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Investigating an Open Source based platform strategy at Sony Ericsson

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Investigating an Open Source based platform strategy at Sony Ericsson

Abstract

- Title:** Investigating an Open Source based platform strategy at Sony Ericsson
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Jonas Andersson, Software Business Manager, Sony Ericsson Mobile Communication
- Purpose:** The purpose of the thesis is to investigate whether the future development of the Digital Home creates incentives for Sony Ericsson to initiate an Open Source based platform strategy.
- Issues:** The main issues presented:
- To create future scenarios of the Digital Home environment and describe its ecosystem of consumer electronics and mobile phones.
 - To investigate the competitive advantage for Sony Ericsson to implement an Open Source based platform in each of these scenarios.
- Method:** In order to succeed with the purpose, the current market situation is studied and development trends are identified. A prediction of the development of the industry is made on the basis of a Micro Delphi analysis in combination with studying written sources. Future scenarios are constructed and used as a foundation for the analysis.

Conclusions: The scenarios presented in this paper all create incentives for Sony Ericsson to initiate an Open Source based platform strategy. Such a strategy would put the company in a good position if an Open Source based platform, especially a Linux platform, would become one of the leading. An Open Source based platform has the potential to become leading due to the nature of Open Source which attracts third party development especially from Internet service providers, crucial for survival in the industry. With an Open Source based platform, there is also an opportunity for Sony Ericsson to create a common platform with Sony and together build an ecosystem of devices for the future Digital Home. However, due to the instable value chain and the uncertainty of its structure in five years, it is the authors' believe that an Open Source based platform should not constitute the single one, but be one of several in a platform portfolio where an Open Source based platform would be the long-term strategy.

Key words: Telecommunications, consumer electronics, Digital Home, Open Source, scenario analysis and Sony Ericsson Mobile Communications.

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*“Vision without action is a daydream
Action without vision is a nightmare”*

Elin & Kajsa

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The Master thesis project was the biggest academic challenge we had ever faced. However, an even bigger challenge has been to confronting the fact of graduating in January and facing a world of possibilities. Within the walls of our small office at Sony Ericsson, there have been many thrilling and complex discussions about the future telecommunication industry but nevertheless we both agree that the reflections upon life and our personal future stand for the greatest benefit of the fall 2007.

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Definitions

Application	Application software is a subclass of computer software that employs the capabilities of a computer directly and thoroughly to a task that the user wishes to perform.
Bluetooth	An industrial specification for wireless personal area networks. Bluetooth provides a way to connect and exchange information between devices such as mobile phones, laptops, PCs, printers, digital cameras, and video game consoles over a secure, globally unlicensed short-range radio frequency.
CE	Consumer Electronics include electronic equipment intended for everyday use. Consumer electronics are most often used in entertainment, communications and office productivity. Some products classed as consumer electronics include personal computers, telephones, audio equipment, televisions, calculators, and playback and recording of video media such as DVD or VHS.
DLNA	Digital Living Network Alliance. More than 100 member companies are committed to providing seamless wireless interaction between consumer electronics, mobile technology and personal computers.
Digital Home	An expression for digital equipment used in the home environment in people's everyday life.
Hotspot	A location that offers Wi-Fi access.
HW	Computer hardware is the physical part of a computer, including the digital circuitry.

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LAN	A computer network covering a small geographic area, like a home, office, or group of buildings. The defining characteristics of LANs, include their high data transfer rates, small geographic range, and lack of a need for leased telecommunication lines.
OS	An operating system is the software that manages the sharing of the resources of a computer and forms a platform for other system software and for application software.
OSS	Open Source is computer software for which the source code is available under a license. This permits users to use, change, and improve the software, and to redistribute it in modified or unmodified form. It is often developed in a public, collaborative manner. Open Source software is the most prominent example of Open Source development and often compared to user generated content.
PC	Personal Computer
SEMC	Sony Ericsson Mobile Communication
SW	Computer software is a general term used to describe a collection of computer programs, procedures and documentation that perform some task on a computer system. The term includes application software such as word processors which perform productive tasks for users, system software such as operating systems, which interface with hardware to provide the necessary services for application software, and middleware which controls and co-ordinates distributed systems.
Series 60	User Interface developed for Symbian by Nokia. Also used by Samsung.

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Symbian	Operating system for Smartphones developed in collaboration between a number of handset manufacturers including Sony Ericsson.
UI	User Interface
UIQ	User Interface developed for Symbian, owned by Sony Ericsson and Motorola.
UX	User Experience
VoIP	Voice over Internet Protocol. The routing of voice conversations over the Internet or through any other IP-based network.
Wi-Fi	A wireless technology brand owned by the Wi-Fi Alliance intended to improve the interoperability of wireless local area network (WLAN).
WLAN	A wireless local area network, which is the linking of two or more computers without using wires.
WiMAX	<i>Worldwide Interoperability for Microwave Access</i> is a telecommunications technology aimed at providing wireless data over long distances in a variety of ways, from point-to-point links to full mobile cellular type access.
3G	The third generation of mobile phone standards and technology. 3G technologies enable network operators to offer users a wider range of more advanced services while achieving greater network capacity through improved spectral efficiency.

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1 Introduction

This chapter introduces the reader to the thesis and sets its framework. A presentation of the company and the background is presented and then a problem discussion ends up in a purpose. Finally, delimitations, target group and the disposition are presented.

1.1 The Company

Sony Ericsson Mobile Communications (SEMC), a 50:50 joint venture of Sony Corporation and Telefonaktiebolaget LM Ericsson, was established in October 2001 with the mission to make SEMC the most innovative and attractive global brand in the mobile phone industry. The attempt was a challenging combination of two firms with both cultural and industrial background that turned out to be a successful one.

By combining powerful technology with innovative applications for imaging, music, communications and entertainment in their products, SEMC aim to provide interesting business opportunities for mobile phone operators and desirable products for end users globally.

SEMC is a multinational corporation undertaking product research, design and development, manufacturing, sales, distribution and customer service. Headquarters are located in London, R&D sights in Sweden, UK, France, Netherlands, India, China and the U.S.¹. For a complete structural map of the company the reader is referred to appendix 1².

As of today SEMC is a thriving company showing a 31 percentage growth on quarterly basis during the third quarter of 2007. The same quarter the company

¹ www.sonyericsson.com, 2007

² *Sony Ericsson Mobile Communications intranet*, 2007

managed to slightly exceed the profit expected by the market, despite lower revenue per product as well as lower sales than expected thanks to lowered sales and administrative costs. The revenue per product is predicted to even further decrease due to an increased price competition on the market and SEMC's entrance in cheaper mobile phone segments. However, industry analytics mean that SEMC's latest report gives a stable picture of the company, which is gaining market shares and keeping the revenue marginal up³.

This research paper is performed under supervision of the Software Business Manager, operating in the Product Business Group GSM/UMTS seen in the organizational chart in appendix 1. Consequently, the study will be made from a software strategic perspective. However, this brief company background was considered fruitful and a more detailed introduction to the Product Business Group GSM/UMTS and SEMC's software development strategy will be given initially in Chapter 4.

1.2 Background

Since the general introduction of the mobile phone in the beginning of the 90's, it has experienced a transition from strictly being a phone with which you call, to an advanced multiple-task device. The mobile phone of today has converged into also being a music player, a calendar and a camera and is for many people a substitute for several different gadgets. Content, such as music files and photos, can be stored on the mobile phone and the importance of transferring this information to other electronic devices is increasing. Since the mobile phone in this way is becoming a part of a symbiosis of electronic products, among which this development is seen in general, the question is how this development proceeds.

Apple is an example of a company, who has been very successful in making their products communicating in a seamless way. For Sony, one of SEMC's mother companies, a similar strategy would be attractive to be able to live up to new consumer requirements. However, they are facing difficulties in

³ Carlsson, B, *Stabil Rapport ändå från Sony Ericsson, DI*, 2007

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succeeding; a problem related to diverse software platforms in different products. Apple has based their product portfolio on the same software platform, whereupon the products easily communicate with each other. Sony has so far never had a common software platform for all their products but is investigating the possibilities. As of today, they are frequently using Linux Operating System and are at the same time looking into the possibilities of developing proprietary software according to an Open Source Based Strategy to be used in as many products as possible⁴. Additionally, Microsoft is nowadays not just a software company but develops products, such as X-box and the music player Zune, to have a portfolio of products that are to communicate with each other through the Microsoft operating system, Windows⁵.

The software in mobile phones was for a long time characterized by closed proprietary platforms. However, this is changing and the software development in the industry has come to head towards more standardized, open software platforms, contributing to shorter time to market and lower development costs. As a result, applications can easily be downloaded and fit on several phones regardless the brand, similar to the case of PCs. Microsoft, as the largest operating system manufacturer in the PC industry has tried to gain market importance even in the mobile phone industry and its standardized platform, Windows Mobile, runs on high-end mobile phones. As a response, Linux has taken initiatives to introduce Linux software in mobile phones and is developing a Linux Mobile platform.

At SEMC, the discussion of using an open software platform is ongoing and it is known that competitors are working with both Linux Mobile and Windows Mobile. SEMC themselves are using Open Source in the development environment as a way to cut development costs as well as direct costs for the actual software. They are also part of Symbian, an open software platform for high-end phones. However, no strategic benefits of initiating a development of an open software platform for SEMC's remaining product portfolio have been identified.

⁴ Abe, M, Sony Corporation, 2007

⁵ Wallström, M, *Microsoft lockas av trådlös underhållning*, idg.se, 2007

1.3 Problem Discussion

The background illustrates a convergence of consumer electronics (CE) as well as the importance of making these devices integrated so that they can intercommunicate. These developments are of great interest for SEMC to understand and adapt to, to remain competitive.

The definition of CE is both vague and wide. The authors have concluded that a distinction can be made between CE that are shared in the home and those that are personal, which is explained further under delimitations. Devices of both these definitions will be a part of the future scenarios but since personal devices fill a much more individual role than home devices, a distinction between them wanted to be specified. Further, CE that are related to the end user in a certain way today may not fill the same role in the world of tomorrow. Consequently, devices from both groups will play different “roles” depending on scenario and be of more or less importance in relation to the integrated home as well as the end user.

In the background it is also mentioned that both Sony and Apple are looking into using the same software platform for all products in the portfolio. Not only does that make the company’s products compatible with each other but also simplifies the process of enabling communication with products of other brands since they all operate on the same software. Microsoft is developing a proprietary software platform within which they are launching their own products. They also license the platform to a wide range of companies within the CE market, making both their own and other companies’ products compatible. Microsoft is a powerful competitor, enabling the company to expect other market players to make themselves compatible with their proprietary software.

Competitors to SEMC are also looking into the world of an open software platform by using Windows Mobile, Linux as well as Nokia’s Series 60 and influent carriers have been talking about only accepting a certain number of operating systems in the future. For example, Vodafone has said to only support Series 60, Windows Mobile and Linux Mobile. With the growing amount of, by

carriers and third party, developed applications, the cost of developing the same application for more than a few operating systems may not be agreed upon.

Finally, the fact that Google is spreading its wings within the Internet, software and telecommunication markets is of great importance to keep under observation.

This research paper aim to combine the two development paths of convergence and open software platforms to investigate whether they could be an incentive for SEMC to initiate an Open Source based platform strategy. That is a development towards a software platform not only common for SEMC products but that also reaches outside their own product portfolio and is developed in collaboration with other players in the CE market.

In the aim of summarizing the problem discussion, a hypothesis has been formulated, that makes up the foundation of the areas of inquiry. It has been stated as follows:

“On the basis of future scenarios in the CE market, of what value will it be for SEMC to initiate an Open Source based platform strategy?”

1.4 Areas of Inquiry

These are the three areas of inquiry that will be covered by the research:

1. To understand the present situation in the CE market and identify actors and factors of importance for the market and technology development.
2. To map out likely future scenarios in the CE market and diversify them with unique characteristics.
3. Carry out a cost-benefit analysis with using an Open Source based platform strategy at SEMC for each scenario. Above all explore the importance of an Open Source platform for competitive advantage and compatibility in each scenario.

1.5 Purpose

The purpose of this thesis is to investigate whether the future development of the Digital Home creates incentives for SEMC to initiate an Open Source based platform strategy.

