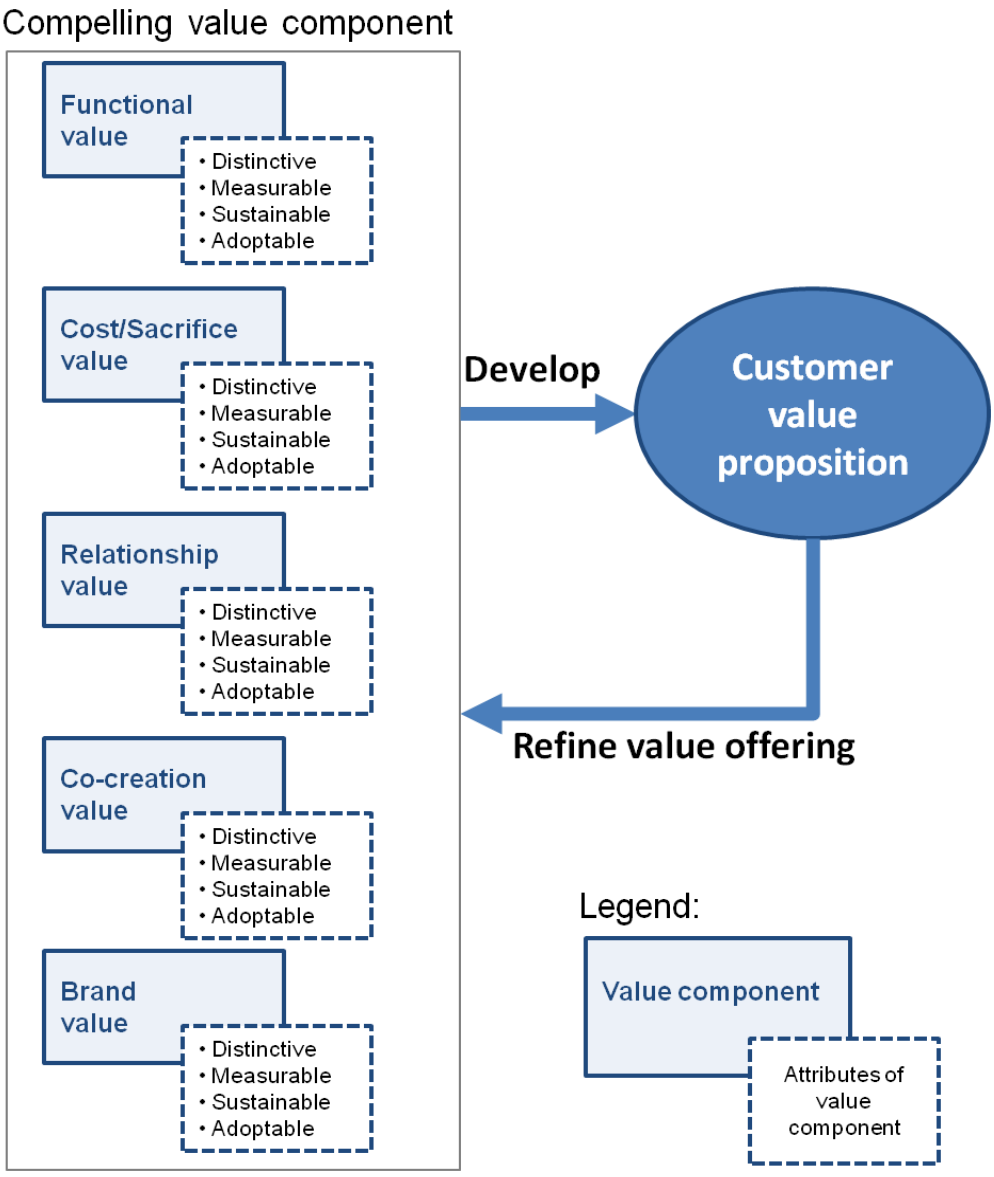


Figure 16. Model on customer value creation (Shanker 2012).

As seen in Figure 16, in the model by Shanker (2012), the *functional value* concentrates on the product, the value that different functions offer to users. *Cost and sacrifice value* concentrates on the investments that the customers have to make in order to get a service and the value that they can gain from those investments. Relationship value is split into two categories: *relationship with the supplier* and *relationship with the customer* by Shanker (2012). All these criteria seem to be reasonable also in the case company context.

The model seen in Figure 16 examined the concept of customer value through open source software development. Although this thesis does not discuss about open source software development, this model can be seen reasonable to be adapted and used. It can offer a good view to the product, to the case company and to its customers through the value components used in this model. It is also very interesting to find out how the internal and external stakeholders see the supplier and customer value regarding mHealth services. Thus, in this study the model on customer value creation seen in Figure 16 is chosen for creating an initial customer value proposition of the case company's mHealth product.

However, since there are several different stakeholders in the healthcare value chain, so some changes were necessary to the model by Shanker (2012). Having different roles in the healthcare value chain leads to the need that the gained value should be examined from different aspects. For example, *brand value* is really important to the case company and now it should be looked at from the healthcare business point of view. *Co-creation of value* was removed as a value component, as Shanker (2012) has suggested.

Next Section describes the development of the customer value proposition based on the model by Shanker (2012) and the case company data gained from the interviews and discussions. The model was a good starting point since the theme interviews needed a concrete, hands-on model where the questions and later on customer value proposition could build on.

5 Building the Customer Value Proposition

This Section tells what business literature says about mHealth and describes the process of building the preliminary customer value proposition.

5.1 mHealth Value Propositions

The mHealth business is a part of the complex healthcare ecosystem and value chain. It is quite natural that all parts of the value chain want to be successful and benefit from their participation. Every participant seeks a different kind of value for themselves. Several stakeholders and consulting companies have made formal and informal studies about mHealth value proposition. This proves that there is a lot of interest towards mHealth but from the business perspective mHealth it not quite clear yet.

> Engaging a broad ecosystem of stakeholders is critical from the outset of mHealth research, given that the adoption and sustainability of these innovations lies in meaningful ownership of the research findings. The value proposition of mHealth investments may not be obvious to all who need to support it for scale-up — robust, rigorous research is necessary to provide evidence to stakeholders and to overcome mSkepticism and policy inertia (Labrique 2013: 1).

A lot of research has been done already and yet there is skepticism, in this context mSkepticism as Dr Labrique (2013) states above. This skepticism does not concern only mHealth; it is common to all areas where new technology is first introduced. The following view by Digital Health Initiative describes briefly what could be the benefits in mHealth value chain:

> Benefits to **patients**: improves quality of life for patients by enabling timely and precise diagnosing medical conditions and, consequently, treatments. Benefits to **healthcare professionals**: enables effective patient management, increased efficiency through remote diagnosis and reductions in treatment and management costs. Benefits to **operators**: supports the launch of new business initiatives in the healthcare domain that can be used to retain customers and attain new ones. Benefits to **healthcare insurers**: provides healthcare cost savings and improved quality of the healthcare services through optimized patient monitoring. Benefits to **governments**: delivers healthcare more cost effectively and efficiently to citizens (Ericsson and Digital Health Initiative 2010).

If looking more closely into mobile network operators (MNO) it is clear that mHealth business would bring significant benefits. New business initiatives and the possibility to retain customers and attain new ones certainly are interesting aspects when the competition is tough and price margins have gone down. Dr Miller-Duys, the mHealth Portfolio Manager from Vodacom goes more in detail regarding MNO benefits in her presentation "Integrating Healthcare: The role and value of mobile operators in mHealth" (Miller-Duys 2013). She has defined four main areas where there can be value gained from mHealth, seen in Table 12 below:

Diversification of revenue streams: •Move away from sole reliance on data and voice. •mHealth global market estimated $10 billion by 2015.
Leverage capabilities: •Leverage strengths of M2M, mMoney. •End-to-end services – hosting, cloud services etc.
Competitive differentiation: •Brand loyalty, reduce churn. •Preferred provider of ICT health services.
Improve health outcomes: •Contribute infrastructure, resources and capacity to allow health providers to deliver their ROI's. •Support sustainability of economy.

Table 12. Four main areas where mHealth creates value (Miller-Duys 2013).

The four main aspects how mHealth can create value, as seen in Table 12, are: a) diversification of revenue streams, b) leverage capabilities, c) competitive differentiation and d) improve health outcomes. The core business of mobile network operators has changed rapidly in the last two decades. When GSM networks were first rolled out in 1990s the cash cows were voice calls and Short Message Services (SMS). That lasted until 2000s when 3G networks became more common and data connections started to be important. Now more on more of the traffic has moved over IP-connections and people are making fewer phone calls or send messages. At the same time the price competition between MNOs has brought data prices so low that the profit to operators is getting thin. What is also common in today's mobile business is the fact that customers are not very loyal and change their MNO very easily if the competitor has a better

price offer. According to Dr Miller-Duys (2013), mHealth could be one solution to MNOs, it would move the business away from sole reliance on data and voice and would make customers more loyal.

One of the world's leading mobile network operators Orange sees their role in the mHealth value chain as a crucial hub which connects all the stakeholders in the healthcare ecosystem. This analysis is reasonable, considering how good connections mobile network operators have to both technology vendors and to end customers.

> The role of mobile network operators can be as broad or as deep as the partnerships they form with healthcare providers, payers and medical device developers. This is because mHealth is far more than an app on a phone, or operators providing simple connectivity for healthcare products – mobile network operators bring unique capabilities for providing secure end-to-end healthcare services. mHealth spans the patient pathway, supporting wellness, prevention, diagnosis, treatment and monitoring. It can also be used to strengthen existing healthcare systems, such as emergency response, healthcare practitioner support, healthcare surveillance and administration. The operator can be the hub that connects patients to all stakeholders in the healthcare service ecosystem (Orange 2013: 1).

Consulting company PricewaterhouseCoopers (PwC) and GSM Association (GSMA) have similar findings as Orange stating that mobile network operators will be the ones who benefit the most of the rapid mHealth market growth.

> Mobile operators are expected to be the key beneficiaries of the expected growth in the mHealth market and command about 50% share of the overall market, corresponding to US$ 11.5 billion, in 2017.
>
> mHealth is likely to be a large value creation opportunity for multiple stakeholders – mobile operators, device vendors, content and application players and healthcare providers – across the world (PwC 2013: 1-5).