The goal is to create reliable scenarios of the future Digital Home as well as answer the question whether SEMC should apply an Open Source based software strategy. The research also aims to give a response to whether such a strategy would be applicable in all scenarios and whether it is crucial for the competitive advantage of SEMC.

1.6 Deliverables

The expected outcome of the thesis is a written academic paper that will be reviewed by both the supervisor at SEMC as well as the one at Lund University. It will also be presented and objected upon from an academic perspective at the University.

In addition to the report, a presentation will be held at SEMC to guide strategy managers at the company in how to find a suitable strategic path regarding an Open Source based platform. This presentation will be held on the basis of a slideshow and encourage discussion as well as invited personnel to pose questions. The slideshow will also contain backup slides supporting the presentation so that it can be used as a form of report for internal use at SEMC.

1.7 Delimitations

It is regarded as crucial to determine the time perspective investigated, when creating scenarios. The timeframe for the scenarios in this paper will be 3-5 years. It has been chosen on the basis of two aspects; first of all that it is a reasonable timeframe for SEMC to develop an open software platform for their products and second of all this is a suitable timeframe to explore the future CE market within.

As already mentioned in the problem discussion CE is a wide definition, whereupon restrictions are needed to be made to it in this paper. The authors have decided to include all personal devices. However, among the home CE only the devices related to multimedia will be included. Further this excludes CE providing home security systems, lightning system etc.

Finally, the report is written from a software business perspective at SEMC and does not aim to be technologically thorough. As a consequence, there may be ideas and suggestions expressed in the paper that have a lack of technological foundation.

1.8 Target Group

The thesis will have both academic and commercial target groups. SEMC has taken initiative to this thesis in interaction with the authors and is therefore considered the primary target group. The academic target group is mainly final year students at a technical university with options taken in business strategy.

1.9 Disposition

To give the reader an overview of the outline of the paper, the chapters are hereby presented as well as a short content description to each one of them. It is the authors' belief that this will encourage the understanding of the paper and make it easier to follow.

Chapter 1- Introduction

An introduction to the paper will be given. First the background to the paper will be given as well as a problem discussion. Thereafter the areas of inquiry, the purpose and deliverables are presented. Finally, confidentiality, delimitations and target group are discussed.

Chapter 2 - Methodology

The chapter brings up various methodological approaches to utilize in research of different kinds. It determines both the research strategy and the research methodology of the paper as well as a brief description of the data collection is given. Additionally, the theoretical frame is set and the sources of criticism are defined.

Chapter 3 - Theory

The reader will be familiarized with the theory that will be applied in the analysis of the paper. First, theories of market analysis and scenario creation are presented. Thereafter, theories related to standards war, platform leadership and the technology life cycle will be explained, which are all theories that will be used when analyzing the scenarios.

Chapter 4 - Software Development

A short chapter providing the reader with an overview of Open Source software development, the software development at SEMC and the company's current Open Source strategy.

Chapter 5 - SEMC and its Environment

This chapter is opened with an identification of trends regarding the Digital Home. Thereafter, the telecommunication industry today is analyzed according to the framework of Porter's five forces. To be aware of technological and consumer trends in the Digital Home as well as to have a picture of the industry at date, is seen as crucial for the reader to follow the analysis.

Chapter 6 - Micro Delphi

In this chapter the procedure for the Micro Delphi analysis will be described as well as the results after both round one and round two. The chapter is ended with a final synthesis, creating the foundation of the scenarios.

Chapter 7 - The Scenarios

Four scenarios are presented after identifying common and diverging drivers on the basis of the Micro Delphi analysis. The scenarios are of general character, meaning that they aim to give an objective picture of the CE ecosystem not without involving names of players in the industry.

Chapter 8 - Analysis

The four scenarios are analyzed on the basis of the theory presented in chapter 3. This analysis is further focused on software platforms and is ended with a cost/benefit analysis of initiating an Open Source based strategy at SEMC.

Chapter 9 - Conclusion

Conclusions are made on the basis of the research. Industry trends will be presented and the scenarios will be briefly described. Thereafter, conclusions will be made whether there are incentives for SEMC to initiate an Open Source based strategy on the basis of the future development. Finally, the authors will comment the results of the paper and provide the reader will suggestions of future studies.

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2 Methodology

This chapter describes the methodology of the thesis. It determines both the research strategy and the research methodology of the paper as well as a brief description of the data collection. Additionally, the theoretical frame is set and the sources of criticism are defined.

2.1 Research Strategy

When initiating a research project it is important to choose a research strategy, which can be seen as a rough action plan for the research. In Martyn Denscombe's *The Good Research Guide*, five strategy paths are introduced; survey investigation, case study, experiment, action research and ethnography. Sometimes several paths can be followed and there is no right or wrong in what path to choose. However, some strategies are more appropriate than others for a certain problem and it is important to consider what strategy to pursue since it is difficult to change once the research is initiated.

2.1.1 Positive vs. Normative Economics

This paper is investigating the future of a market and what actions to consider from the resulting scenarios. Such a research is very dependent on the dynamics and relationships in the market in point and the company cannot be studied independently from various developments there. Additionally, the authors' prior knowledge will unquestionably contribute to the final result. This prevents the authors from applying positive economics. Further, the paper is meant to foresee the future and also provide recommendations to a company in the aim of achieving desirable goals, which makes it a research of normative nature.

The normative methodology is used for research of investigative and exploratory kind, fully in line with this problem⁶.

2.1.2 Strategy Approach and Considerations

To consider this research as a case study is suitable since it is performed in close relationship to SEMC as a company as well as the problem is formulated from the perspective of this single company. Throughout the project the problem will be analyzed from SEMC's perspective and the resulting recommendations will be specifically directed towards this company. One could also claim that the research strategy is of survey investigative nature, since the main part of the research will be pursued through interviews. However, the authors are of the opinion that this is a case study paper and the survey investigation is regarded as part of the methodology.

Regarding the three remaining strategies in *The Good Research Guide*, none of them are applicable to the purpose of this research paper. An ethnographical research is used to understand cultural behavior in geographical regions of different kind. Research of action is a strategy used to solve problems related to human relations and requires an unnoticed participation of the situation investigated. Finally, an experimental strategy is not applicable, since no field or laboratory experiments would be possible.

2.2 Research Methodology

After deciding on what research strategy to pursue, the research methodology is to be chosen. The methodology can be considered as the tools with which the research strategy is to be conducted. It is recommended that a research project applies more than one research tool since this eliminates the risk of supporting the research on one single result. By investigating the problem with more than one among written sources, survey investigation, interview and observation, the

⁶ Lantz, *Intervju Metodik*, 2002

results become validated by comparing them, which provides a profound foundation for the analysis. This is called the triangulation method⁷.

2.2.1 Qualitative vs. Quantitative

The terms qualitative and quantitative defines the type of research taking place. They are used to describe two contrasting positions regarding a number of dimensions. Qualitative is said to have *words* as the central analysis variable and is used to a larger extent when the knowledge of the research topic is to be further investigated and deepened. It is describing, associated with research studies of smaller scale and includes more involvement from the researcher. In quantitative research, on the other hand, *numbers* are the central analysis variable. Quantitative studies require more specific knowledge and are performed in a purpose of comparison. It is analytic, often used in research studies of larger scale and is more neutral regarding involvement from the researcher⁸.

2.2.2 Methodological Considerations and Approach

A normative research strategy is often related to a qualitative methodology. A quantitative research methodology falls short since it requires more specific knowledge and independent comparables, not being the case for an investigative and exploratory problem. The qualitative research will be performed through interviews and written surveys. Interviews are regarded to establish a more personal and deeper relation to the source, while written surveys will be conducted for further conclusions subsequent to the interviews, as those are less time consuming.

In addition to the data collection through interviews and surveys, the research involves a pre-study during which written sources will be explored. This includes media in all its forms, internal material and external literature, papers and articles.

⁷ Denscombe, M, *Forskningshandboken*, 1998

⁸ Lantz, *Intervju Metodik*, 2002

2.3 Data Collection

2.3.1 Primary and Secondary Data

Primary data, e.g. interviews, will be the main source of data and constitute the foundation for this thesis. To structure the data collection, interviews will be performed according to the Micro Delphi Method. This method has its origin in the Delphi Method, which is one of the oldest forms of future study methodologies and that is well recognized. It was developed in the 1950's and is a brilliant, simple idea to cope with the unknown future concerning a specific domain.⁹ By this method, a researcher can reach a fast consensus, the participants can be positioned anywhere around the world whereupon a direct influence by the group is avoided.¹⁰

First, experts are identified whereas they are asked to reflect upon the target topic through questions, sensitive to the key issues. Then, those answers are analyzed and a midway synthesis is created. The experts are told upon the results and asked again, with similar or on the contrary modified questions. This process is repeated until a desirable result is achieved. The analysis results in a mean of the answers, which provides the most accurate prediction of the future, as shown in Figure 1. However, the Delphi Method has its limitations, such as its time consumption and the need of a large panel of experts. Therefore, in the end of the twentieth century, Swiss scholars developed a down-sized version, without several of the shortcomings, and called it the Micro Delphi Method.

⁹ Rossel, P, 2007

¹⁰ www.12manage.com/methods_helmer_delphi_method_sv.html

The Delphi expected effect

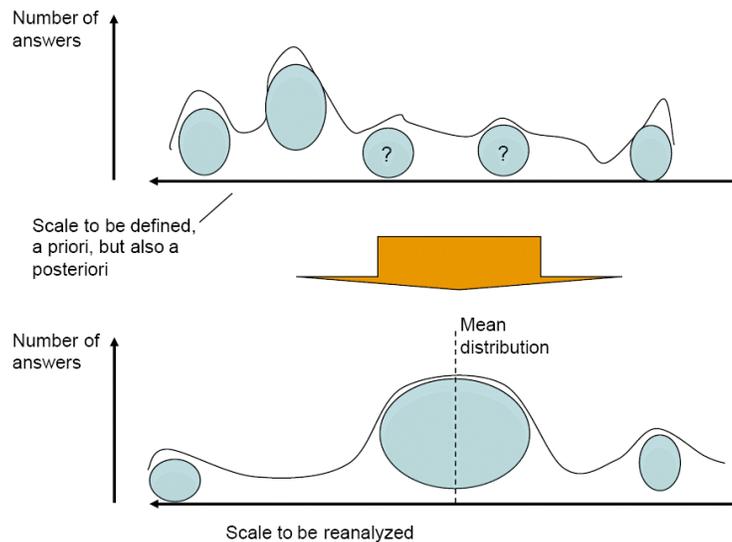


Figure 1 The Delphi expected effect¹¹

The Delphi Method can have more than two rounds of questions or undergo a continuous process, as already described. However, Micro Delphi, which aims to simplifying the procedure, keeps the idea of two rounds but no more. Additional characteristics of the Micro Delphi Method are the following:

- Short time available, focused topic
- Fewer experts, but all of them already having to cope with the topic's challenges, stakes and dilemmas in their professional activities
- Fewer questions, but also less open and broad, in fact looking essentially for key problems to reflect upon
- Functions best in emerging or even breakthrough situations where an important uncertainty is still existing

¹¹ Rossel, P, 2007

- Not statistics-minded as sometimes Delphi can be, but depth-, conditions-, reasoning, multi-dimensions and options-minded¹²

The Micro Delphi Method will fulfill the requirement to cover a broad perspective of the future CE market since both internal experts at SEMC as well as external experts from different areas will participate. The interviews will be of deep character and mainly focus on general questions although resulting questions will be of the competence-specific kind. Interviews will also be performed during the analysis process to confirm the technical aspects in the scenarios, due to the authors' finite technological knowledge.

Secondary data will be used both as an input for the scenarios and as research methodology performed in parallel with interviews and surveys and will consist of internal documents, literature, articles and Internet sources.

2.3.2 Pre-study

To set the purpose and the delimitations for the thesis, a number of discussions will be held with the Software Business Manager, the Manager Software Strategies, Chief Technology Office (CTO), and the Senior Manager, Application SW Common Functions & Strategy, at SEMC. These meetings will be carried out in the beginning of the thesis in order to get a deeper knowledge of SEMC's actual situation and internal opinions about the topic. In parallel with the discussions, gathering of secondary data such as literature, internal reports and articles will take place. The design of the questions for the Micro Delphi Method will be based on a number of trends discovered during the pre-study.