Although these are strong arguments considering how new the whole mHealth concept is, the expected value is huge. Responding to the question of what could then be the actual ways for mobile network operators to participate to the mHealth value chain more actively, Dobberstein and Ghee Chua (2012) see the solution as a smart enabler strategy. Dobberstein and Ghee Chua (2012) suggest that MNOs should develop open

platforms for service creation and the ecosystem should be as open as possible, easy to join. They have developed a smart enabler strategy for mobile network operators, seen in Figure 17 below:

Enabling platforms	• Develop platforms that allow participation in the ecosystem and encourage the creation of new services • Structure open interfaces that allow third parties to leverage operator's assets and customer information
Ecosystem integration	• Facilitate participation • Collaborate with partners to create industry standards and open ecosystems • Foster alliances to create customer awareness and communities, and to take advantage of brand affiliations and marketing clout
Customer analytics	• Provide real-life insights into (digital) consumer behavior • Offer tailored solutions and instant recommendations to customers

Figure 17. A smart enabler strategy for mobile network operators (Dobberstein and Ghee Chua, 2012).

The smart enabler strategy seen in Figure 17 has three main points: a) enabling platforms, b) ecosystem integration and c) customer analytics. The main idea is that open ecosystems should be developed together with platforms. Co-operation in the industry is the key to success, shared standards are needed. Dobberstein and Ghee Chua (2012) highlight also the importance of listening to customers, there should be tailored solutions available.

Dobberstein and Ghee Chua (2012) go deeper into the possibilities for mobile network operators to pioneer mHealth connectivity in Figure 18. Four steps are defined to help mobile operators: a) provide new services, b) open gateways, c) enable ecosystem integration and participation and d) integrate new points of contact. Dobberstein and Ghee Chua (2012) also provide examples as these steps and tell what could be the value capture received from those actions.

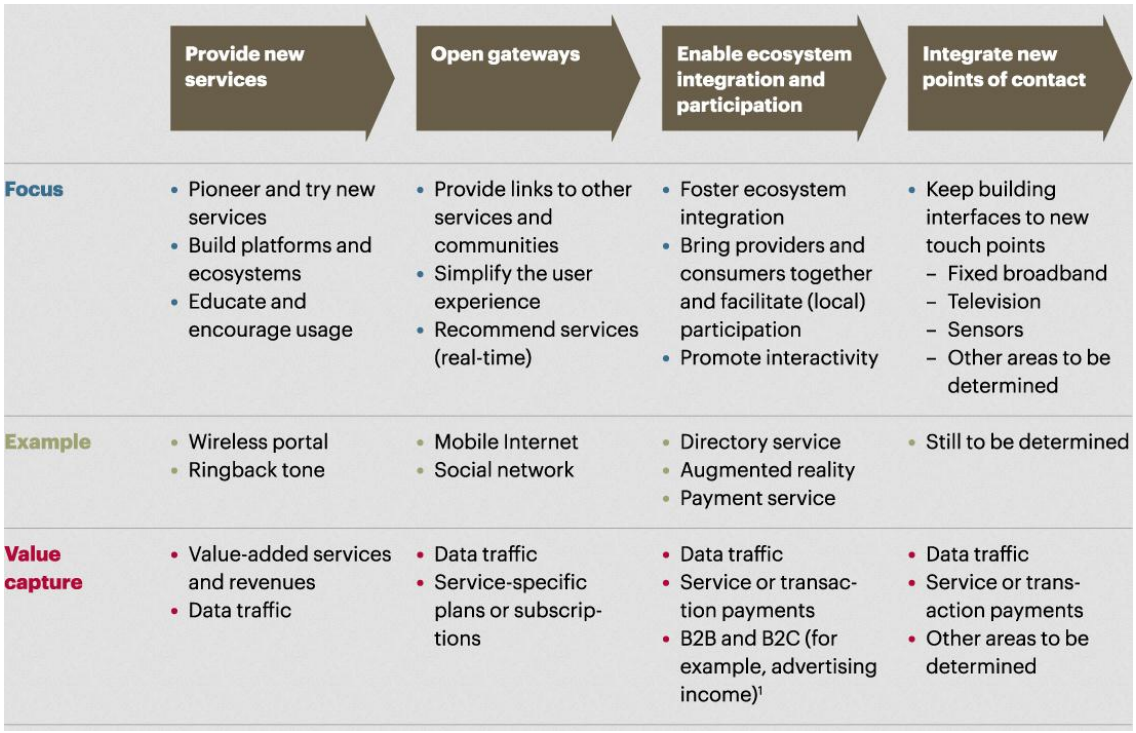


Figure 18. Possibilities for mobile network operators to pioneer mHealth connectivity (Dobberstein and Ghee Chua 2012).

As seen from Figures 17 and 18, the focus is on well working ecosystem. In Finland such ecosystem called Taltioni has been build and funded by the Finnish Innovation Fund Sitra (Description of Taltioni). Taltioni follows closely the ideology that also Dobberstein and Ghee Chua (2012) have presented. Taltioni aims to produce a single database and service platform which contains personal health information.

> Taltioni is a new national-level concept in the health care and well-being sector which enables operators in the private, public and third sectors, and companies providing ICT services, to create an independent community, a cooperative. Members of the Taltioni cooperative will independently produce services for Finns. These services complement one another and enable proactive promotion of health and well-being (Taltioni 2013:1).

Yet it is clear that every research and report has been done from a slightly different point of view, it is easy to notice that they all have similar findings about mHealth. So-called mServices are the next big thing for mobile network operators. The dominance of voice and data as cash cows is fading away and MNOs need to figure out revenue streams.

The mHealth business among other vertical business is still in the starting phase and the business hasn't really started booming yet. Thinking about customer base, joining healthcare value chain as well as other vertical areas would bring a significant number of new customers. The complex healthcare ecosystem has many participants which could create again new business possibilities for mobile network operators. There would be benefits also regarding the already existing customer base; to end customers who otherwise are not very loyal to their MNO and change it quite often. According to Vodacom mHealth Portfolio Manager, Dr Kirsten Miller-Duys mHealth services could be a factor which makes customers stay more loyal and not to change to competitor despite some price offerings.

Mobile network operators have potential to offer end-to-end services and that they should exploit more than before. PricewaterhouseCoopers (PwC) and GSM Association estimate that the mHealth market size for MNOs would be 11.5 billion US$ in 2017. The key approach reaching that market share is to contribute to the infrastructure, resources and capacity which would allow health providers to deliver their ROI's. The money would return to also to MNOs. Many reports focus on the importance of working ecosystem. That ecosystem is not yet there in most of the cases and needs constant development together with its members. Dobberstein and Ghee Chua (2012) think that an open ecosystem is the solution. Collaboration with industry partners and participation in creating industry standards is crucial, for the successful future of mHealth.

Next question concerns the role and added value of the case company in this healthcare value chain and ecosystem. Although the case company is a newcomer to healthcare business and has still a very limited footprint in it, it is a market leader in communications driven solutions and therefore has good potential to drive up new technology. The case company is well known partner to mobile network operators and the brand of the company is strong. That would surely help also in the so-called mSkepticism; partnership with world's largest mobile network vendor would bring credibility. No matter how big the MNO or the solution vendor is and how good the reputation is, it will not succeed in mHealth business alone. It can be said that mHealth is boundaries breaking business; it connects the public and private sectors together in a new way. Therefore also the case company should be an active member of the mHealth ecosystem, developing the platforms and standards. That is also a strength of the case company; it has long history being a member of the 3GPP, 3rd Generation Partnership Project

5.2 Current Ericsson Mobile Health Value Proposition

As mentioned in Section 1.4 Business problem, objective and outcome, Ericsson Croatia acquired the mHealth in 2008 and has been responsible since. Ericsson Mobile Health has not totally been lacking a value proposition but the case company believes that value proposition especially mobile network operators should be made more clear and broader. The aim is not to invent EMH value proposition from scratch but to utilize the current value proposition and to make enhancement if needed.

Table 13 shows the elements of the current EMH value proposition to Operators and Solution Providers:

· Expand into new value chains
· Secure new, sustainable sources of revenues
· Position themselves as pioneers in new market segment
· Leverage an existing infrastructure and services

Table 13. The elements of the current EMH value proposition (Ericsson 2008).

These four elements seen in Table 13, together with the general value proposition seen in Figure 19 have been the baseline for this thesis and helped scaling up the needs for a new, revised customer value proposition for the mobile network operators.

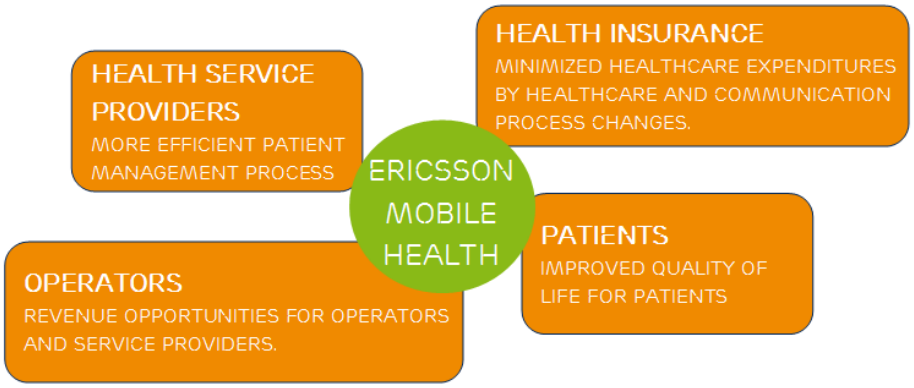


Figure 19. Summarized current EMH Value Proposition (Ericsson 2012).

The current complete EMH Value Proposition seen above in Figure 19 is aimed at the following stakeholders in the healthcare value chain: a) health service providers (more

efficient patient management process), b) health insurance (minimized expenditures by healthcare and communication process changes), c) mobile operators (revenue opportunities for operators and service providers) and d) patients (improved quality of life for patients).

5.3 External Customer and Internal Stakeholder Theme Interview Questions

This subSection describes the process of defining the questions for internal stakeholder and customer theme interviews. Since this health vertical is new for the case company also the customer base is also still very limited. Therefore only one potential customer was chosen to be interviewed. This mobile operator has existing customers from the healthcare field so they have expertise on that and also know the challenges and requirements.

The framework for the interview questionnaires was build following the Shanker (2012) model seen in Figure 16 and its value components. Literature has many good examples of questionnaires regarding customer value proposition. This thesis applies the model of customer value creation defined by Shanker (2012). Although Shanker (2012) discusses this from the open source software point of view, the same rules apply, the value perceived by enterprise customers. The model consists of five value types, each one measuring different kind of value. Based on the value component description, its attributes and the researcher's expertise, the corresponding questions are composed and presented at the end of the sub-Section.

5.3.1 Functional Value

There are six key attributes of functional value according to Shaker (2012), which refers to the features of the product itself:

1. Distinctive: the functionality should be different from other market offers, providing the customer with a differentiating value driver.

2. Sustainable: the functionality and quality should remain the same over time.

3. Extensible: customers should be able to extend the core functionality of the product to interface with their software and services.

4. Customizable: customers should be able to customize a solution to suit their specific needs.

5. Simple: users should be able to understand the functionality of the software with a reasonable amount of effort.

6. Adoptable: the software should be usable in the customers' environment without them having to make major changes to their internal environment.

Questions: 1.) What in your opinion are the most important functionalities of a medical technology product such as mHealth? 2.) To what extent should the functionalities be customizable to different customer needs? 3.) Which different technologies should the product support? (UE: Android, iOS, Windows; Network: GSM, WCDMA, LTE)

5.3.2 Cost/Sacrifice Value

The product should be worth it to the customer. The cost paid can be in monetary terms, time, effort spend defining requirements, or any other way in which the

These questions are meant to solve what functionalities should EMH concentrate on and to what extent should there be a possibility to customize the functionalities depending on the customer needs. Technology plays also a big part when designing products, decision have to be made which different technologies and platforms should EMH support.

There are four key attributes of cost/sacrifice value:

1. Distinctive: the sacrifice between "give and get" components for the customer should be less than other alternatives.

2. Measurable: there should be significant cost savings for the customer in comparison to other market offers or making the software in-house.

3. Sustainable: the customer should perceive the sacrifice between "give and get" components as being worth it over time.

4. Adoptable: the effort required to overcome barriers to adoption should be perceived as worth it to the customer.

Questions: 1.) What do you see as biggest benefits of mHealth to your business? 2.) What do you see as the biggest barriers to adoption of mHealth services?

It is important to understand how different stakeholders, internal and external, see benefits of mHealth and also the barriers which prevent the full adoption of mHealth services.

5.3.3 Relationship Value with the Product/Service Supplier

This type of value refers to the customer's relationship to the supplier of complementary assets such as customization, consulting, and integration. According to Shanker (2012) there are two key attributes of relationship value with suppliers:

1. Sustainable: the supplier should provide the same value to the customer over time by constantly adapting to the customer requirements.

2. Risk-free: the supplier should be able to guarantee a risk-free experience for the customer where support requests are resolved within the timelines required by the customer.

Questions: 1.) What kind of customer support model do you see that is best for mHealth? 2.) Since mHealth is a service related to people's health, do you see that response times to customer support requests and change requests should be shorter?

Business is more and more services business nowadays and therefore it is important to know how stakeholders emphasize the importance of customer support related to mHealth services.

5.3.4 Relationship Value with the End Customer

This type of value refers to the relationship with the end customer, which business to choose and which customer groups to target.

Questions: 1.) Do you think that there are clear business models for mHealth? 2.) Who do you see as your end customer?

Business models are not always clear and either it is not always clear who the real end customers are. Therefore it is good to clarify this from the stakeholders.

5.3.5 Brand Value

The brand of the software and the supplier are value drivers for customers and there are two key attributes that can be associated with brand value:

1. Supplier reputation: customers trust software that is from a reputable supplier brand that they can trust.

2. Software reputation: customers rely on the mobile platform reputation as their selection criteria.

Questions: 1.) How do you see the Ericsson brand in healthcare technology business? 2.) How do you see the mHealth brand, is it well known?

A good brand is really valuable for a company. The case company has a good brand in its traditional business, but it should be solved how the brand is seen when talking about healthcare vertical business. It should also be solved how mHealth is seen in general; people's knowledge about mHealth.

5.4 Theme Interviews

Altogether six theme interviews were carried out during year 2013. There are a few main reasons why the number of interviewees was this low. First, this field of business is very new and there is not much business or experience even globally. Second, the economic situation limits the investments especially to new technology such as mHealth and the case company's customer base in mHealth is still small. Therefore customer interviews were hard to get. Third reason is the internal case company strategy, where different countries have differing focus to verticals such as mHealth. This has restricted the willingness of some internal employees to answer to questions regarding mHealth.

The following Sections sum up the responses from the interviews question by question followed by the researcher's analysis based on the responses.

5.4.1 Functional Value

When talking about solutions to mobile phones it is quite obvious that the ease of communication would be highlighted. It was clearly shown also in these responses that easiness and communication are the key factors that drive mobile phone solutions such as mHealth. Healthcare workers access to medical data and patients possibility for direct communication with nurses and doctors are crucial. In Table 14 below Strategic Marketing Manager gives four key choices as most important functionalities in mHealth:

· Education and collaboration functionalities.
· Option for direct communication with doctor
· Reminders
· Built in treatment path schedule and next steps recommendations

Table 14. The most important functionalities in mHealth (Strategic Marketing Manager, theme interviews).

The most important functionalities in mHealth according to a Strategic Marketing Manager, seen in Table 14: a) education and collaboration functionalities, b) option for direct communication with doctor, c) reminders and d) built in treatment path schedule and next steps recommendations. The option for direct communication with the doctor

is what mobile systems are expected to offer. Small consultations could be done or medical examination results could be given using a mHealth service instead of physical appointment. Reminders and built in treatment paths and recommendations can be seen as one very important function group. Healthcare is following the universal path where costs must be decreased from all possible areas. Early discharge from the hospital is one the ways to save money because every night spent in hospital costs money, depending on the treatment. If medically possible, patients could be discharged to home earlier than before, supported by mHealth. Remote monitoring together with treatment paths and recommendations could help in the healing process at home more efficiently than before. mHealth doesn't aim to help only patients; it offers several benefits also to the healthcare personnel:

> Health worker empowerment: all the way from enabling more efficient data collection, appointment scheduling and planning, to education through mobile phones (mHealth Programme Coordinator, theme interviews).

Depending on the task given, mHealth could streamline many of the process related to that task. If simplified, that could for example mean that things do not have to be documented twice anymore, first to paper and then to digital format. Education is also an area which was adduced in the interviews. Especially in the developing countries a mobile phone could be a powerful tool for spreading health knowledge and awareness. The mobile phone technology and its functionalities have different kind or roles depending if we are talking about developed or developing countries. In western developed countries mHealth is seen more of a supporting system along with the existing healthcare ecosystem, e.g. patient remote monitoring after surgery. In developing countries the role of mobile technology can be bigger. In those countries the healthcare ecosystem does not exists or it is incomplete. Since the basic concept of mHealth system is quite simple (Section 3.1) but nevertheless powerful and easily scalable, it could be a justifiable option when building healthcare information technology systems in developing poor countries. For western countries it offers supporting value and cost reductions possibilities with fairly low investments.

Responses show that in order to succeed, first priority is the interoperability with existing healthcare systems, national health reporting systems, health insurance reporting systems, operator billing/provisioning systems etc. Again different conditions apply to rural areas where connectivity is poor and connection is at least slower and therefore the amount of transferred data cannot be big. Instead of real time data (for example

heart rate) there should be more to simple, text based solutions. Interview responses show that although mHealth systems are very much based on technology, it must be kept in kind that those systems are used by people and also meant to help people's lives. Customers are the ones who define what functionalities are needed and how much those can be customized. Healthcare is a complex area also from the technology point of view; one solution is not enough, not even when targeted to a specific disease. mHealth Team Leader points out:

> Functionalities should be customizable to different healthcare systems, different therapeutic areas and different target groups within the same therapeutic area (i.e. in diabetes you have newly diagnosed, type2 diabetes as differential diagnose of i.e. CHF and type1 diabetes people who either have insulin pump or have a needle) (mHealth Team Leader, theme interviews).

The main message from these responses is that the solutions should be customizable but the main functionalities should be the same for all. One of the external interviewee responses was that they aim to have 80% of the functionality as common and 20% customizable function. Technology was not seen to play a big role what comes to phones operating system or mobile network. Access is the key and that can be established with all operating systems and network technologies, naturally depending on the location. The offered mHealth solution should adapt to the market situation, conditions and service requirements. It might however be a risk to make solutions to only one mobile phone platform, such as Android. It is seen that different market segments and even geographical areas differ on the mobile phone platform market share. This is how eHealth Portfolio Manager from a Mobile Network Operator sees the role of technology platforms:

> This is very dependent on geography and customer environment. If you need to interact with all end users you have to cover as many operating systems as possible. For example iOS is a common platform in the developed world but in Africa, Apple has only bit smaller markets share with much less growth potential than Android. They should ideally support as wide a range of network capabilities as possible but again, for example LTE is not widely available in Africa (although this will change in the next 5 years) (eHealth Portfolio Manager, theme interviews).

Mobile networks develop constantly just as mobile phones giving more possibilities for solutions due to growing data speeds etc. This should be kept in mind in the development work but not to forget the more simple functionalities and networks.

5.4.2 Cost/Sacrifice Value

The following statement was said by a System Manager from Ericsson who works with many different kind of solution areas:

> It increases the patient base, meaning you can cure more patients at the same time. Due to economy of scale, there is a possibility of medical costs going down over a period of time. It also avoids needless visits of the patients thereby allowing the doctor to treat new patients. By providing patients value added services in healthcare, it also generates alternate source of revenue (System Manager, theme interviews).

That statement also abstracts quite well how the case company sees mHealth and its value to the healthcare value chain. The biggest benefits of mHealth to mobile operators are the new market segments and customer bases that are opening. As said by an eHealth Portfolio Manager:

> Enable mobile operators to move up the value chain in terms of ICT, so we can get more of the value available rather than just providing the connectivity and handsets we actually provide the ICT platform (eHealth Portfolio Manager, theme interviews).

That is the core message of new vertical business areas to mobile operators, enables them to move up in the value chain and in that way create more value to their business. The interviewed eHealth Portfolio Manager continues by saying:

> It is a differentiator which allows stickiness to our network – people may purchase a mHealth solution and with this package some the devices, connectivity, data etc. There are also social and corporate branding benefits (eHealth Portfolio Manager, theme interviews).

Not only services such as mHealth bring more customers and make them more committed. These services have also social and brand values which influence in a positive way to the company image.

When talking about biggest barriers to adoption of mHealth services, it gave more responses than the benefits of mHealth. This expresses the situation where the complete mHealth industry still is; the so-called big breakthrough has not yet happened and many of the stakeholders have still a lot of questions and even doubts. The interviewed Strategic Marketing Manager from Ericsson had a good view to this and gave a clear answer, as seen in Table 15 below:

· Finding a sustainable business case for all stakeholders.
· Reimbursement schemes.
· Patient motivation to use.
· Health professional's readiness to change present working/treatment patterns and tools.
· Availability and price of medical sensors.
· Clear evidence of financial benefits for service provider, value added for medical service provider and patient.