2.3.3 Main Study

To be able to give an answer to the question whether an Open Source based platform strategy will be of value for SEMC in the future CE market, an opinion of the future development must be obtained. A useful tool to do this in a structured way is the scenario method. Experience shows that it is impossible

¹² Rossel, P, 2007

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to make straightforward predictions of the future and that it is wise to picture various alternative futures¹³. Scenarios describe a special situation regarding market and other external forces and the most important purpose of the scenario method is to show the most crucial forces that drives the development¹⁴.

The scenarios of the future CE market will be built upon two parts; the pre-study as described above and the Micro Delphi Method. Through the pre-study, the authors will obtain knowledge about the future CE industry upon which a first draft of scenarios will be made. To deepen the knowledge and confirm the scenarios, the Micro Delphi analysis will be carried out.

The interviews aiming to confirm the technical aspect in the scenarios will be made when the first round of the Micro Delphi analysis is finalized and the scenarios have been identified. These interviews will be of semi-structured character and performed mainly internally.

When analyzing the scenarios, it is crucial that the authors can compare an Open Source based platform with other platforms. This will be difficult when studying a general Open Source based platform. Therefore, for the analysis, a more specific type of Open Source based platform will be studied, the Linux platform, to simplify the comparison. However, when this is made, a general conclusion for an Open Source based platform will be constructed based on the results of the analysis.

¹³ Bouwman & van der Duin, *Technological forecasting and scenarios matter*, 2003

¹⁴ Ström & Tillberg, *Smart tillväxt*, 2003

2.4 Theoretical Frame of Reference

On the basis of the scenarios, a cost-benefit analysis will be made which will answer the question whether initiating an Open Source based platform is of value for SEMC or not. Due to time limitations for the thesis, the authors have been forced to focus the analysis on a few key aspects and have therefore chosen to distinguish the most relevant theory. The scenarios will be analyzed on the basis of the following theories.

Theory about *standards wars* will be used to discuss how the standardization of this new technology will take place and provide SEMC with recommendations whether they should initiate cooperation to gain importance in the standardization process.

Crossing the chasm by Geoffrey Moore discusses the change in consumer behavior due to technological development and the difficulties for new technologies to be accepted and adopted by the majority of consumers. This will be described by the adoption curve.

The *product lifecycle* will be looked upon in relation to the adoption curve.

By using the theory about the *First mover advantage* and *attacker's advantage* the question whether SEMC should initiate an Open Source based platform before or after the competitors will be answered.

Platform leadership will be discussed since this is a possible outcome of a standards war.

2.5 Sources of Criticism

According to research methodology there are three important sources of criticism to consider; objectivity, reliability and validity¹⁵.

A research is objective when it is free from prejudice. In a qualitative research the researcher's personal opinion can be difficult to separate from the conclusions made and therefore it is important to reflect upon existing prejudice and inform the reader of biases that are unavoidable. That way the reader is aware of the circumstances under which the conclusions were made.

In this paper, the question is formed from a SEMC perspective and the answers are directed this specific company, which may affect the objectivity in a sense. However, the fact that the authors are students at an academic institution would rather indicate the opposite. Finally, the authors are both studying Industrial Engineering and Management, a fact that may or may not affect the way of solving and analyzing problems.

Reliability is a term related to objectivity, since the reliability can be adventured if the research is performed from a biased point of view. A reliable result is one that would be the same independently of who performs the research and makes the conclusions. Once again, the fact that the problem is stated from a SEMC perspective should be enlightened as well as that the author's personal experiences will influence on the result. However, to ensure the reliability of the paper, the authors will throughout the paper thoroughly explain how the research was set about, from problem specification to conclusion.

The validity reflects how solid the research strategy is perceived. To guarantee a valid result the delimitations and alternative considerations made have to be reasonable; the result is to rely upon a number of sources (triangulation) as well as conclusions made throughout the work is to be realistic. For the validity of this paper, the method of triangulation has been adopted, using interviews,

¹⁵ Denscombe, M, *Forskningshandboken*, 1998

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surveys and written sources. To reinforce the validity the authors reasoning will be clearly explained throughout the project and alternatives in methodology and sources have been evaluated. Methodologies taken under consideration were written surveys, focus groups and non-iterative interviews. However, none of them was considered as appropriate as the Micro Delphi method which includes a wide range of experts and is an iterative process. The iterative process of course has its pros and cons. The purpose with iteratively posed questions is to strengthen the outcome, but the author's can not guarantee how the experts in the panel are influenced by taking part of each others answers from the previous round. It is of course the authors' hope to reach a mean with the experts being professional by answering unbiased regardless of answers from other experts. Finally, comments will be made in the conclusion chapter to further discuss the choices of methodology and its pros and cons.

3 Theory

In this chapter, the reader will be familiarized with the theory that will be applied in the analysis of the paper. First, theories of market analysis and scenario creation are presented. Thereafter, theories related to standards war, platform leadership and the technology life cycle will be explained.

3.1 Porter's five forces

Michael E. Porter from Harvard Business School developed a framework for industry analysis in 1979 called Porter's Five Forces. By using concepts from Industrial Organization economics, it determines the competitive intensity, changes and attractiveness of a market. The framework consists of five forces analyzing the firm's microenvironment. These are forces close to the company, affecting its ability to serve its customers and make a profit.

Porter's Five Forces is a qualitative analysis of environmental development in a market and a firm's strategic position within it. Three of the five forces focus on the horizontal competition: threat of substitute products, threat of new entrants and threat of existing competitors, where as two are part of the vertical competition: bargaining power of suppliers and bargaining power of customers. Porter's five forces will be as a support for the market analysis conducted in chapter 5.

3.2 Scenarios

“A scenario has the mission of describing in advance the conditions in which a system or a policy is supposed to take place (...) It is a logical concentration or credible events, although hypothetical, starting from present time and leading to some future date¹⁶”

As the definition above declares, scenarios are used when it is considered impossible to make straightforward predictions and that it may be wise to picture various alternative futures. Scenarios are insights into relationships between, to the subject studied relevant developments and clearly defined assumptions concerning these. Normally, these relevant developments are found through other methods of future studies, such as trend analysis and the most relevant and uncertain trends serve as the axes along which the alternative scenarios are constructed. To create possible and reliable scenarios, one should address the following criteria:

- Plausibility – the scenarios are not to be science fiction
- Consistency – to prevent the combination of mutually incompatible trends
- Completeness – the scenarios are more than a variation of the same theme
- Validity – underlying assumptions are to be valid

Scenarios are used in business situations with high uncertainty for managers and decision makers to broaden their horizon and provide them with alternatives of directions in which the world is changing¹⁷. Since the mobile phone industry and its relation to CE faces an uncertain future it has, as mentioned above, in this paper been chosen to pursue a scenario analysis according to the Micro Delphi Method.

¹⁶ Rossel, P, *Session 11: Scenario Design*, 2007

¹⁷ Bouwman & van der Duin, *Technological forecasting and scenarios matter*, 2003

3.2.1 Scenario design according to Ute von Rebnitz

In the aim of working according to a structure, the authors found a model by Ute von Rebnitz¹⁸, which has been a support throughout the scenario creation process. The chapter describing the Micro Delphi Method will follow this model and work its way through the eight steps seen in the Figure 2 below.

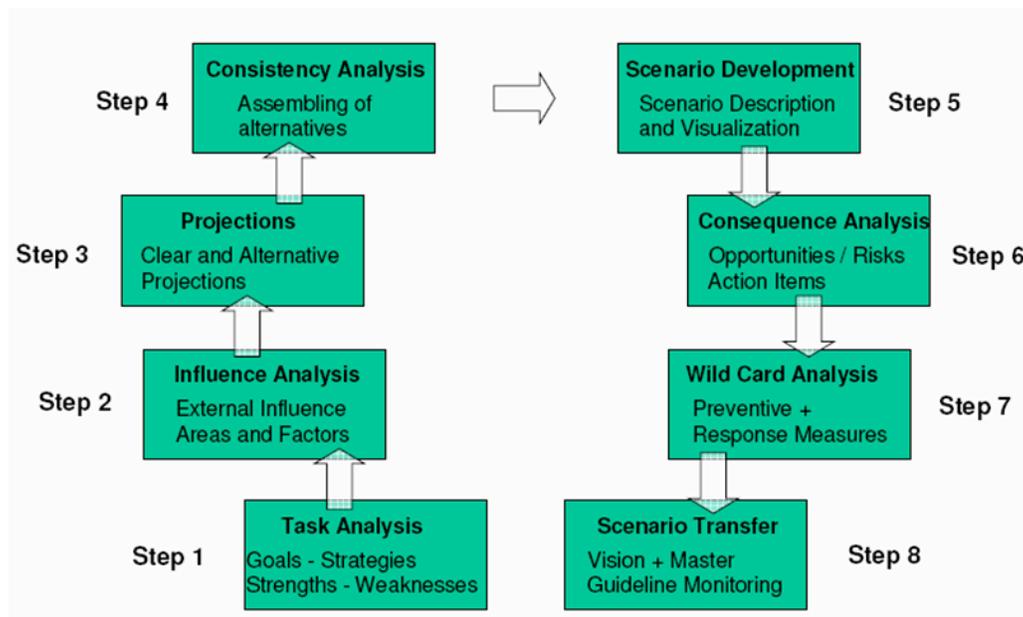


Figure 2 Scenario Design¹⁹

¹⁸ Rossel, P, *Session 11: Scenario Design*, 2007

¹⁹ Rossel, P, *Session 11: Scenario Design*, 2007

3.3 Scenario Model – technological forecasting and scenarios

In a future study by Bouwman and van der Duin²⁰, the authors use a model combining technological forecasting and scenarios. This combination has the advantage that on the one hand scenarios present accurate pictures of the technical possibilities, while on the other hand making it clear why it is that certain technologies have a greater chance of becoming successful than others. Due to the rapid technology development within the telecommunication industry, the technological possibilities tend to be ahead of other developments, such as the market or consumer behavior. This model allows the authors to investigate the potentials of a technology without taking its realization for granted but instead examining what factors will have an affect on its potentials.

Technological forecasting is described as an exploration of developments in the technology domain. It offers a comprehensive view of the technologies already available as well as of emerging technologies and the way these influence or substitute each other. As described above, scenarios are various alternative pictures regarding possible futures.

Technological forecasting makes a valuable input in the creation of scenarios. By combining these two, the human factors, needs and attitudes of consumers, can be given more attention in the scenarios while as technology development is taken for granted, relying on the assumptions made in the forecasting. Technology is seen as an enabler, meaning that it is only when technology fits the needs and attitudes of consumers that they can be incorporated into a clear picture of the future. When combining technological forecasting and scenarios Bouwman and van der Duin argue that two conditions need to be fulfilled:

- 1) Technological forecasting and scenarios have to have the same level of abstraction
- 2) Technological forecasting and scenarios must apply and relate to one another

²⁰ Bouwman & van der Duin, *Technological forecasting and scenarios matter*, 2003

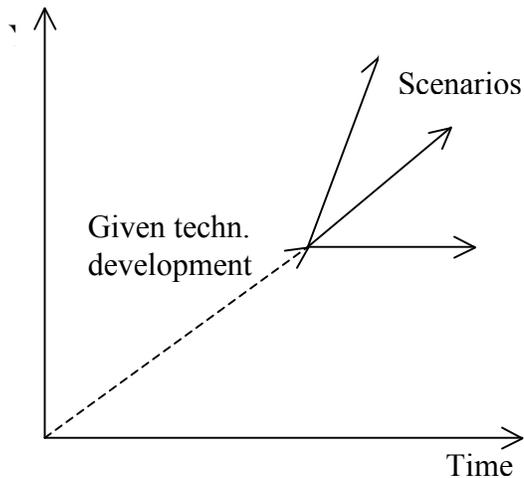


Figure 3 Technological forecasting and scenarios²¹

When these conditions apply, the model can be used by letting the scenarios start where the technological forecasting ends, Figure 3. The technological forecast can be seen as a gathering of technological developments beginning in the past and continuing into the future. However, after a certain time the uncertainty of the future will make it difficult to extend the line. From this point, the scenarios are used to explore the future. The arrows symbolize variables of uncertainty that are considered crucial to take into account for the purpose of the study.