Table 15. The biggest barriers to adoption of mHealth services (Strategic Marketing Manager, theme interviews).

These barriers seen in Table 15 are all major barriers that should be solved. It is clear that there two main factors of barriers; financial factors and human factor. The biggest barriers were seen to be firstly in the patients and healthcare professional's motivation to start using mHealth services. That is the single most import factor when thinking how to make mHealth successful. Healthcare professionals must me first motivated so that they can influence their patients. Second major barrier that was mentioned several times is the regulation regarding healthcare and medical equipment. Not only regulations are very strict but also those are not always up to date, not taking new medical applications well into consideration. The lack of business models was also mentioned as a barrier.

5.4.3 Relationship Value with the Product/Service Supplier and End Customer

These are the views of Strategic Marketing Manager and System Manager from Ericsson when asked what is to importance of customer support in mHealth services:

> Patient support: to keep the patient motivated he/she needs to have the feeling those medical personnel is always available, using in-app messaging as well as having an open medical support hotline.
> Technical support: hospital should always have the option to contact the support center in local language so 1st line technical support should always be available locally while 2nd and 3rd line can be provided from overseas (Strategic Marketing Manager, theme interviews).

> If it's about patient support, then that's the most important thing. You have to ensure that the support personal are all medically trained. There should be a multi-level triaging support starting with a nurse to a general practitioner to a specialist etc… (If you are treating a patient remotely). There should be a proper decision support system in place with the right kind of certified content (System Manager, theme interviews).

The importance of customer support is highlighted when dealing with service that is connected to human's health. There are multiple possible points of failure that must be considered. The mobile phone, mHealth application, network connection, backend server etc. are all mainly technical aspects but mHealth service requires also a lot of medical knowledge from nurses and doctors. Almost every interviewee mentioned call center as a suitable first point of contact to mHealth users. This follows the concept from many other support solutions since call centers are quite a cost efficient. Those can be outsourced to low cost countries but yet again people may require service with their own language in health related matters.

Business models were seen ambivalent among the interviewees. Roughly half thought that there are no clear business models and other half thought that there are business models but those haven't been yet used in a larger scale.

> Yes, there are several options of business models that could be implemented. However, it is much harder to build a sustainable business case and find the customer base (patients or medical institutions) that are willing to pay the price that will support the business case (Strategic Marketing Manager, theme interviews).

> There are, but it seems tough at the moment. Significant investment in infrastructure needed and therefore a public-private partnership type of models might be a success. Plus, unless the people get over the thought that the treatment is only

> possible unless they go and see the doctor, it's even tougher because the service uptake would be very slow (System Manager, theme interviews).

The biggest problem regarding mHealth business models is, thus, how to build a sustainable business case and finding the customer base. As healthcare is mostly handled by the public sector, should the partnering between private and public sector be more efficient.

5.4.4 Brand Value

Ericsson has a well-known, strong brand in wireless networks but not in healthcare. The brand is especially strong among the closest customers, mobile operators and that image and reputation should be used to boost up also the vertical business products and solutions.

> Ericsson Brand can only be considered strong in healthcare when we talk to operators. Healthcare institutions and healthcare industry generally does not consider Ericsson to be a strong player in healthcare market (Strategic Marketing Manager, theme interviews).

> I would say that Ericsson is a brand that people associate to wireless technologies. We would be very well seen as technology enablers in the area of remote healthcare. The front-ending of such services towards the patients have to be done through healthcare providers (System Manager, theme interviews).

Networked Society and Technology for Good are concepts that the case company is pushing strongly forward (Ericsson 2013). Networked Society has the same basic vision which was introduced in Section 1.1; almost everything will be connected to Internet in the future. In the Networked Society, Ericsson will be the leading advocate of Technology for Good which also belongs to the Sustainability and Corporate Responsibility program. In that vision connectivity can help people and make them more equal around the world. This could be a natural way to clarify that also the case company has products in healthcare and make its brand known to healthcare decision makers.

Overall the mHealth brand is not very strong yet. There might be several reasons to it, one is the poor economic situation and the fact that some people see mHealth as just another hype and nor worth investing to.

> In some certain sectors, but many people still think it is about mobile clinics! I do not think it is well known or understood outside of a relatively small ecosystem of health and technology providers but this is changing (eHealth Portfolio Manage, theme interviews).

There is certainly a need for making mHealth brand more known, what is it, what are its possibilities and benefits. If the case company wants to be taken as a serious player also in the healthcare market, it should definitely actively participate in making mHealth known. That would help its business and create new customer relationships.

5.5 Customer Value Proposition for the Mobile Operators

The basis for this master's thesis was the need to make Ericsson Mobile Health value proposition for mobile network operators clearer and broader. According to the case company strategy mobile network operators are the primary customer and sales channel to other stakeholders in the healthcare value chain. EMH value proposition has been almost unchanged since the case company acquired the mHealth product in 2008. Business environment is changing rapidly and therefore it was well-grounded now to make a deeper analysis into value proposition especially for mobile network operators.

Six theme interviews were carried following the structure presented in Section 3.5, conceptual framework of building a customer value proposition. This model was introduced by Shanker (2012) in Technology Innovation Management Review which is published by Carleton University in Ottawa, Canada. The TIM Review focuses on the theories, strategies, and tools that help small and large technology companies succeed (Technology Innovation Management Review 2012).

When re-building the Ericsson Mobile Health value proposition it is natural to use the same structure as in theme interviews. The Shanker (2012) value proposition structure has five main elements; Functional value, Cost/Sacrifice value, Relationship value with the product/service supplier, Relationship value and Brand value. The collected information about recent mHealth value proposition research together with the data from theme interviews is used to build the new value proposition.

Functional Value

1. Distinctive: the functionality should be different from other market offers, providing the customer with a differentiating value driver.

It cannot be proved that Ericsson Mobile Health would have functionality that competitors do not have. The overall installed mHealth base is still fairly small and therefore it is difficult to make any reliable comparison. The interview questions based on this value attributed didn't either directly ask how Ericsson Mobile Health ranks among mHealth vendors.

2. Sustainable: the functionality and quality should remain the same over time.

As mentioned in point 1, the mHealth product is still new and there is not any user experience data available from a long period of time that could be used to define if the functionality quality remains the same over time. However, Ericsson has a long history in R&D within mobile networks and has the experience to develop its products. That strong brand gives new customers the promise of good quality products.

3. Extensible: customers should be able to extend the core functionality of the product to interface with their software and services.

The interviews clearly indicated that this is one of the most important value attributes; first priority is the interoperability with existing healthcare systems, national health reporting systems, health insurance reporting systems, operator billing/provisioning systems etc. Ericsson Mobile Health has been designed to that it can have an interface to multiple systems.

> Ericsson can – based upon feasibility - offer system integration services and integration of new types of medical sensors. This development will be managed in a separate "customer-specific" project (development / implementation / integration) (Ericsson 2012).

4. Customizable: customers should be able to customize a solution to suit their specific needs.

Customization was also seen as an important possibility regarding mHealth services. One of the interview responses was that their organization has principle of keeping 80% of the functionality as common with a 20% customization function. This could be seen as a guiding principle, where most of the functionality stays the same and small part of it is customizable. This principle helps the product development to have a clear strategy. Ericsson Mobile Health can be customised to some extent, e.g. language options are naturally such. As mentioned in point 3., the customizations are done as a separate project outside the core product development.

5. Simple: users should be able to understand the functionality of the software with a reasonable amount of effort.

Again not enough user experience data is available to determine whether Ericsson Mobile Health functionality is understandable with a reasonable amount of effort.

6. Adoptable: the software should be usable in the customers' environment without them having to make major changes to their internal environment

This *adoptability* value attribute links to *extensibility and customizability attributes.* Customer environment vary in different ways and it is not possible neither reasonable to try to make software that adapts to all possible environments. Ericsson Mobile Health solution aims to be as adoptable as possible, where the Backend System is the mains interface towards customer's environment (Ericsson 2008).

Summary of the Functional Value Proposition for Mobile Network Operators:

Ericsson has a long experience creating end-to-end mobile network solutions and this adds value also to mobile network operators in mHealth services.
The interoperability with existing healthcare systems is a requisite and is achieved with system integration services and integration of new types of medical sensors that Ericsson offers.

Cost/Sacrifice Value

1. Distinctive: the sacrifice between "give and get" components for the customer should be less than other alternatives.

This was a difficult area for the interviewees, maybe because the customer share of all interviewees was minimal. However valuable comments were received from one of the mobile network operator's eHealth Portfolio Manager:

> Enable mobile operators to move up the value chain in terms of ICT, so we can get more of the value available rather than just providing the connectivity and handsets we actually provide the ICT platform." (eHealth Portfolio Manager, theme interviews).

> It is a differentiator which allows stickiness to our network – people may purchase a mHealth solution and with this package some the devices, connectivity, data etc (eHealth Portfolio Manager, theme interviews).

It is obvious that mHealth is still seen as a risk among mobile network operators but the potential behind the risk is big, MNOs are expected to command about 50% share of the overall market, corresponding to US$ 11.5 billion, in 2017 (PwC & GSMA, 2013). The strong already existing business relationships between Ericsson and mobile network operators can be seen as a value adding element. Yet the risk is there, but a well-known and reliable partner in the new business are would lower the barrier to make investments.

2. Measurable: there should be significant cost savings for the customer in comparison to other market offers or making the software in-house.

Cost savings to mobile network operators customer depend on the business model to be used (Section 3.1.2 Ericsson Mobile Health Business Models) and therefore cannot be argued unambiguously. General research shows that there are significant cost savings related to mHealth:

> Mobile technology has the potential to increase both the efficiency and reach of healthcare services – maximizing healthcare professional's time - while also reducing costs of maintaining the delivery of quality healthcare along the value chain (The Boston Consulting Group 2012: 2).

3. Sustainable: the customer should perceive the sacrifice between "give and get" components as being worth it over time.

According to the internal case company analysis, financial investments to mHealth will start to make profit approximately latest in two years from the start. There are also other than financial elements worthwhile to the customer such as social and brand factors, as said by the interviewed eHealth Portfolio Manager.