²¹ Bouwman & van der Duin, *Technological forecasting and scenarios matter*, 2003

3.4 Standards War

Standards wars are battles for market dominance between incompatible technologies. Even though these battles are typical for the information age, they are not new. Historical examples are the construction of railroads and the war between AC and DC technology in the United States in the end of the 19th century. A classical example from modern times is the film standards battle of the VHS versus the Betamax in the beginning of the 1980s.²²

Standards are specifications that enable compatibility of different products. When the products are part of such a system, such as playback equipment and recorded media, the standard is defined as a set of components that are compatible with one another. Other standards allow adopters to create a communication network, where the standards define the network-users ability to communicate with one another. An example is the early days of the Macintosh and the PC when the users of the different operating systems could not exchange files since these represented different standards for file exchange.²³

Virtually, every high-technology company has some role to play in these battles; as a primary combatant, as a member of a coalition, supporting one side, or as a customer, seeking to choose a winner when adopting new technology.²⁴

3.4.1 Economies of standardization

Standards wars are interesting from an economical point of view since the outcome often is a “winner takes it all” situation in the market. Standards can arise in two ways. First, a new technology can enter a market that is fundamentally incompatible with the old. Second, producers can intentionally design technologies to be incompatible. The economics in the second case are more complex since the producers have made the decision to choose

²² Shapiro, C & Varian, H, *The art of standards wars*, 1999

²³ Stango, V, *The economics of standards wars*, 2004

²⁴ Shapiro, C & Varian, H, *The art of standards wars*, 1999

incompatibility. In either case, the trend towards standardization increases when there are network effects, which are complementary relationships of value creation among adopters of a common standard. A classical example is the fax machine. If there was only one stand alone fax machine, it would be worthless but if it is a part of a network of several fax machines that can send information to one another, they are all of value to their users. This is often described as a direct network effect or network externality, because adoption in itself confers a benefit on others. The existence of a strong direct network effect pushes the market towards adoption of a single standard since adopters benefit most when all users have chosen the same standard.

A second type of network effect is an indirect network effect that arises in markets for system goods where adoption itself does not confer benefits on other users of the system. However, adoption might ultimately benefit others since for example greater adoption of a particular type of game consoles generates greater variety in game titles for this standard. Widespread adoption allows producers to achieve scale more easily.²⁵

3.4.2 Sponsored or unsponsored and de facto or de jure

Standards can fall into categories based on two features; whether it is sponsored or unsponsored, and whether it is de facto or de jure. Sponsored standards can be used only by the holder(s) of the property rights, for example patented technologies, whereas unsponsored standards can be used by anyone. Wars between sponsored standards are typically more complex since they depend not only on decisions and requirements from the consumers, as for unsponsored, but also on the strategic behavior of the firm owning the standard.

The other distinction is between de facto and de jure standards. De facto standards are the outcome of a standards war whereas de jure standards emerge through industry consensus. This consensus can be informal, formally expressed through an industry standards body or approved by a standards organization.²⁶

²⁵ Stango, V, *The economics of standards wars*, 2004

²⁶ Stango, V, *The economics of standards wars*, 2004

3.4.3 The lock-in effect

The term lock-in refers in general to a situation where a customer is dependent on a vendor for products and services and cannot move to another without substantial switching costs.²⁷ Communication networks are classic examples of markets where the lock-in effect occurs since they display strong network externalities.²⁸

3.4.4 Possible outcomes

The outcome of a standards war can be either a truce where a common standard is ultimately adopted; a duopoly where two standards remain; or a fight to death. The last outcome is mainly unique to markets with strong network effects.

Before entering a standards war, the combatants should consider a peaceful solution. Unlike many other aspects of competition, where coordination among rivals would be seen as illegal conspiracies, agreeing on an early truce can in a standards war benefit the consumers as well as the vendors and therefore avoid the risk of an antitrust lawsuit.²⁹

3.4.5 Key assets

The ability to successfully pursue a standards war depends on the ownership of seven key assets:

- Control over an installed base – A firm that has a large base of loyal or locked-in costumers is uniquely placed to conduct an Evolution strategy offering backward compatibility
- Intellectual property rights – Firms with patents and copyrights controlling valuable new technology or interfaces are clearly in a strong position

²⁷ http://en.wikipedia.org/wiki/Vendor_lock-in

²⁸ Stango, V, *The economics of standards wars*, 2004

²⁹ Shapiro, C & Varian, H, *The art of standards wars*, 1999

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- Ability to innovate – The ability to make proprietary extensions in the future is crucial for a strong position in the present
- First-Mover advantages – Having done a lot of product development and being further down the learning curve than the competition gives yield a strong position
- Manufacturing capabilities – A low-cost producer, due to either scale economies or manufacturing competence, has a strong position
- Strength in complements – Producing a product that is a significant complement for the market in question gives a natural leading position since acceptance of the new technology will stimulate sales of the other products produced
- Reputation and brand name – A brand-name premium is highly valuable especially in network markets, where expectations are crucial³⁰

3.4.6 Tactics

Preemption is one of two important marketplace tactics that often arise in standards wars. The logic is to build an early lead for the firm in question to have positive feedback and not the rival. With network externalities, the positive feedback comes on the demand side; the leader offers a more valuable product or service. One way to preempt is to be first to market and gain a first-mover advantage. However, this is not always the best solution which will be further discussed below. In addition, launching the product early and attract the “early adopters” is a good way to build an installed base of customers which is crucial in a standards war. Another insinuation is that the player in a standards war with the largest profit stream from related products stands to win the war.

The second key tactic is the management of expectations. This is a major factor in consumer decisions about whether or not to purchase a new technology and therefore it is crucial to establish credibility.³¹

³⁰ Shapiro, C & Varian, H, *The art of standards wars*, 1999

³¹ Shapiro, C & Varian, H, *The art of standards wars*, 1999

3.5 Platform Leadership

At the birth of many industries, a few firms develop all or almost all the components necessary to produce a product. As industries evolve, specialized firms normally emerge developing only certain parts of the product. This is today a common pattern in an increasing number of industries, especially those with complex products as the computer, telecom and automotive industry.³² In these industries, platform leaders are handling threats from wannabes and complementary software. Platform leaders are companies that drive industry wide innovation for an evolving system of separately developed pieces of technology, wannabes are companies that want to become platform leaders and complementing companies that make supplementary products that expand the platform's market.³³ In recent years, many high-tech industries have become battlegrounds for companies that want to establish their products as the next industry platform.³⁴

Platform leaders face three problems. First is how to maintain the integrity of the platform, namely the compatibility with complementary products, in the face of future technological innovation and the independent strategies of other firms. Another problem is how to let platforms evolve technologically while maintaining compatibility with past complementary products. The final problem is how to maintain platform leadership.³⁵ A platform leader can benefit from, but also highly depend on, innovations developed by other firms. Since it is impossible for firms today to develop all components needed themselves, as would be the ideal situation; platform leaders have to work closely with other firms to create initial applications and new generations of complementary products. Platform leaders and complementary innovators have great incentives to cooperate because their combined efforts can increase the potential size of the pie for everyone.³⁶

³² Cusumano, M & Gawer, A, *Are you a platform leader?*, 2002

³³ Cusumano, M & Gawer, A, *The elements of platform leadership*, 2002

³⁴ Cusumano, M & Gawer, A *Strategies for being a platform leader*, 2007

³⁵ Cusumano, M & Gawer, A, *The elements of platform leadership*, 2002

³⁶ Cusumano, M & Gawer, A, *Are you a platform leader?*, 2002

The platform leadership theory is closely linked with the network externalities theory, explained above. Platform leadership is the ability of a company to drive innovation around a particular platform technology at the broad industry level, as mentioned above. This dynamic is recognized as network externalities, the more people who use platform products, the more incentives there are for complement producers to introduce complementary products, causing a cycle. However, this game is complex and sometimes violent standards wars occur.³⁷

It is quite likely to fail to become a platform leader and to mismanage the process of stimulating and channeling complementary innovation. Both successful platform leaders as well as wannabes must work hard to establish, maintain and grow their dominant market positions.³⁸

3.5.1 The levers of platform leadership

Cusumano and Gawer have developed practical guidelines for managing innovation whether the innovator is a platform leader, a wannabe or a complementing company. Four distinct but closely related levers of platform leadership can assist managers in both strategy formulation and implementation.

1. Scope of the firm

Scope includes the amount of innovation the company does internally and how much it encourage outsiders to do. Managers of platform leaders and wannabes must weigh whether it is better to develop a general in-house capability to create their own complements, to let the market produce complements or to follow a middle road. Companies that want to become platform leaders, first need to assess how dependent they are on complements, then they need to determine how to increase demand for their platform.

2. Product technology

Platform leaders and wannabes must make decisions about the architecture of a product and the broader platform, if the two are not the same. In particular, they need to decide how much modularity they want, how open their interfaces

³⁷ Cusumano, M & Gawer, A, *The elements of platform leadership*, 2002

³⁸ Cusumano, M & Gawer, A, *Are you a platform leader?*, 2002

should be and how much information about the platform and interfaces to reveal to other firms. Potential complementors may become future competitors.

3. Relationships with external complementors

Firms must determine how collaborative or competitive they want relationships to be between platform producers and complementors. Platform producers also need to work on creating consensus and handling potential conflicts of interest, such as when a platform leader decides to enter complementary markets directly and turn former partners into competitors.

4. Internal organization

The right internal structure can help platform producers manage external and internal conflicts of interest. Options include keeping groups with similar goals under one executive or putting them in distinct departments in order to address potentially conflicting goals with outside constituencies. Since innovative, modular industries are often uncertain and a complementor can become a competitor in a short period of time. An internal atmosphere that encourages debate can accelerate strategy reformulation when such situations occur.³⁹

3.5.2 Vision of being a platform leader

It is possible to be too platform focused. There are of course other ways to compete, like being a niche player with superior quality or service. Not every company needs to be a platform leader.⁴⁰ Though, the ability to establish a platform is an option for both small and large companies. Success depends not on size but on a company's vision and its ability to create an appealing ecosystem. This is often difficult when an industry is undergoing transition or when a technology is developing too rapidly. However, under such conditions platform strategies are likely to stand out since they are so badly needed.⁴¹

It is important for platform leaders to perform a balancing act between competing and collaborating with complement producers, whose products are

³⁹ Cusumano, M & Gawer, A, *The elements of platform leadership*, 2002

⁴⁰ Cusumano, M & Gawer, A, *The elements of platform leadership*, 2002

⁴¹ Cusumano, M & Gawer, A *Strategies for being a platform leader*, 2007

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necessary to create demand for the platform.⁴² In addition, it is of great importance for platform leaders to work continually with platform evolution, to avoid to become tied to certain technologies. Therefore, platform leaders need to have a vision that extends beyond their current business operations and the technical specifications for one product or component. The ecosystem can be greater than the sum of its parts if companies follow a leader and create new futures together and it is the platform leaders and the decisions they make that have most influence on the degree and kind of innovations that even complementary producers create. However, these innovations do not happen spontaneously, it is the platform leaders' visions that initiate them.⁴³

⁴² Cusumano, M & Gawer, A, *Are you a platform leader?*, 2002

⁴³ Cusumano, M & Gawer, A, *The elements of platform leadership*, 2002

3.6 Attacker's advantage

A model to show the typical path of product performance in relation to investment in R&D is the so called "S-curve". The idea behind it is that a limited amount of improvement in the technology results in payback.⁴⁴

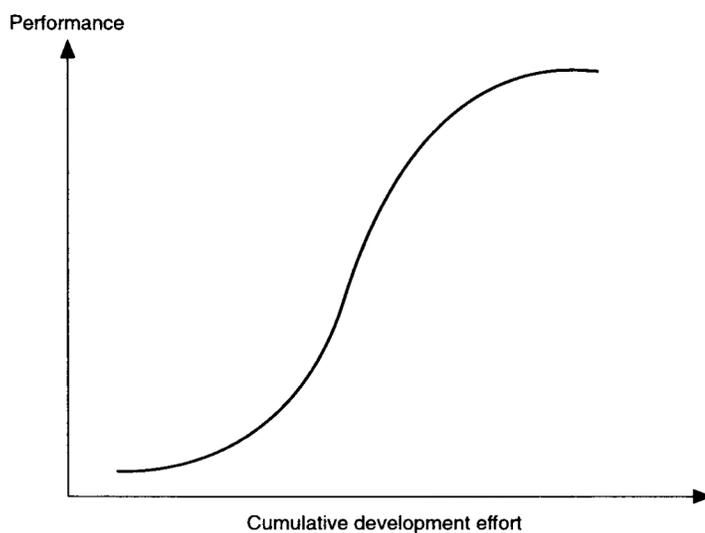


Figure 4 The S-curve

In the initial phase of a product, payback is very slow, Figure 4. After this period, more rapid payback occurs and a product with better performance leads to higher returns in relation to improvements. This usually does not last too long, perhaps a few years. Eventually, the limits of technology are approached and it becomes increasingly difficult and expensive to make improvements valued by the market. As a result, returns are few as the technology can no longer provide returns on investment and firms should look elsewhere for investment opportunities. As firms tend to hold on to their worn-out technology, they become vulnerable to attackers with new technology.⁴⁵

⁴⁴ Cooper, R, *Book review, Innovation: The Attacker's Advantage*, 1987

⁴⁵ Cooper, R, *Book review, Innovation: The Attacker's Advantage*, 1987

The S-curve can be used as a forecasting tool and yield valuable insight on how much further current products can be improved and how much effort it would take to get them to higher levels of performance. By sketching an S-curve for a competitor, one can obtain knowledge about how products will manage in the future, what new products to develop and how much effort this will require.