4. Adoptable: the effort required to overcome barriers to adoption should be perceived as worth it to the customer.

Interviews indicated that the most concerning barriers seen to affect mHealth business were healthcare professional's motivation to start using mHealth services and regulation regarding medical devices. These are both elements that belong to the complex healthcare ecosystem. Increasing the overall knowledge about mHealth systems among healthcare professionals would make the acceptance of mobile solutions in medicine easier. That would overtime have also a positive affect to regulations when mHealth systems are more common. The case company has had a big influence to the evolution of mobile networks. For example company's presence in the annual Mobile World Congress in Barcelona is important. It is an event where all the vendors present the latest technological releases. If the case company would strongly defend mHealth in this kind of events, it would most probably have an effect to mobile networks operators and their customers.

Summary of the Cost/Sacrifice Value Proposition for Mobile Network Operators:

The significant status of Ericsson in wireless technology adds value to its customer when moving into new business areas, such as healthcare where the expected ROI is notable.
mHealth requires investments from the mobile network operators but the various business models that Ericsson has to offer help to create new partnerships in the healthcare value chain and decrease the investment risk. Ericsson Mobile Health services will help mobile network operators to retain customers and attain new ones.

Relationship Value with the Product/Service Supplier / Relationship Value with the End Customer

1. Sustainable: the supplier should provide the same value to the customer over time by constantly adapting to the customer requirements.

Customer requirements change together with the operational environment. This is one of the strengths of Ericsson. It is a big company which invests to research and customer relationships, staying one step ahead so to say.

> Ericsson's Customer Relationship Management (CRM) is about providing a holistic and transparent a view of the customer as possible, and optimizing a business relationship which is intended to be developed over time. (Ericsson 2010).

2. Risk free: the supplier should be able to guarantee a risk-free experience for the customer where support requests are resolved within the timelines required by the customer.

Every business has its risks, so it is impossible to say that neither Ericsson Mobile Health would be risk free. However the case company has put a lot of effort to support its customers.

> Ericsson's broad portfolio of support services delivers network availability, stability, operational efficiency and service continuity. The foundation of Ericsson's support offering is the Secure Support service. This package can be complemented with value-added Ericsson services such as Assure, Proactive Support, Software Update Management, Special Event support and Extend in order to respond to different operator needs (Ericsson 2010).

Interviews clearly indicated the highlighted role of customer support in mHealth services. One of the issues were that there should always be 1st line service available with the customers own language. mHealth customer support solutions has to multi-layered since it requires both medical knowledge as well as technical knowledge from mobile phone technology to mobile network technology.

Summary of the Relationship Value Proposition for Mobile Network Operators:

Ericsson is a trusted business partner to mobile network operators and continuously invests to research, development and innovation.
Strong experience from end to end customer support helps customers to start offering new services.

Brand Value

1. Supplier reputation: customers trust software that is from a reputable supplier brand that they can trust.

Brand is an advantage for Ericsson. As mentioned in Section 3.1.1, SWOT analysis from Ericsson internal Verticals Strategy Review, Ericsson is a neutral Swedish company and has no political burdens because of its background. The Ericsson brand is well known and company has good business relationships to mobile network operators. Clear discovery from the interviews was that Ericsson is not yet thought as a vertical business company at all. In this case healthcare technology and Ericsson are not connected in people's minds. One of the interview responses gives a good picture of the situation:

> Overall, telco's (telecommunication companies) do not have a brand in that area and that's the reason why they are coupling with health recognized brands to launch their activities (mHealth Team Leader, theme interviews).

The strong brand that Ericsson has can be seen as a value adding element despite the fact that it is not yet known for its healthcare technology area. It can be seen as a possibility to make new kind of business connections with recognized health brands as mentioned in the interview above.

2. Software reputation: customers rely on the mobile platform reputation as their selection criteria.

As already mentioned in this Section before, Ericsson has long history and a good reputation in software development. This value attribute can however have a broader meaning. When talking about software reputation it usually means the reputation of the whole mobile platform reputation, most usually iOS, Android or Windows in mobile phones.

> This is very dependent on geography and customer environment. If you need to interact with all end users you have to cover as many operating systems as possible. For example iOS is a common platform in the developed world but in Africa, Apple has only a bit smaller market share with much less growth potential than Android (eHealth Portfolio Manager, theme interviews).

This statement says it well and comes again down to customizability. One option solution will not be enough in today's world, consumers and decision makers demand more. At the moment Ericsson Mobile Health is designed on Android platform. It is understandable that in the early phases of product development it's not even wise to make many different so-called software tracks. If the mHealth business starts to flourish for Ericsson, it might be good to consider if other mobile phone software platforms could be used as well.

Summary of the Brand Value Proposition for Mobile Network Operators:

Strong neutral and well-known brand of Ericsson helps mobile network operators to build their new business. The presence of the world's biggest mobile network vendor brings credibility to the complex healthcare value chain.

6 Key Stakeholder Feedback of the Proposed Customer Value Proposition

This Section concentrates on the views of the preliminary customer value proposal and to the final CVP based on the feedback given.

6.1 Views on the Value Proposition

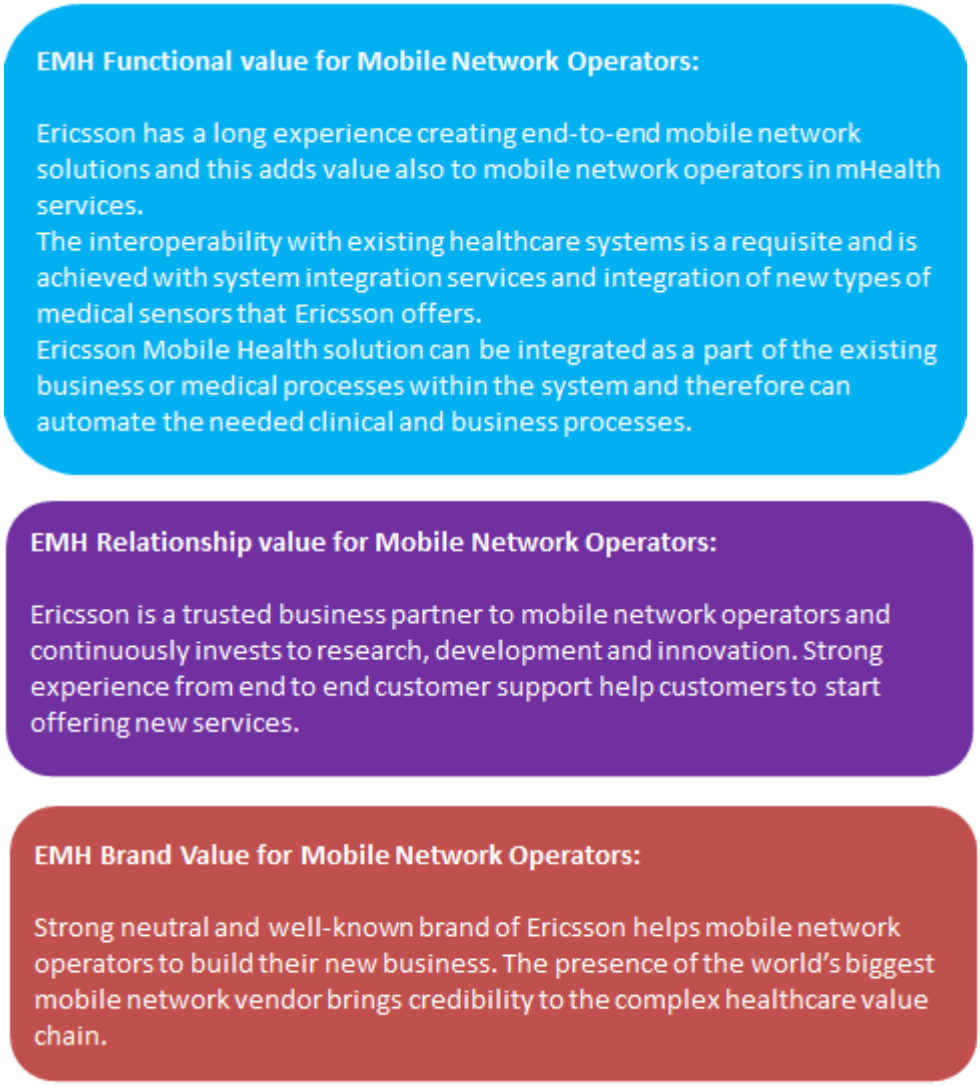
After the preliminary CVP (Section 5.5 Customer value proposition for the mobile operators) was composed, the key stakeholders of EMH were asked to review it, give their opinions and amendments. The following direct speech is the feedback that was received:

> In general, I think this is great work – I really like the approach you have undertaken in defining the VPs. For sure, this is a great tool that can be used to define the value for customer in any market segment, not just healthcare – and I plan to leverage on that in the future. There are two comments that I have to add.
>
> 1. When talking about integration with existing healthcare systems, apart from talking about integration in terms of SI – with other health TI systems or new sensors – it is important to underline the integration of mHealth services with existing business or medical processes within the system. Meaning that automation of clinical and business processes needs to be enabled by the mHealth solution that we would like to market.
> 2. To achieve a higher value return for the cost/sacrifice needed, it should be stressed out that moving upstream in value chain, in terms of business model complexity, is mandatory. If pursuing only connectivity fees, the value provided in minimal for operator. Providing a full e2e service and taking a leading role in building of ecosystem is what actually provides differentiation I n the market.
>
>   As I can see, you have already assumed that is needed to get the distinction, but I miss it in the value proposition (Strategic Marketing Manager Ericsson)

The overall feedback about the proposed value proposition was good. Especially the approach how value was defined was appreciated; it was seen as a tool that can be applied also in other market segments. Two improvement comments were received regarding Cost/Sacrifice value and Functional value. Those will be applied to the final customer value proposition presented in Section 6.2.

6.2 The Final Customer Value Proposition

This final proposition shown in Figure 20 below is based on the preliminary version and on the feedback that was received from the internal stakeholders.



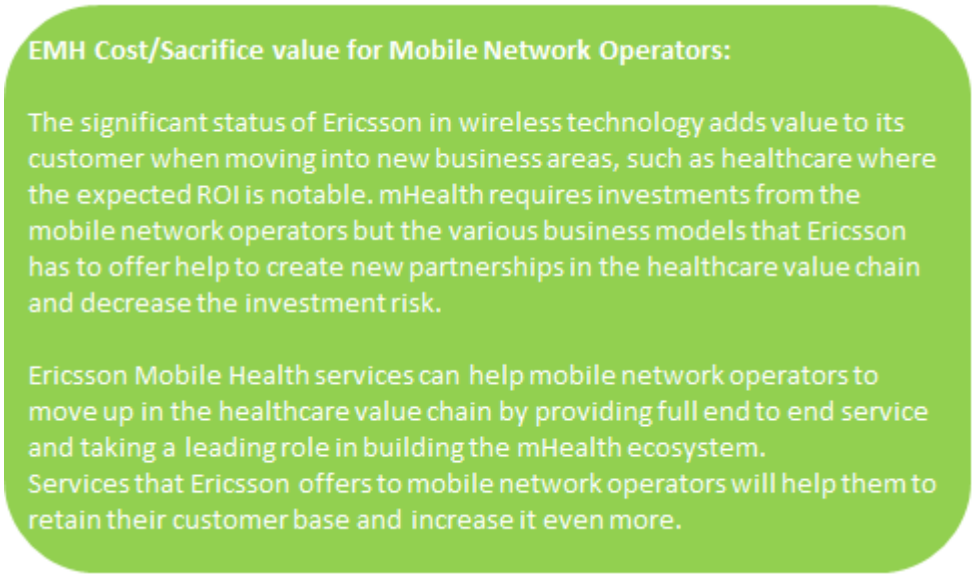


Figure 20. Ericsson Mobile Health Customer Value Proposition for Mobile Network Operators.

This value proposition seen in Figure 20 represents the current business situation. The healthcare information technology business environment is constantly changing as well as the specific mHealth business. The mHealth business is still young and is still seeking its final shape. When more experience is gained from the use of Ericsson Mobile Health this value proposition for mobile network operators will most likely also further develop.

7 Conclusions

This Section summarizes this Master's thesis, looking into outcome of the research and to the reliability and validity.

7.1 Evaluation

Taking Ericsson Mobile Health Customer Value proposition as the subject for the final thesis was a big challenge for the researcher. Traditionally CVP belongs traditionally to sales and account management so looking into it from the engineer role required a lot of work. The starting point for the thesis work was not ideal. The researcher works at Ericsson Finland where there is now sales or R&D activity regarding mHealth, that is all handled from Ericsson Croatia. The fact that communication with EMH management had to be handled by phone or e-mail and there was no face to face contact made things a bit complicated but not impossible. The economic depression did not affect only to customers but also internally. In certain geographical areas some of the internal management was a bit cautious about vertical business and did not want to use too much time or resources for investigating vertical business opportunities, especially concerning healthcare.

Ericsson Mobile Health in Croatia was really helpful and they provided valuable information to this research. With their help, it was also possible to contact some mHealth experts globally and ask their views on the value proposition. The thing which was seen more complicated was contacting the customers, mobile networks operators. There were some views that customers should not be bothered with some thesis interview. This was most probably due to the tight competition and sensitive market situation, no risks wanted to be taken what comes to customer relations.

As whole, the researcher sees that this thesis was quite successful. The objective set to this work was reached and a new customer value proposition was composed. The only major drawback was seen in the number of interviewees, altogether six stakeholders were interviewed. The end result might have been even more refined if more views could have been received.

7.1.1 Objective vs. Outcome

The objective of this thesis was to answer the question: What is the value of Ericsson mHealth services to mobile operators? Further based on that, a customer value proposition was composed. There was an existing, though not very structured customer value proposition from 2008 as a basis for this work. It did not however have an impact on the research process. All the findings, which enriched the initial framework, were made from theme interviews and can therefore be considered focused on the case company. Some similarities were found between the CVP from 2008 and the CVP composed in this thesis project. This fact supports the reliability of the new customer value proposition, but now the structure is clearer and the content of the CVP cover a wider area.

The new customer value proposition received good feedback from internal stakeholders, especially the way it was constructed. It was found as a useful way to define customer value:

> For sure, this is a great tool that can be used to define the value for customer in any market segment, not just healthcare – and I plan to leverage on that in the future (Strategic Marketing Manager Ericsson)

The outcome of the study also meets the objective that was set in this thesis. Only time will tell how useful it is to Ericsson Mobile Health and how well it supports the sales. Technology and business environment is constantly changing so consequently the customer value proposition must also adapt to changes.

7.1.2 Reliability and Validity

When talking about reliability in qualitative research, trustworthiness is its key element. As Seale (1999) argues:

> Trustworthiness of a research report lies at the heart of issues conventionally discussed as validity and reliability (Seale 1999: 467).

Stenbacka (2001) supports this view by saying that since reliability issue concerns measurements then it has no relevance in qualitative research.

> The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable (Joppe 2000:5).

This definition of reliability in research above by Joppe (2000) concentrates on how the research should be replicable or repeatable. This thesis was based on action research where the theme interviews were the essential part of data collection. If this research would be repeated by some other researcher, the might be some differences in emphasizing some of the customer value areas. Other researchers may approach this business problem with some other conceptual framework which could also have an effect to the end result. Nevertheless, the basic concepts in value creation are the ones which are discussed in Section 4 Best practices of building customer value proposition. Therefore it can be said that the end result could be more or less the same despite the personality of the researcher, which the research approach in this thesis reliable. Charles (1995) argues that:

> The consistency with which questionnaire items are answered or individual's scores remain relatively the same can be determined through the test-retest method at two different times. This attribute of the instrument is actually referred to as stability. If we are dealing with a stable measure, then the results should be similar. (Charles 1995: 102).

In the context of this study, this statement would mean that a similar customer value research should give similar results also if this study was conducted at a different point in time. However, Charles (1995) says that the measure should be stable. Customer value is concept which cannot be seen as stable. Customer value depends on many different factors and develops together with the product along time. Also Joppe (2000) criticises the view of Charles (1995) by saying that we cannot be sure that there was no change in extraneous influences such as an attitude change that has occurred.

Lincoln and Guba (1985) state that:

> Since there can be no validity without reliability, a demonstration of the former [validity] is sufficient to establish the latter [reliability;] (Lincoln and Guba 1985: 316)

There has been a lot of discussion about the term validity among qualitative researchers. At the same time they say that validity is not applicable to qualitative research but they also agree on that there should be some qualifying check for the studies. Creswell and Miller (2000) state that:

> The validity is affected by the researcher's perception of validity in the study and his/her choice of paradigm assumption (Creswell and Miller, 2000: 124).

This has resulted in various concepts if validity among researchers, e.g. Lincoln and Guba, 1985; Seale, 1999; Stenbacka, 2001. According to Cho and Trent (2006) there are two general approaches to validity, transactional and transformational validity:

> We define transactional validity in qualitative research as an interactive process between the researcher, the researched, and the collected data that is aimed at achieving a relatively higher level of accuracy and consensus by means of revisiting facts, feelings, experiences, and values or beliefs collected and interpreted.
> …
> We define transformational validity in qualitative research as a progressive, emancipatory process leading toward social change that is to be achieved by the research endeavour itself. Such a process in qualitative research, as a critical element in changing the existing social condition of the researched, involves a deeper, self-reflective, empathetic understanding of the researcher while working with the researched (Cho and Trent 2006: 321).

This thesis should be examined using transactional validity. Cho and Trent (2006) describe validity as a transactional process consists of techniques by which misunderstandings can be adjusted and thus fixed. One of the techniques is member checking. Lincoln and Guba (1985) as well as Hammersley and Atkinson (1995) see member checking as 'the most crucial technique for establishing credibility'. It is a throughout inquiry process where the collected data is presented back to the informant to check for perceived accuracy and reactions.

As seen from the research process model of this thesis in Figure 5 the proposed Customer Value Proposition was presented to key stakeholders before composing the final proposition. This was done to make sure that all agree on the CVP and that there aren't any misunderstandings. It can be therefore said that the validity of this thesis was verified using transactional validity approach and the member checking technique.

The researcher does not belong to the Ericsson Mobile Health from the organizational point of view. Nevertheless, the case company has flexible, organizational boundaries crossing cooperation, which has also made this Master's thesis possible. The researcher is located in Finland and EMH organization in Croatia, so there has not been any face to face communication. This has not been any obstacle; the researcher has had access to all relevant information regarding EMH using the case company's internal systems. The support from the intra-company stakeholders has been absolutely crucial to the success of this thesis. These stakeholders have been participating to this thesis process from the very beginning and have offered advices when needed.

What can then define the credibility of the researcher in this study? What made the researcher to choose this topic? The researcher himself is not working with Ericsson Mobile Health in his daily work, yet in the company. This can be seen both as an asset as well as a weakness in this study. Being a member of the EMH team would possibly give more advantage to the research, but at the other hand looking to this subject from outside gives clear view. This view is possible through the case company business and product knowledge, over six years working an engineer in the company.

The value proposition formed in this Master's thesis is based on the best practices of creating a value proposition, according to literature and to the views of internal and external stakeholders of Ericsson Mobile Health. It is possible that some other researcher might choose another view from the literature on creating a value proposition. Also, if other stakeholders would have been interviewed they could have offered some other views to this matter. Regardless of that, this value proposition is the best possible on these conditions. This new Ericsson Mobile Health Value Proposition for Mobile Network Operators has been accepted by the key intra-company stakeholders and will be used from now on supporting the EMH sales.

Finally, the mHealth industry is new and therefore also from the case company point of view there are not that many completed projects so far. However, the interviewees selected to this study have been involved in mHealth development from the beginning and have also strong customer relation experience regarding verticals such healthcare. They are among the key people who are bringing this industry forward and more known to people. That is a strong argument to support the reliability claim of this study.

7.2 Summary

The research question of this study was: *What is the value of Ericsson mHealth services to mobile operators?* The objective was to define a Customer Value Proposition (CVP).

This thesis project began already in the beginning of year 2012 when Ericsson started to introduce its new vertical business and new business areas; Utilities, TV&Media, Transport, Government and Healthcare. Ericsson Finland had mainly been active on the TV&Media business but the business on the other vertical was still to be started. In the fall of 2012 the researcher started his Master of Engineering studies in Healthcare Business Management program at the Metropolia University of Applied Sciences. This Master's Thesis belongs to the studies thinking about the Healthcare vertical area. After some discussions with Ericsson Key Account Manager, it was found out that there had been some initial discussions about selling Ericsson Mobile Health services to Finland. However, after further discussions with the Account Management it was found out that EMH needed a stronger customer value proposition. Therefore EMH R&D in Croatia was contacted if defining a customer value proposition would suit their needs.

The actual work started with defining more clearly the business problem and objective for this thesis. That was followed by the literature review about building a customer value proposition and finally defining the conceptual framework. Value as such is not an unambiguous concept. First impression of value maybe financial but value is also many other things, especially in healthcare related matters. Value proposition is a complex theme which builds from many different parts of industry, company and its personnel. In that sense it can be said that qualitative research is a good way to study customer value proposition.