S-curves almost always come in pairs, Figure 5. The gap between them represents a discontinuity, a point when one technology replaces another. However, detecting these discontinuities is very difficult since this often takes place in a period of chaos when several technologies are competing to become the new leader.⁴⁶

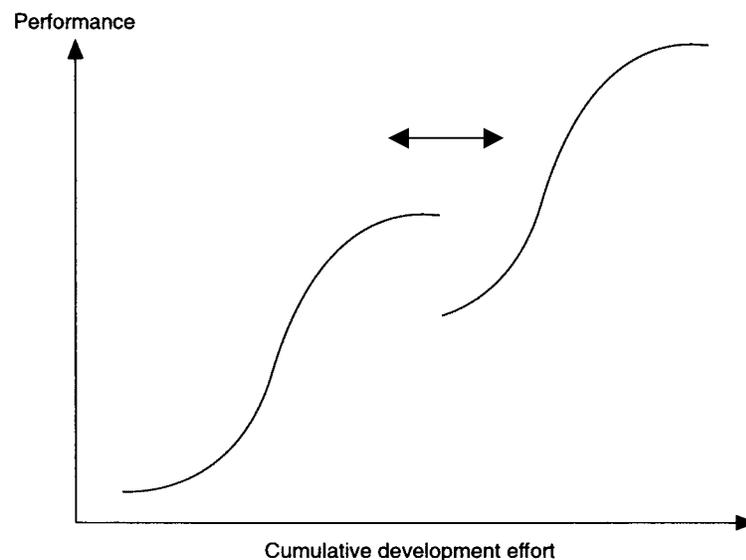


Figure 5 Discontinuity

Managing the discontinuities is critical. A fundamental dilemma is that it always appears to be more economic to protect the old business than to invest in the new one. However, staying with the old technology is often a

⁴⁶ Cooper, R, *Book review, Innovation: The Attacker's Advantage*, 1987

disadvantage since attacks from new technology is very likely. The defender of the old technology may not even know that he is attacked since the attacker can hide in a niche, being extremely motivated and often more powerful than he appears. By being on the right S-curve, a small company can compensate for much of its size and market power disadvantage. Further, even if a defender succeeds in managing his own S-curve, chances are that he will not be able to raise the efficiency with more than 50% which will not be very useful against an attacker whose productivity might increase ten times faster since he has chosen a different, more appropriate S-curve. By ignoring or underestimating the threat of an attacker, a defender takes the risk to be run over and even conquered. Therefore, as a result of a discontinuity, technologies that have just entered the most productive phase of its S-curve must often be abandoned in favor of new ones.⁴⁷

3.7 First Mover Advantage

First mover advantage is a concept that seems to intuitively appeal to business managers and a phenomena that almost is taken for granted. It is defined as a firm's ability to be better off than its competitors as a result of being first to market in a new product category. A distinction between durable first mover advantage, improving a firm's market share or profitability in the long term, and short-lived can be made. A long-term advantage remains from the infancy to maturity stage of a product while as the end of a short-lived advantage may come very suddenly. Nevertheless, it can still be profitable in the short term to enter such a market, since the gain from a short-term advantage may be greater than the cost of not entering the market at all.

In an article from Harvard Business Review, Suarez and Lanzolla, argue that first mover advantage is not such an obvious term within business management as claimed above. For every case proving that there is such an advantage, there is a case proving the opposite. However, the authors claim that the difference in outcome is not random but rather dependent on certain circumstances. These

⁴⁷ Cooper, R, *Book review, Innovation: The Attacker's Advantage*, 1987

are factor and conditions that, in addition to a firm's resources and luck, are beyond a company's control.

Two factors that strongly influence a first mover's success are identified: the pace of technology evolution and the pace at which a market expands. The rate of technology development can vary enormously; some evolvments are incremental, that is equal over time, and others are disruptive, creating dramatic changes to technological preconditions. The faster and more disruptive the technology develops, the greater challenge is it to control it. The pace of market evolution is affected by the uncertainty of a market's growth. The more revolutionary the new product, the more difficult is it to predict the market's acceptance of it.

By combining these to critical factors, Suarez and Lanzolla, introduce a model of four fields; *Calm Waters*, *the Market Leads*, *the Technology Leads* and *Rough Waters*, all implying different conditions for first mover advantage, Figure 6.



Figure 6. The combined effects of Market and Technological Change⁴⁸

⁴⁸ Suarez, F & Lanzolla, G, *Harvard Business Review*, April 2005

Calm Waters

Gradual evolution of both technology and market creates the best conditions for first mover advantage and a long lasting dominance. The slow pace of technology development makes it hard for later entrants to differentiate their products and a gradual market growth gives the first mover time to satisfy new segments.

The Market Leads

A fast growing market of mature technology. Under these conditions a firm's resources become crucial. Possessing skills in design and marketing as well as a strong brand are resources making it possible to obtain a long-term advantage while as a short lived advantage is more likely when resources are limited.

The Technology Leads

Technology changes abruptly but the market is slow in accepting the new product. No short-term advantage is likely, since a firm will face many years of slow market growth and low sales. Deep pockets are required to be able to endure the slow market evolution and, if successful, the firm benefits from a long-lived first mover advantage.

Rough Waters

With fast technology innovation and rapid consumer acceptance. These are conditions under which the first mover is very vulnerable. Long-lived advantages are not very likely since competitors have the opportunity to quickly introduce superior products as well as the first mover may have difficulties in satisfying the fast growing market due to limited production capacity.

These four different situations demonstrate the importance of the conditions under which a firm wants to achieve first mover advantage. When market leads, large-scale marketing, distribution and production capacity are key and when technology leads R&D, new product development and deep pockets are key. The consensus is that resources, skills and luck not solely have an influence on the opportunities related to a first mover advantage, but also external factors

that a firm cannot control. And before becoming the first mover a firm needs to consider both with what resources and in what environment it is moving.

3.8 Technology life Cycle and the consumer

Technological products changes through their lifecycles from birth to maturity. Customers continually view products in a new light and the dimensions upon which it is judged change. As a result, the way the product is conceived, developed and marketed must change as well.

In its early days, a technology can not meet all requirements of its customers. It is only the people that need the technology and that are willing to suffer incompleteness and high-costs that buy it, the so called early adapters. Meanwhile, they keep demanding better technology and even higher performance and with time, technology matures and can offer better performance and higher reliability, the product reaches the maturity stage. These phases are shown in Figure 7. When the technology exceeds the basic needs for most of its costumers, there is a major transformation point and a huge change in customer behavior. Technology has reached the point where the technological improvements are of less importance and factors like efficiency, reliability, low cost and convenience are more critical.

Investigating an Open Source based platform strategy at Sony Ericsson

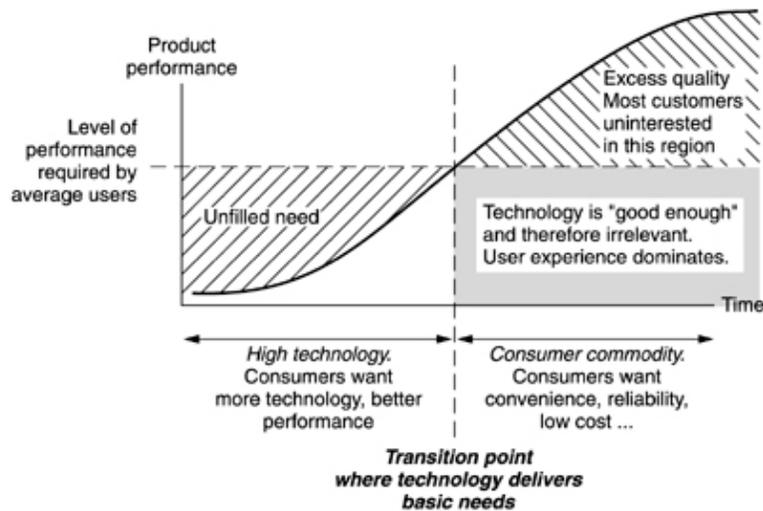


Figure 7 The needs-satisfaction curve of a technology⁴⁹

New customers keep entering the market as technology matures. In the early phases, the innovators and technology enthusiasts that demand technology drive the market. Even if this phase is important, it is only a small percentage of the market that is early adopters. In the later phases, the pragmatists and conservatives dominate who want solutions and convenience. This is the large mass of the market. This is the cycle of market adoption, described by Figure 8. There is a chasm between the two kinds of adopters. On each side of the chasm, different attitudes and strategies towards the market must be taken.

⁴⁹Norman, D, *The invisible computer*, 1998

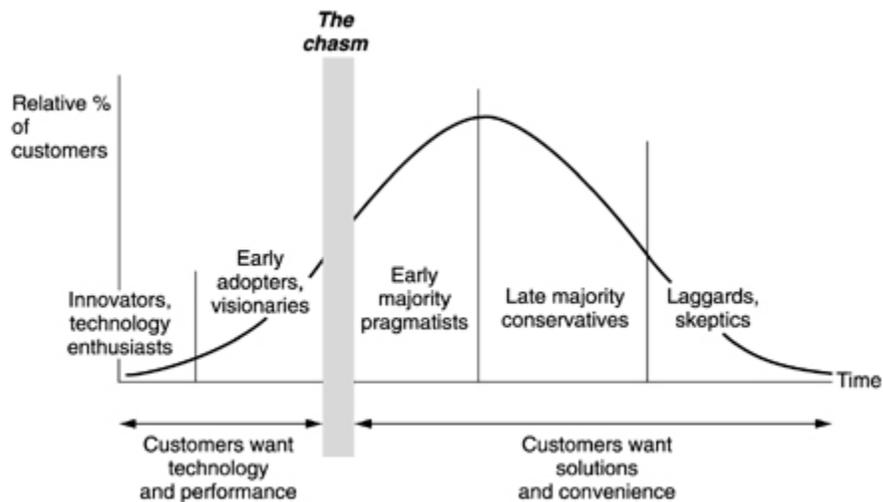


Figure 8 Cycle of market adoption⁵⁰

When studying both cycles, it is seen that the two fit well together. Late adopters want convenience, low price and a good user experience (UX) which is possible when the technology exceeds the transition point. This corresponds to the location of the chasm in Figure 9. Although the early adopters are few in number, they drive the technology development. However, the vast majority of people is pragmatic and conservative and belongs to the late adopters. They watch and learn from the early adopters and wait until the price has dropped and technology has stabilized before investing. The result is that technology companies often face problems since their strategy for dealing with early adopters often is contradictory to the strategy needed in the mature phase.