Conceptual framework was one of the key essentials of this thesis; it shaped the questions to theme interviews and at the end formed the structure for the customer value proposition. Theme interviews were the most challenging part of this process. Internal stakeholders were naturally easy to contact and they were very helpful from the beginning. Problematic was getting the views from external stakeholders, meaning mainly mobile network operator representatives. The customer base of EMH is still fairly small and mobile network operators are cautious in making investment and moving into new

business areas, all due to the economic depression. After all, some customer views were managed to get, which was crucial to the success of this thesis.

The results from the interviews were grouped based on the value theme and then analyzed into a proposal as the new Ericsson Mobile Health Customer Value Proposition for Mobile Network Operators. This proposal was then presented to the EMH key stakeholders and based on their feedback some small adjustments were made to the final value proposition. The final value proposition consists of four parts: a) functional value, b) cost/sacrifice value, c) brand value and d) relationship value.

EMH Functional value for Mobile Network Operators:
Ericsson has a long experience creating end-to-end mobile network solutions and this adds value also to mobile network operators in mHealth services. The interoperability with existing healthcare systems is a requisite and is achieved with system integration services and integration of new types of medical sensors that Ericsson offers. Ericsson Mobile Health solution can be integrated as a part of the existing business or medical processes within the system and therefore can automate the needed clinical and business processes.

EMH Cost/Sacrifice value for Mobile Network Operators:
The significant status of Ericsson in wireless technology adds value to its customer when moving into new business areas, such as healthcare where the expected ROI is notable. mHealth requires investments from the mobile network operators but the various business models that Ericsson has to offer help to create new partnerships in the healthcare value chain and decrease the investment risk.
Ericsson Mobile Health services can help mobile network operators to move up in the healthcare value chain by providing full end to end service and taking a leading role in building the mHealth ecosystem. Services that Ericsson offers to mobile network operators will help them to retain their customer base and increase it even more.

EMH Brand Value for Mobile Network Operators:
Strong neutral and well-known brand of Ericsson helps mobile network operators to build their new business. The presence of the world's biggest mobile network vendor brings credibility to the complex healthcare value chain.

EMH Relationship value for Mobile Network Operators:

Ericsson is a trusted business partner to mobile network operators and continuously invests to research, development and innovation. Strong experience from end to end customer support help customers to start offering new services.

These four value types and value propositions put together form the Ericsson Mobile Health Value Proposition for Mobile Network Operators. As mentioned in Section 6.2, this value proposition represents the current situation in mHealth business.

8 References

Anderson J C, Narus J. A., and van Rossum W. (2006). Customer Value Propositions in Business Markets. *Harvard Business Review*. Vol. 3, pages 92-99.

The Boston Consulting Group (2012). The Socio-Economic Impact of Mobile Health: Discussion paper. The Boston Consulting Group.

Bradbury, D. (2012). Following the Money: Funding Incentives and Disincentives: Vodafone mHealth Solutions. Vodafone.

Brock S.J. and Colgate M. (2007). Customer Value Creation: A Practical Framework. *Journal of Marketing Theory and Practice*. Vol. 15 (Issue 1), pages 7-23.

Buccoliero, L (2008), A Methodological and Operative Framework for the Evaluation of an eHealth Project. *International Journal of Health Planning and Management*, Vol. 23 (Issue 1), pages 3-20.

Charles, C. M (1995). *Introduction to educational research*. Ann Arbor, Michigan: Longman Publishers.

Cho, J. and Trent, A. (2006). Validity in qualitative research revisited. *SAGE Publications*, pages 319-430.

Coghlan, D. and Brannick, T. (2010). *Doing Action Research in Your Own Organization*. London: SAGE Publications Ltd.

Creswell, J. W. & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, Vol.39 (Issue 3), pages 124-131.

Dobberstein, N. and Ghee Chua Soon (2012). Mobile Network Operators as 'Smart Enablers'. A.T. Kearney.

Ericsson (2012). Ericsson Mobile Health: Case company presentation. Ericsson

Ericsson (2012). Ericsson Mobile Health: Internal and External Factors Business Model Analysis. Cordial Business Advisers.

Ericsson (2012). EMH Business Guide. Ericsson.

Ericsson (2008-2013). EMH Technical Product Description. Ericsson.

Ericsson (2012). This is Ericsson: Case company presentation. Ericsson.

Ericsson (2010). Towards 50 Billion connected devices: Discussion paper. Ericsson 2013.

http://www.ericsson.com/ourportfolio/products/customer-relationship-management
Description of Ericsson Customer Relationship Management. Ericsson 2013.

http://www.ericsson.com/ourportfolio/services/support
Description of Ericsson Support. Ericsson 2013.

http://www.ericsson.com/thinkingahead/networked_society
Description of the Ericsson Networked Society. Ericsson 2013.

Ericsson in partnership with the Digital Health Initiative Discussion (2010). Challenges and Opportunities in Scaling up Digital Health: Discussion paper. Ericsson and Digital Health Initiative.

Hammersley, M. and Atkinson P. (1995). *Ethnography: Principles in Practice*. New York: Psychology Press.

Jansen P. and Giesen D. (2010). Business Models for eHealth: Results from an EU Project. Capgemini Consulting.

Johnson, Scholes and Whittington (2009). *Fundamentals of Strategy*. Jersey: FT Press.

Johnson M.W., Christensen Clayton M. and Kagermann H. (2008). Reinventing Your Business Model. *Harvard Business Review,* no.12, pages 1-12.

Joppe, M (2000). The research process. School of Hospitality & Tourism Management.

Kaplan, R.S. and Norton, D.P. (2004). *Strategy Maps: Converting Intangible Assets into Tangible Outcomes.* Boston: Harvard Business School.

Labrique, A. (2013). Success In mHealth: Shifting Focus From The 'm' to The 'Health'. *Forbes*. Vol. 5, pages 1-2.

Lincoln, Y.S. and Guba E.G. (1985). *Naturalistic inquiry*. Dallas: SAGE Publications.

Linder J. and Cantrell S. (2000). Changing business models: Surveying the landscape. Accenture.

Miller-Duys, K. (2013). Integrating Healthcare: The role and value of mobile operators in mHealth. Vodacom.

Orange (2013). Mobile network operators bring unique capabilities for providing secure end to end healthcare services: Discussion paper. Orange.

Patton, M.Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Services Research.* Vol.34 (Issue 5), pages 1189-1208.

Porter, M.E. (1979). How Competitive Forces Shape Strategy. *Harvard Business Review*, no. 2, pages 137–145.

PwC (2013) Discussion paper: The global mHealth market opportunity and sustainable reimbursement models. PwC.

Seale, C. (1999). *Quality in qualitative research*. Goldsmith's College, University of London, pages 465-477.

Shani A. B. and Pasmore W. A. (1985). *Organizational Inquiry: towards a new model of the action research process* in D.D Warrick (Ed), Scott Foresman. City: Glenview, pages 438 - 448.

Shanker A (2012). An Enterprise Perspective on Customer Value Propositions for Open Source Software. *Technology Innovation Management Review,* Vol. 12, pages 1-9.

Shiple, D. (2012). Enterprise mHealth Strategy. Divurgent.

Slater, S. F. (1997). Developing a customer value-based theory of the firm. *Journal of the Academy of Marketing Science*. Volume 25 (Issue 2), pages 162-167.

Stenbacka, C. (2001), Qualitative research requires quality concepts of its own. *Management Decision*, Vol.39 (Issue 7), pages 551-555.

http://www.taltioni.fi/en/partners/taltioni
Description of Taltioni. Taltioni 2013.

Woodall T. (2003). Conceptualising 'Value for the Customer: An Attributional, Structural and Dispositional Analysis. *Academy of Marketing Science Review.* Issue 12, pages 1-44.

Woodruff, R.B. (1997). Customer value: The next source for competitive advantage. *Journal of the Academy of Marketing Science.* Vol 25 (Issue 2), pages 139-153.

Appendices

Appendix 1

Value Proposition of mHealth Services - Stakeholder Interview Questions

Functional value

1.) What in your opinion are the most important functionalities of a medical technology product such as mHealth?

2.) To what extent should the functionalities be customizable to different customer needs?

3.) Which different technologies should the product support? (UE: Android, iOS, Windows; Network: GSM, WCDMA, LTE)

Cost/Sacrifice value

1.) What do you see as biggest brands of mHealth to your business?

2.) What do you see as the biggest barriers to adoption of mHealth services?

Relationship value with the product/service supplier

1.) What kind of customer support model do you see best for mHealth?

2.) Since mHealth is a service related to people's health, do you see that response times to customer support requests and change requests should be shorter?

Relationship value with the end customer

1.) Do you think that there are clear business models for mHealth?

2.) Who do you see as your end customer?

Brand value

1.) How do you see the Ericsson brand in healthcare technology business?

2.) How do you see the mHealth brand, is it well known?

Appendix 2

Summary of the theme interview responses

Functional value

	What in your opinion are the most important functionalities of a medical technology service such as mHealth?
Strategic Marketing Manager, Ericsson	1. Education and collaboration functionalities. 2. Option for direct communication with doctor 3. Reminders 4. Built in treatment path schedule and next steps recommendations
mHealth Team Leader, Ericsson	Measurement data collection, communication (chat or notification) – feedback mechanism, reminders, questionnaires, data preview, ability to choose who to share data with.
System Manager, Ericsson	Remote patient monitoring, chronic disease management, and awareness programs
Senior Engagement Manager, Ericsson	Depends on how you define mHealth. How specialized you would like to be. The most important functionalities are ease of use and accessibility of data.
mHealth Programme Coordinator, external	Developing world: - All the way from creating awareness, participation and promotion • Maternal messages • HIV/TB messages • Etc. - Diagnosis: not allowed in all the countries however where allowed it increases greatly health access especially to those living in rural areas - Monitoring: maybe even more important in the developed world however even in the developed world it can play enormous value especially in medicine adherence (i.e. adherence to ARV medication) - Health worker empowerment: all the way from enabling more efficient data collection, appointment scheduling and planning, to education through mobile phones - Health systems strengthening: • Due to lack of IT solutions, mobile phones play major role in data collection in various health facilities. When closing the loop, mobile phones also help managing and reporting. • Improving supply chain efficiencies • Drug authentication
eHealth Portfolio Manager, external	• Interoperable- this environment is very fragmented from a technological perspective and the ability to share data elements is key to promote scale • Ease of use for the customer (be they consumers or business) • Secure – there is a lot of concern about the transfer of health data so data security has to be part of the solution.