⁵⁰ Norman, D, *The invisible computer*, 1998

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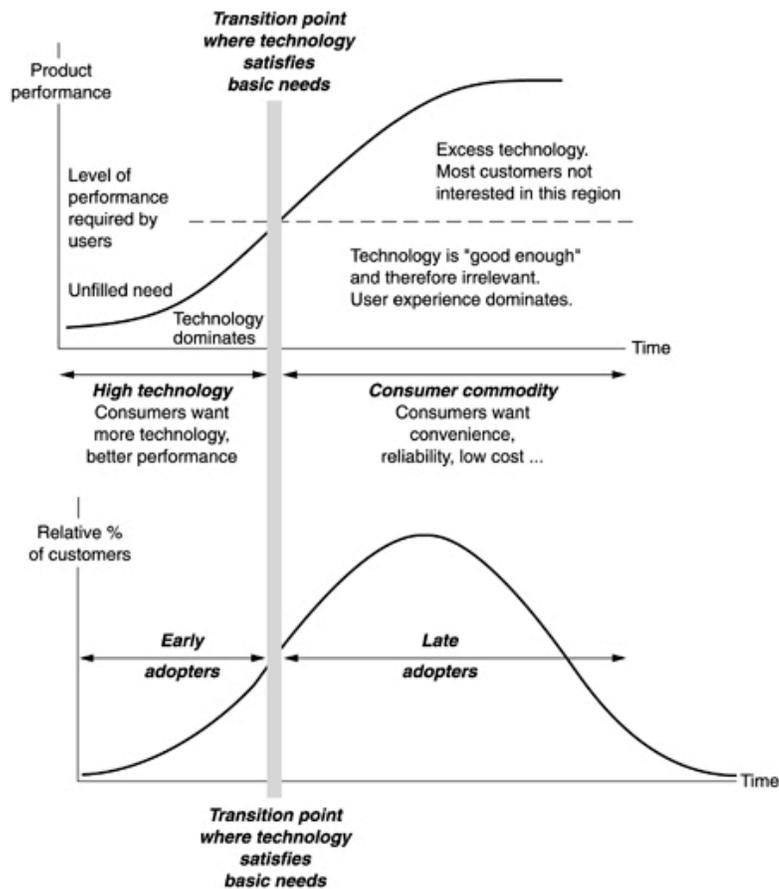


Figure 9 The change from technology-driven products to customer-driven⁵¹

Therefore, to be able to reach the large mass, a company moving from the first phase to the second has to completely change its strategy. At this time, not only marketing is important for success but also UX. To be able to sell the product, it has to be capable of delivering the required functions and performance at a reasonable cost as well as it has to have an enjoyable and effective UX.

⁵¹ Norman, D, *The invisible computer*, 1998

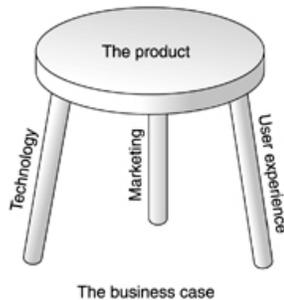


Figure 10 The three legs of product development⁵²

To improve products, companies need a development philosophy that targets the human user, not the technology; they need a human-centered development. This requires three equal partners, three legs to a triad of product development: technology, marketing and UX. All three legs provide necessary and complementary strengths; weaken one leg and the product falls, Figure 10. Additionally, the product must be appropriate for its position in the technology lifecycle.

In early life, the stool does not have to be balanced since early adopters care most about the technology. UX and marketing simply have to be “good enough”. As a product matures, marketing plays a more important role. During the mature phase, things change dramatically as the product crosses the chasm. At this point, the product will easily fail if not all three legs are in balance.

3.8.1 Technology

For high-technology information based products, the importance of technology is obvious. It is what drives the products by making new functions possible, increase quality and lower costs.

3.8.2 Marketing

Marketing is not a single concept; it covers a wide range of activities, requiring a number of skills. Above all, it is the role of marketing to provide expert

⁵² Norman, D, *The invisible computer*, 1998

information about the customers; who they are, what they want to buy and how much they are willing to pay. Critical aspects of marketing is first of all to understand the criteria that are used at the time of purchase which often has little to do with how the product is actually used. Here, it is important to be able to distinguish the users and the customers since these are not always the same. Second, it is of importance to position the product in the marketplace. Position of the company, the brand and the product determines the customer's perception of quality, prestige, value, reliability and desirability. Marketing plays an essential role in creating products that people want to buy, that meet market expectations, are priced correctly and have features that appeal to users at the point of sale. To have the best technology and product, mean nothing unless people want to buy it.

3.8.3 User experience

UX includes all aspects of the user's interaction with the product; how it is perceived, learned and used. It also contain ease of use and most important the needs that the product fulfills. Whereas marketing is concerned with the customer that buys the product, the UX group focuses on the actual user. Their emphasis is on the usage phases of the product, from taking it home, unwrapping, assembling and initial learning, to continued daily use, maintenance, service and upgrading. UX affects point of sale primarily through appearance, the graphical and industrial design and the brand reputation for ease of use, convenience and quality.

A wide range of attributes are covered by the term *user experience*. Some are technical, such as developing a conceptual model that guides developers in their design decisions so that the entire product development represents a consistent, understandable face to the user. Some attributes come from the experimental, social and behavioral sciences and observations of potential users to understand their real needs and to determine what product that would be of value to them. Other arts focus on the aesthetics; appearance, feel, size, weight etc; ensuring that the product is perceived as attractive. This requires skills of the graphical and industrial designers. Elegant, aesthetic, visually pleasing products not only sell better, they even appear to work better.

Ease of use has many benefits for a company; not only are customers more likely to be satisfied with the product, but the need, and thereby the costs, for after sales service should decrease. In addition, satisfied users become repeat purchasers, likely to recommend both the product and the company to friends and colleagues, enhancing the overall reputation. This is one possible strategy to acquire locked-in consumers.⁵³

3.9 Tomorrow's advertisement

With an increasing amount and lacking precision of advertisement, consumers' interest in commercials is ceasing and the society of today is becoming increasingly skeptic and hard to please. In the future, consumers will avoid marketing and the media of tomorrow, such as the Internet, will give them the possibility to get around commercial offers. Consequently, the marketing industry is facing great challenges in finding new business models for *how* to reach the *right* customers.

An article by Peter Siljerud and Pernilla Jonsson⁵⁴, argues that companies will be forced to innovation to reach the consumers of the future and that the changes are so profound that one could talk about entering a new paradigm within marketing. Instead of seeing the consumer as a passive receiver, she should be made an active part of the advertisement and get the feeling that it contributes with a value to her everyday life. The article identifies three dimensions forming the shift of paradigm; real world flows, digitalization and five dimensional branding. Two of them will be mentioned briefly below where as digitalization will be described more thoroughly, since it is of greater importance for this paper.

Real world flows

In the post modern society, markets have become fragmented and it has become more difficult to identify target groups to reach the consumer. However,

⁵³ Norman, D, *The invisible computer*, 1998

⁵⁴ Jonsson, P & Siljerud, P, *Morgondagens påverkan, Kairos Future*, 2007

physical and material structures can be used to describe our everyday life and to identify pattern of activities performed day after day. These patterns have been given the name “real world flow”.

Five dimensional branding

The brand sense concept is all about creating advertisement that appeals to all of our five senses in an integrated way. Perhaps the consumer is likely to embrace advertisement if it is communicated correctly.

Digitalization

The digital world, including the Internet, online gaming, chatting and blogging among others, attracts more and more of people’s attention. At the same time as TV, newspapers and radio, earlier channels for advertisement, are being distributed over the Internet. However, the marketing business has not found its role and space in the Cyber world.

Meanwhile, a need of guidance on the Internet can be observed. With the increased amount of choices that the consumer has, a guide is needed as some kind of retailer between consumer and producer. There are several players interested in carrying this role; TV-channels, mobile carriers, Internet providers, newspapers etc. A crucial success factor for them is to distribute value-adding content and thereby gain the consumers confidence in what they offer.

Advertisement on mobile phones is a so far unexplored market. According to a report from the Kelsey Group, advertisement in the mobile phone will increase with 112 percent each year up to year 2012. This forecast is based on a number of indicators⁵⁵:

Companies providing search motors, such as Google and Yahoo, are looking for new platforms to apply their business model on. According to the report Google currently has more content providers than distribution channels. The Kelsey Group also argues that the release of the iPhone will lead to additional entries on the mobile phone market, further decreasing the prices. Distribution of advertisement in the mobile phone could be a solution to offering mobile

⁵⁵ Kämpe, J, *Mobila annonser för miljarder*, Mobil, 2007

phones to a lower price. Finally, the technology development of mobile broadband makes it possible to support more advanced advertising applications.

3.10 The Net Generation

Demographics is the study of human populations and a crucial component for the understanding of economy, business and society. Within the area of demographics, society has been divided into a number of generations, identified with certain characteristics. The Net Generation is of specific interest for the purpose of this paper but for a better understanding and overview, the other generations will be briefly mentioned as well.

3.10.1 The Baby Boom (1946-1964)

The baby boom was first of all a consequence of people postponing having children until after the Second World War. Additionally, the economy was very strong after the war, giving families the confidence to have many children. The Baby Boom has become the TV generation due to the impact that the television had on the boomers and their world. The television was a communications revolution, giving its users the ability to see the people they earlier only could listen to on the radio, and came to consume a significant part of the day.

3.10.2 Baby Bust - Generation X (1965-1976)

The years between 1965 and 1976 are called the baby bust, mainly because there were 15 percent fewer children born. During this period, new immigrants belonged to the boomers, increasing the number of boomers. Consequently, the baby busters entered the labor market, realizing that people older than they had already filled all the positions. Being excluded from the working force, generation X is the best-educated demographic group in history.

3.10.3 Baby Echo Boomers – Generation Y (1977-1997)

The urge for baby boomers to prolong youth made them to delay their parenthood, leading to a late and long lasting generation of echo boomers. The echo boom coinciding with the digital revolution has created a generation that is not only a demographic group but also a wave of social transformation. The penetration of digital media has always been high in households with children, since parents want their children to be part of “the new world”. Therefore, the computer revolution has affected generation Y just as the TV changed the lives of baby boomers.

The computer revolution has brought along the Internet, the Net; a network of networks including a wide range of computing, telecommunications, entertainment and publishing. The television’s passive *viewer* suddenly became an interactive Net *user*. In comparison with the TV, people control their world on the Internet by searching rather than looking for information that they critically evaluate⁵⁶. Generation Y considers the computer, Internet and the mobile to be the most important gadgets to communicate with the outer world and are born and raised in a society where this technology is taken for granted⁵⁷.

⁵⁶ Tapscott, D, *Growing Up Digital: The Rise of the Net Generation*, 1997

⁵⁷ Siljerud, P, *Young people and integrity, Kairos Future*, 2007

4 Software Development

This is a short chapter providing the reader with an overview of Open Source software development, the software development at SEMC and the company's current Open Source strategy.

4.1 Open Source

During the 1960's the first hacker communities, developing Unix software, were founded at MIT and Berkley. By then, computers were few as well as big and the purpose with the communities was to faster develop software through collaboration. The commercial software business was initiated in the 1970's when IBM, who earlier had distributed free software together with their hardware, started to charge their customers for software as well. After Unix was sold in 1984 and no longer freely distributed, there were strong reactions among hackers to that software was no longer free of charge. As a consequence the Free Software Foundation (FSF) was founded. The foundation initiated the new community GNU, Gnu is Not Unix, to develop open software distributed for free. In 1994, Linus Thorvalds released the source code to the Linux kernel and in 1998 the Open Source Initiative, OSI, was founded. The term Open Source was coined, representing software that is both freely distributed and free of charge.

Open Source is today still free of charge, however, a commercial business has developed related to the software. There are several firms offering services for Open Source software and software developers have started to integrate Open Source into commercial software. As mentioned in the introduction, there have been different initiatives taken to develop a Linux platform in the telecommunication industry that will be further introduced in this chapter. Furthermore, rumors say that in a consolidating market, carriers will limit the number of software platforms that they will accept on mobile phones. That

Linux is one of them explains why it is interesting for SEMC to look into the possibility to initiate an Open Source based strategy.