	To what extent should the functionalities be customizable to different customer needs?
Strategic Marketing Manager, Ericsson	Ideally, the system would be customized to meet the needs of the treatment process for the targeted disease. As well, if possible system should be customized I the way to allow integration with business or medical IT systems of all stakeholders that are involved (i.e. hospital IT systems, national health reporting systems, health insurance reporting systems, operator billing/provisioning system…etc.).
mHealth Team Leader, Ericsson	Functionalities should be customizable to different healthcare systems, different therapeutic areas and different target groups within the same therapeutic area (i.e. in diabetes you have newly diagnosed, type2 diabetes as differential diagnose of i.e. CHF and type1 diabetes people who either have insulin pump or have a needle).
System Manager, Ericsson	The basics remains the same, however the packaging changes. You may want to segment the patients based on demographics and package the same service accordingly so that the patient uses the same. In rural areas for e.g., the 3G connectivity might be poor, there might be a shortfall of infrastructure, electricity, medicines which might not be the case in an urban area.
Senior Engagement Manager, Ericsson	- Depends on the customer you are targeting - If we are targeting the healthcare providers, then our solution needs to be relevant to their existing IT infrastructure - If we are targeting the operators, then a generic set of functionalities should be fine. Assuming operators are targeting end users. - However, mHealth is all about devices & data. If we could allow for easy access to both device and data and provide a set of Open APIs for easy customization / adaptation by healthcare providers / application developers. That would trigger a whole new innovation/creativity around mHealth.
mHealth Programme Coordinator, external	- Depending what functionalities we are talking about as also customers. I.e. maternal messaging can be replicated for most of the part however one might consider customizing language, if need for a specific medical need (HIV, …) - I would say that we should all thrive toward developing solutions that can be replicated up to a point, however localized beyond that. I am a firm believer in primary research that determines product concept
eHealth Portfolio Manager, external	It depends on the customer type, business model, the specific project and your technology. We aim for the principle of 80% of the functionality as common (where we have developed and used it before) with a 20% customization function.

	Which different technologies should the product support? (UE: Android, iOS, Windows; Network: GSM, WCDMA, LTE)
Strategic Marketing Manager, Ericsson	This will largely depend on the market constraints in terms of technology availability in targeted market as well as customer preferences and service requirements (i.e. video collaboration needed or not).
mHealth Team Leader, Ericsson	Does not matter, since this is just access and the main issues are on levels above (security, data protection, service design, etc.)
System Manager, Ericsson	All these technologies.
Senior Engagement	UE: Android, iOS. Networks: GSM: WDCMA, LTE

Manager, Ericsson	
mHealth Programme Coordinator, external	Depending on the market. If developing world it has to work on the most basic phones.
eHealth Portfolio Manager, external	This is very dependent on geography and customer environment. If you need to interact with all end users you have to cover as many operating systems as possible. For example iOS is a common platform in the developed world but in Africa, Apple has only a bit smaller market share with much less growth potential than Android. They should ideally support as wide a range of network capabilities as possible but again, for example LTE is not widely available in Africa (although this will change in the next 5 years)

Cost/Sacrifice value

	What do you see as biggest benefits of mHealth to your business?
Strategic Marketing Manager, Ericsson	This question is more applicable to medical service providers than for the solution vendors.
mHealth Team Leader, Ericsson	Positioning in new market segment for more connected devices.
System Manager, Ericsson	It increases the patient base, meaning you can cure more patients at the same time. Due to economy of scale, there is a possibility of medical costs going down over a period of time. It also avoids needless visits of the patients thereby allowing the doctor to treat new patients. By providing patients value added services in healthcare, it also generates alternate source of revenue.
Senior Engagement Manager, Ericsson	Question not applicable to the interviewee.
mHealth Programme Coordinator, external	Question not applicable to the interviewee.
eHealth Portfolio Manager, external	Enable mobile operators to move up the value chain in terms of ICT, so we can get more of the value available rather than just providing the connectivity and handsets we actually provide the ICT platform. It is a differentiator which allows stickiness to our network – people may purchase a mHealth solution and with this package some the devices, connectivity, data etc. There are also social and corporate branding benefits.

	What do you see as the biggest barriers to adoption of mHealth services?

Strategic Marketing Manager, Ericsson	1. Finding a sustainable business case for all stakeholders 2. Reimbursement schemes 3. Patient motivation to use 4. Health professional's readiness to change present working/treatment patterns and tools. 5. Availability and rice of medical sensors. 6. Clear evidence of financial benefits for service provider , value added for medical service provider and patient.
mHealth Team Leader, Ericsson	Depending on part of the world, but if focusing on US and EU: It is not put as priority in healthcare systems, adaptation of new service (process reengineering, reimbursement), motivation of end-users, regulatory issues.
System Manager, Ericsson	Trust in such services, people are skeptical to use new technologies unless prescribed or forced by the doctor (as it deals with the life of the patient). The new services should be gradually launched in a well-planned manner. The services should be branded by a healthcare provider and not any other service provider (like for e.g. an operator)
Senior Engagement Manager, Ericsson	- Regulation - Certification of Devices
mHealth Programme Coordinator, external	In developing world: - Regulation - Government limited awareness and support - Not enough evidence - Lack of scalable and sustainable business models that would drive the industry toward higher investment
eHealth Portfolio Manager, external	- Lack of sustainable business models. Often solutions are deployed as a good idea and some donor funding with little idea of how they will sustain themselves 2,3 or 5 years later - Point solutions – that address one geographic or disease area and don't integrate or interoperate with anything else - Sufficient government regulatory support, leadership and enablement of innovation.

Relationship value with the product/service supplier

	What kind of customer support model do you see best for mHealth (if compared to some existing model, as for example WCDMA support)?
Strategic Marketing Manager, Ericsson	Patient support: to keep the patient motivated he/she needs to have the feeling those medical personnel is always available, using in-app messaging as well as having an open medical support hotline. Technical support: hospital should always have the option to contact the support center in local language so 1st line technical support should always be available locally while 2nd and 3rd line can be provided from overseas.
mHealth Team Leader, Ericsson	Support from technology vendor will be the same as for any other technology, if comparable (i.e. if we are selling platform than the same as for any other IT platform). If we are talking about e2e service, technical customer support will be channelized through medical support centers, cause they will be first customer interface (the same as with operators, end users and us).
System Manager, Ericsson	If it's about patient support, then that's the most important thing. You have to ensure that the support personal are all medically trained. There should be a multi-level triaging support starting with a nurse to a general practitioner to a specialist etc… (If you are treating a patient remotely). There should be a proper decision support system in place

	with the right kind of certified content.
Senior Engagement Manager, Ericsson	Question not applicable to the interviewee.
mHealth Programme Coordinator, external	Call centers: although they might be very expensive I am hoping if carefully interlinked to mobile operator value chain it should bring down the costs
eHealth Portfolio Manager, external	You need good customer support on all levels (connectivity, handset/hardware, and platform/application) The industry is still quite young and users still need substantial support and training to ensure adoption

Relationship value with the end customer

	Do you think that there are clear business models for mHealth?
Strategic Marketing Manager, Ericsson	Yes, there are several options of business models that could be implemented. However, it is much harder to build a sustainable business case and find the customer base (patients or medical institutions) that are willing to pay the price that will support the business case.
mHealth Team Leader, Ericsson	There are business models that could be used as real, but have not been proven on large scales.
System Manager, Ericsson	There are, but it seems tough at the moment. Significant investment in infrastructure needed and therefore a public-private partnership type of models might be a success. Plus, unless the people get over the thought that the treatment is only possible unless they go and see the doctor, it's even tougher because the service uptake would be very slow.
Senior Engagement Manager, Ericsson	It is still evolving.
mHealth Programme Coordinator, external	No. The GSMA however within Pan-African mHealth Initiative is working toward business model creation in various African countries. They are hoping to create a model that can be replicated to some point also to other countries.
eHealth Portfolio Manager, external	Yes, but these rely on partnerships between organizations and entities who are not used to partnering as often the make the most sense in pan-industry application.

Brand value

	How do you see the Ericsson brand in healthcare technology business?

Strategic Marketing Manager, Ericsson	Ericsson Brand can only be considered strong in healthcare when we talk to operators. Healthcare institutions and healthcare industry generally does not consider Ericsson to be a strong player in healthcare market.
mHealth Team Leader, Ericsson	Ericsson does not have a brand in health technology for the moment. Overall, telco's do not have a brand in that area and that's the reason why they are coupling with health recognized brands to launch their activities (most examples come from Orange France).
System Manager, Ericsson	I would say that Ericsson is a brand that people associate to wireless technologies. We would be very well seen as technology enablers in the area of remote healthcare. The front-ending of such services towards the patients have to be done through healthcare providers.
Senior Engagement Manager, Ericsson	Very weak. Ericsson is not seen as playing any role in the healthcare technology business in Asia. It is only mentioned when we talked about Networked Society. This is due to corporate decision to not focus on Healthcare and Legal and Management's concern on the potential liabilities that could be associated with Healthcare.
mHealth Programme Coordinator, external	… not sure it would be strong in South Africa, where my focus is at the moment, however it would be interesting to see results about this
eHealth Portfolio Manager, external	I was not aware they worked in health technology until recently.

	How do you see mHealth as a brand, is it well known?
Strategic Marketing Manager, Ericsson	It is definitely one of the hottest topics in M2M area. It has been explored by operators for the past 5-7 years; pharma is catching the train as well but slower due to regulatory constraints (not clear regulation) and now there is the growing number of governments that are looking into this area.
mHealth Team Leader, Ericsson	mHealth is nowadays quite known in healthcare world, at least on decision making levels. It did not reach every doctor, since implementations are not there on big scale.
System Manager, Ericsson	This is more of a hype at the moment and no real cases I have come across where this has made a difference. In a nutshell, even though this is disruptive but has a lot of barriers to be overcome.
Senior Engagement Manager, Ericsson	A lot of talks, events and pilots among healthcare providers & government regulators are ongoing but no concrete deployments have been seen. Instead, the end consumer seems to be taking a more active role in buying these gadgets directly from app store or sports gear provider e.g. Nike, Adidas, Garmin etc.
mHealth Programme Coordinator, external	Unfortunately not. However GSMA and mHealth Alliance are working hard to make it a much stronger brand
eHealth Portfolio Manager, external	In some certain sectors, but many people still think it is about mobile clinics! I don't think it is well known or understood outside of a relatively small ecosystem of health and technology providers but this is changing.