OPEN SOURCE VERSUS TRADITIONAL SOFTWARE DEVELOPMENT Fundamental Different Principles Adapted

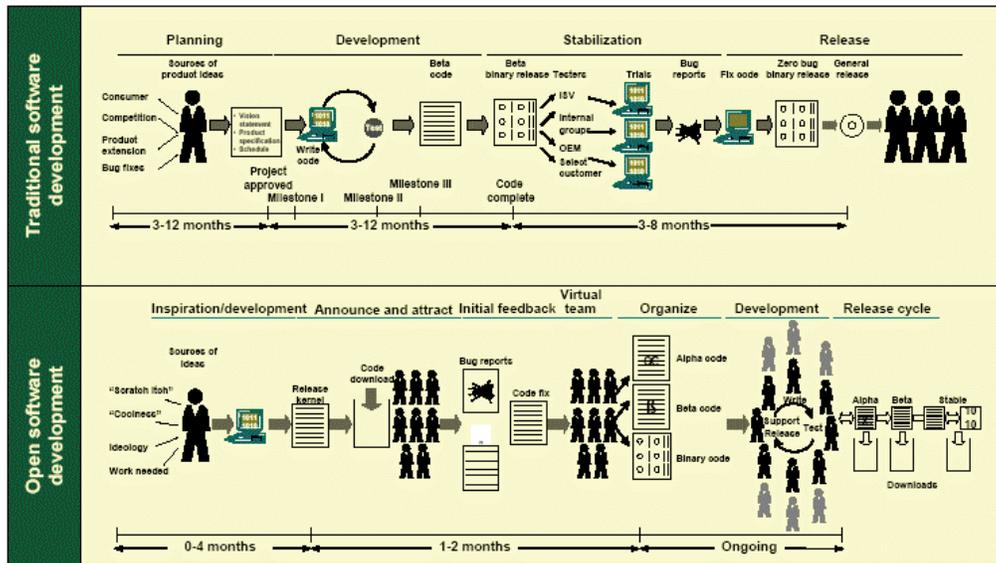


Figure 11 Open Source versus traditional software development

In addition to being free of charge, Open Source software is different from proprietary software in the way it is developed; illustrated in Figure 11. While proprietary software is planned and developed in-house and thereafter stabilized before being integrated to and released in a product, Open Source development is continuously ongoing. There is always one beta and one alpha version of the source code; the beta version available for further improvement and new solutions and the alpha version being stable to use. Improvements that are made in the beta code are sent in to the community for approval. However, to get new source code accepted and integrated to the Open Source software is considered difficult since the standard is very high. All this work is done by developers contributing for free; driven by honor to get source code approved and with the hopes to be rewarded as talented developers and headhunted by a well-considered firm.

4.2 Sony Ericsson's software development strategy

4.2.1 Software Development at Sony Ericsson

The proprietary software at SEMC is developed according to a platform strategy, meaning that all products are based on the same software platform. As a consequence of technology development there are continuous releases of new software editions. SEMC has chosen to call each edition a new Heartbeat and two Heartbeats are expected to be released per year. The reason for producing two heartbeats each year is to have the flexibility to adapt the software to two important events during the year; the first being Vodafone's software specification and the second being new software for Christmas sales. The first product release containing a new Heartbeat is called the mother product while as the following in the same heartbeat are called daughters.

After using this strategy for four years, both pros and cons have been observed. A great advantage is that when a new product is being developed, there is already existing software to install after making product specific adjustments. This decreases the development cost and time significantly, since all those applications that are consistent with the former product's software, don't have to be programmed again. Additionally, by restricting the software to one platform, the employees all work towards the same goal, encouraging to teamwork and advantages of scale. Nevertheless, the fact of having two major software deadlines per year involving all employees is likely to cause stress and pressure of delivering in time. Such stress is positive to a certain extent but is of course ineffective for a company if experienced as negative⁵⁸.

4.2.2 The Sony Ericsson Open Source Strategy

Since the commercialization of Open Source, in parallel with the standardization of mobile software platforms, the usage of Open Source in mobile phone software and its development environment has been discussed within the market. Efforts have been made by various players to introduce a mobile phone based Linux, among which Motorola's is the most known. SEMC,

⁵⁸ Andersson, J, *Sony Ericsson Mobile Communications*, 2007

however, have not taken act upon this development until one year ago when they realized that Open Source may be a key to lower development costs as well as shorter time to market.

By investigating Open Source as a source of software they found the following risks and opportunities⁵⁹.

Risks

Cost of transition – there will be a cost of acquiring resources for working with Open Source and there is a risk of integration, testing and debugging of Open Source software to become costly.

Loss of control – by using Open Source SEMC loses control of parts of their proprietary software. Additionally, it is impossible to guarantee the development path chosen within an Open Source community, which may result in SEMC not being satisfied with the path chosen and therefore being forced to developing the software in-house.

Intellectual properties – one risk is that unwanted intellectual property infringements can be made by using Open Source. The other risk is that proprietary software may become public Open Source if it is not integrated with Open Source software according to Open Source legislations.

Opportunities

Cost savings – by using already existing software components and subsystems the development effort and thereby the costs can be reduced. Additionally, Open Source may be a good way to encourage further distribution of a technology that a company supports.

Time to market – not having to develop the software internally increases the speed to market. However, knowledge regarding Open Source is required to enable smooth integration of it into the proprietary software.

⁵⁹ Ek, Larsson & Sjöström, *Open Source software strategy for PBU central*, 2007

Investigating an Open Source based platform strategy at Sony Ericsson

Innovation- with the larger group of developers that an Open Source community provides, a larger amount of innovation is expected.

Effective standardization – Open Source communities could be another way (in addition to de jure and de facto standardization) of software standardization within the telecommunication market as well as a discussion forum for the future development of mobile technology.

From this mapping of Open Source, SEMC management has taken a strategic decision on how to relate to Open Source. First of all, Open Source can be freely used in the development environment (including tools for software development). Further, software has been allowed to use within the proprietary software for mobile phones. However, such usage has to be approved by several operations within the company to minimize the risks mentioned above. This is the SEMC strategy as of today but the idea of creating an Open Source mobile phone platform is still alive within the company.

Investigating an Open Source based platform strategy at Sony Ericsson

5 SEMC and its Environment

This chapter is opened with an identification of trends regarding the Digital Home. Thereafter, the telecommunication industry today is analyzed according to the framework of Porter's five forces. To be aware of technological and consumer trends in the Digital Home as well as to have a picture of the industry at date, is seen as crucial for the reader to follow the analysis.

To provide a thorough analysis of SEMC and its market situation, it has been chosen to use Porter's five forces as a supporting framework. As described in chapter 3, it will consider; threat of substitute products, threat of new entrants, threat of existing competitors, bargaining power of suppliers and bargaining power of customers to create an up-to-date picture of the telecommunication industry. This chapter is, in addition to the sources that are marked in the text, based upon knowledge of the telecommunication industry that the authors have gained by working at SEMC and talking to people there.

With regards of the hypothesis of the paper, the analysis will be made from the perspective of multimedia CE. Therefore, for the reader to easier follow the discussion, a short introduction will initially be given of the Digital Home; an expression for the increasingly digitalized home, indeed including multimedia.

5.1 Consumer Electronics – the Digital Home

The Digital Home is an expression that can be seen from two perspectives; one being the consumer, the other one being technology. Below, the reader will be introduced to both perspectives and the differences between the two of them. As specified in the introduction, CE have been restricted in this paper to only regard such electronic equipment in the home that is related to multimedia.

5.1.1 The consumer perspective

In an article from Consumer Electronics Association (CEA⁶⁰), the authors explore what CE-technology will be like in 2010 by identifying where we are today and where we could be in 2010. According to investigations on the U.S. market, the average household has roughly 26 CE products, that is; ten products that a person can call its own. However, the interest lays rather in what these products are than how many, whereupon such an investigation was made as well. This showed that the top three devices of today are; the computer, the mobile phone and the TV, which illustrates the importance of the computer as a multifunctional device in the home. The computer has become a substitute to many multimedia functions in the home by replacing audio systems, TVs, by downloadable TV and video content, and game consoles. Additionally, the improved and enhanced Internet supply makes voice communication on the computer a potential replacement of the traditional landline phone.

Further, the article has a good point in indicating that the developers of technology often are the dearest consumers of new technology and that the technology development tends to be ahead of the average user's adaptation. Consequently, it is crucial to see to the average consumers' usage and adaptability to new technology when foreseeing the future and not only the early adopters⁶¹.

On the other hand, another report that was found supports the convergence of technology in the society; by telling the story of the "communication revolution" that is reaching the masses and high-technology solutions entering everyday life. By examining the everyday life of families with teenagers, who are certainly the forefront of the development of media and communication, it is seen that technology is changing the structure of the home environment in many fundamental ways. As a consequence of the rapid technology development media and communication is becoming widely available – "anytime, anyplace and anywhere"- thanks mainly to the mobile phone and computer technology. Technology is also seen to enable teenagers to be more individualized in relation to the rest of the family. Although being at home

⁶⁰ Wargo, S, *Special: 2010 Outlook 5 Technologies to watch* , 2007

⁶¹ Wargo, S, *Special: 2010 Outlook 5 Technologies to watch* , 2007

physically, they are mentally elsewhere when communicating with a larger and larger network of people using chat, email and telephony⁶².

5.1.2 The technology perspective

Today's technology can offer both connectivity and interoperability between devices to a large extent through various solutions (Bluetooth, WLAN etc.). To certify usage areas technology standards for such solutions are developed, making it possible for devices to communicate independent on manufacturer and brand as long as the product is equipped with the functionalities included in the standard. DLNA is one example of such a standard built upon WLAN. In parallel, a convergence of industries can be observed between telecommunications, media and CE. For all three industries the trends point towards a common development of the Digital Home⁶³.

However, that the technological abilities are in place does not mean that they are ready to use. There are several technologies to choose from and not until these technologies are made compatible will devices, of different brands and with varying functionalities, be able to intercommunicate seamlessly. A brief explanation to some of the most common intercommunication technologies is given among the definitions provided in the beginning of the paper.

5.2 The Telecommunication Industry today – Porter's five forces

5.2.1 Bargaining power of buyers

SEMC's buyers are the carriers. They are firms with access to telecommunication networks and are retailers of mobile phones to the end-user. This business model consists of being a middle hand between manufacturers and end-users by reducing the price of mobile phones to consumers when locking them into their network. The carriers have large bargaining power

⁶² Öhrfelt, Björling & Kruse, *Converging Technology, diverging families*, 2006

⁶³ Karlberg, J, *The Digital Home*, 2007

against handset manufacturers thanks to the access and understanding of the consumers. Consequently, the carriers have an influence on the manufacturer's development related to functionality affecting the end-user. The consolidating market even further contributes to this power.

However, developments in the telecommunication market may come to affect the carriers' power⁶⁴. First of all a new type of service providers have evolved. Service providers on the Internet are companies offering applications and tools on the Internet that simplifies the consumers browsing and manages their digital content of various kinds. These are companies that have a competitive advantage in delivering a simple user interface (UI) in form of a webpage and they offer services that consumers need and trust. By letting advertisement finance the services provided, the customers get them for free.

The business model already exists on the Internet, where Google is the largest player, showing a great interest in entering the mobile phone market as well. It has been found that there is a great interest for advertisement in mobile phones and that the money could reduce the price of mobile phones to the end-user⁶⁵. As mentioned in the theory, marketers find it increasingly difficult to reach the consumers with their advertisement and the mobile phone would be a perfect medium to enable personalization of marketing. Google's latest move was to initiate a cooperative with both manufacturers and carriers to develop processes and an operating system supporting such a business model⁶⁶.

Another change affecting the operators is the introduction of voice over IP and an increasing usage of the Internet on the mobile phone. This has already contributed to a new business model, by offering the consumers flat rate Internet access through mobile broadband such as 3G, turbo 3G etc, especially in Japan. But there is still a threat that free wireless Internet access will expand, which would decrease the incentives to pay for the operators' broadband network.

⁶⁴ Kämpe, J, *Operatörerna som kommer misslyckas, Mobil*, 2007

⁶⁵ Kämpe, J, *Mobila annonser för miljarder, Mobil*, 2007

⁶⁶ Thoresson, H, *Android är Googles mobil-plattform, Mobil*, 2007

Multimedia is a greater and greater part of the mobile phone. Today the mobile phone is not only a communicator but can also be an MP3-player, a camera, a calendar, a browser, a portable game console etc. Multimedia providers have spotted this consumer behavior and are to a larger and larger extent collaborating with operators to reach their installed consumer base with music, videos, broadcast TV and games among other things.

Finally, in some markets consumers are able to use a mobile phone in any network by paying a higher price. With the release of Apple's iPhone this business model is expected to increase, especially on the U.S. market. This would make it more difficult for operators to lock in the consumer to their services and entertainment offers.

5.2.2 Bargaining power of supplier

The telecommunication industry is an integrated market. Due to the technological complexity of the product, players in the industry are needed to collaborate closely for the mobile phone to meet all requirements. The size and amount of suppliers vary in a wide range. Both Ericsson and Qualcomm are examples of large firms providing manufacturers with a hard- and software platform as well as carriers with infrastructure. These are suppliers with large power, since handset manufacturers rely on their competences and customization and without them constructing networks; the end-user would be unable to use their mobile phones. However, these suppliers are in return dependent on handset manufacturers, being their sole consumers of the hardware technology; resulting in a rather equal reliability between the two parts. Furthermore, there are plenty of small suppliers specialized on one or a few components. These are very dependent on the handset manufacturer, often serving one unique manufacturer for whom it both develops and produces.

The large suppliers are, as mentioned already, also suppliers of infrastructure to governments. Currently they are developing the infrastructure of 3G under the financial support of carriers. This development is predicted to continue into even faster mobile broadband (turbo 3G, 4G etc.), unless the competitors supporting wireless Internet surpass. If mobile broadband will be the superior mobile connection to the Internet, the carriers' way of remaining a powerful

access to end-users is obvious. But, if wireless communication becomes available to a larger extent outside the mobile broadband infrastructure, end-users will be able to utilize that connectivity for voice over IP and the carriers' power will diminish.

An initiative worth mentioning in this context is Fring, which is an initiative aiming to enable a seamless combination of voice over IP communication and regular mobile telephony⁶⁷.

When analyzing the bargaining power of supplier, also software suppliers should be mentioned. Traditionally, manufacturers develop proprietary software internally and only a part of it is bought from an external source. However, with the increased complexity of mobile phones, a growing part of the software development is outsourced. This is especially the case when it comes to Smartphones. Because of the extensive development resources required for Smartphone software, manufacturers have initiated collaborations for this purpose. The largest collaboration is Symbian, used by among others Nokia, SEMC and Motorola. As a compliment to Symbian two UIs have been developed: Series 60 by Nokia and UIQ by SEMC. Additionally, Motorola recently bought 50 percent of UIQ⁶⁸.

Microsoft is another software supplier with its operating system Windows Mobile. Being distributed by a large software provider has its pros and cons of course. Manufacturers are probably reluctant to getting dependent on such a large firm at the same time as Microsoft is a software company with the power to make its mobile software one of the standards on the market.

Finally, Linux is developing an operating system for mobile phones. This is an initiative that most manufacturers have been taking part of to a larger or smaller extent, Motorola being the leading one. However, the existing platform is not developed enough to compete with the ones above mentioned and the fact that Motorola recently decided to buy into UIQ is a clear indicator of this. Linux,

⁶⁷ www.fring.com

⁶⁸ Brohult, L, *Sony Ericsson och Motorola i storaffär, Mobil*, 2007

with its Open Source nature, has the potential to become a large open platform on the market, but more effort from manufacturers is needed⁶⁹.

5.2.3 Threat of substitutes

To picture a potential substitute to the mobile phone is difficult. The introduction of mobile communication has enabled people to communicate anywhere and at any time and by adapting to this technology people have become dependent on it in their everyday life. Such a behavior is nearly impossible to erase but might be possible to change. However, that it should come to change dramatically within the prospect of five years is not likely.

Only one threat of substitution is on the radar of the traditional mobile phone, namely voice over IP in combination with a small size laptop. Imagine mobile broadband becoming increasingly available and reliable in combination with manufacturers providing smaller laptops. Then, the end-users may choose to purchase a laptop, fulfilling all their needs “on-the-go” instead of carrying around several devices. However, for a small laptop to reach a substantial part of the mobile phone market, a convenient size as well as a reduced price is required. The market development in Asia is supporting such a behavioral trend. As a consequence of the greater part of the population being without access to a computer, mobile phones with access to mobile broadband has become a substitute for a personal computer. But whether this behavior is likely to occur when laptops are already widely utilized is uncertain. However, both Nokia and SEMC are all currently said to be moving into the market of smaller laptops⁷⁰.

5.2.4 Threat of New Entrants

The telecommunication industry is a market with high entrance barriers due to the requirements of extensive capital assets, patent endowments, close relationships to both customers and suppliers as well as large scale manufacturing. In spite of this, ongoing movements exist that may affect the current market place and contribute to additional players entering the scene.

⁶⁹ Wellman, S, *Top four reasons Motorola invested in UIQ, Information Week*, 2007

⁷⁰ Brohult, L, *Dubbel-slide nästa från Sony Ericsson och Nokia, Mobil*, 2007

These movements are numerous, diverse in nature and would have different affects on the market development. First to be mentioned is Google, along with other web-advertisement firms. Their business model has managed to enter many PC screens and especially Google is now targeting the telecommunication market. By using a Linux operating system, Google wants to create a UI; similar to the one they provide in the computer today, on the mobile phone⁷¹. The advertisement model will then make price reduction possible to the end-user without being dependent on carriers. This development would definitely give carriers a different role in the value chain but also handset manufacturers should consider such a change since their products need to be compatible with such technology if adapted.

A challenge facing Google is the firm's way of managing people's integrity. Media is already today criticizing Google for storing information of personal behavioral patterns and preferences on their search function and e-mail service. If consumers start to question the firm's reliability when it comes to integrity, Google will most likely have a hard time to continue the business model described above.

A second threat in the market is the creation of handset manufacturers in technically advanced developing countries such as China. As a consequence of technology transfers from developed countries, these manufacturers may be able to compete on the market in the foreseeable future, especially if partnering with a company from the developed world. This could be a player like Google or one of manufacturing kind. An existing example of such a partnership is HTC, a collaboration between a German and a Chinese manufacturer.

Furthermore, players on the CE market are moving toward the telecommunication market. Among these, Apple's release of the iPhone is the most recent move but before them, both Canadian Blackberry and American Palm entered the Smartphone market. It seems as CE manufacturers see potentials within the telecommunication industry because of the end-user's perceived need of the mobile phone, the mobile phones increased linkage to CE

⁷¹ Kämpe, J, *Inblick: vad bjuder Android på?*, Mobil, 2007

as well as the mobile phone market's continuous global growth. Additionally, the mobile phone has become an entertainment device.

5.2.5 Threat of Existing Competitors

Looking into the existing competition, the latest years' consolidation has led to that the five largest manufacturers hold eighty percent of the market as seen in Figure 12. These are, in order of market share; Nokia, Samsung, Motorola, SEMC and LG and will all be introduced below. Additionally, the Smartphone market has faced competition from mainly iPhone but also Blackberry and Palm, whereupon these manufacturers are considered relevant to include when analyzing the existing competition.

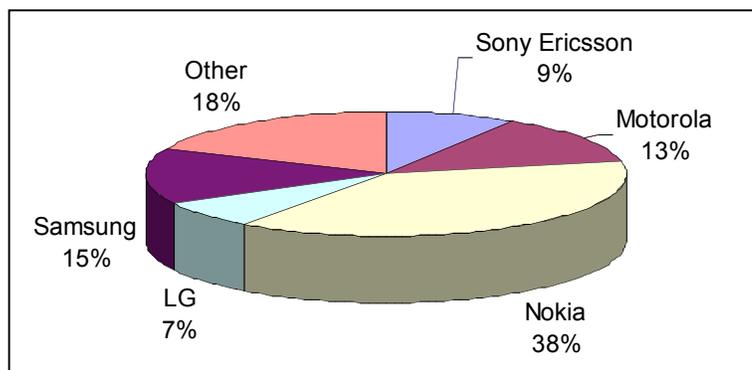


Figure 12 Market Shares in the Telecommunication market⁷²

Nokia

Nokia has an almost 40 percentage market share, making them the outstanding largest competitor in the market. This market position gives the firm the possibility to invest in many development directions, without all of them being successful. Consequently they are present in all market segments and are well ahead in all technology developments.

⁷² Kämpe, J, *Nokia håller greppet om mobilmarknaden*, mobil.se, 2007

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The most important initiatives in the high-end segment made by Nokia lately are the OVI-portal and steps towards releasing Smartphones in the form of mini laptops. The OVI-portal is a website from which music, videos and games are available for downloading to both PC and the mobile phone. It is an obvious challenger to Apple's iStore as well as a competitor to those carriers offering services to network users. Furthermore, Nokia has invested in mobile advertisement by acquiring Enpocket. The American system provides advertisement through sms, mms and on websites for mobile broadband⁷³.

Regarding software, Nokia is still using proprietary software in a large part of their products. Nevertheless, they are one of the owners of the standardized operating system Symbian even though they develop the proprietary UI named Series 60 themselves. Series 60 is today one of the largest UIs in the industry. Further, Nokia has investigated the possibilities with using Linux as operating system. The company still has a large working force developing and contributing to the Linux community, but no Nokia-Linux phones has been introduced on the market so far.

The Nokia brand is strong worldwide; however it is restricted to telecommunication and is not related to CE in a wider sense. This is an interesting observation when anticipating a future convergence of these two markets. Nonetheless, with the capital potentials that Nokia has, who knows what they are up to behind closed doors when it comes to CE, either on their own or as an alliance?

Samsung

As seen in the chart above Samsung has a market share of almost 15 percent, making them the second biggest manufacturer on the market. The strategy of Samsung is to enhance the digital convergence and to create a customer experience within multimedia entertainment. The firm has a clear focus on product design and currently collaborates with Armani.

Samsung as well as Motorola is among the founders of the LiMo (Linux for Mobiles) Foundation, which was launched in January 2007. The company is

⁷³ Thoresson, H, *Nokia köper plattform för mobila annonser, Mobil*, 2007

also a member of Google's initiative to a Linux operating system, Android⁷⁴. Further they recently launched two phones of an open OS combining Symbian and Series 60 and one with Microsoft's Windows Mobile.

Samsung Electronics do not only produce mobile phones but also electronic devices within image and sound as well as IT-products, making them present on the multimedia CE market. Additionally, they produce home appliances such as washing machines, refrigerators etc⁷⁵.

Motorola

The Motorola market share sunk during the third quarter of 2007 to 13.1 percent. According to the Gartner Group, this is a consequence of an insufficient product portfolio and lower sales volume in the low-end market.

Motorola is as mentioned members of the LiMo Foundation as well as Google's Android. Motorola is a former owner of Symbian but decided to leave the collaboration and started to develop a Linux platform. They have made efforts to develop and launch mobiles with a Motorola Linux platform but it has not been very successful, giving one of the explanations to a smaller product portfolio. Another proof of Motorola's indecisive strategy is the investment in 50 percent owner share of UIQ, sold by SEMC in October 2007. UIQ is the second UI developed for the Symbian OS. It was formerly wholly owned by SEMC but now the two companies are to develop the software in collaboration⁷⁶. This initiative is an additional indicator that the Motorola Linux platform is still not ready for the market⁷⁷.

Motorola claim to be present within three business units, namely; enterprise mobility solutions, home & network mobility and mobile devices. This makes the firm present in the multimedia home environment but only as a supplier of networks and not CE⁷⁸.

⁷⁴ www.gigaom.com

⁷⁵ www.samsung.com

⁷⁶ www.mobil.se

⁷⁷ Wellman, S, *Top four reasons Motorola invested in UIQ*, *Information Week*, 2007

⁷⁸ www.motorola.com

LG

With 7.1 percent of the market share, LG is the fifth biggest player on the mobile phone market. LG has presented attractive 3G-phones with emphasis on design and branding like Samsung, currently collaborating with Prada. However, the company is suffering from low margins and may face problems with obtaining profit on a consolidating market.

In addition to the proprietary software, products in the company portfolio licenses Symbian and Series 60. They are also members in both the LiMo Foundation⁷⁹ and the Open Handset Alliance Android⁸⁰.

Once again similar to Samsung, LG is a company competing on the CE, home appliances and mobile communications and consequently have knowledge resources on the multimedia CE market⁸¹.

Apple

Apple launched their first mobile phone, a Smartphone, on the North American market in June 2007 and it directly entered top ten ranking there. During the last part of 2007 and beginning of 2008 the iPhone will be launched across Europe⁸². The iPhone brings the mobile phone UI to a new level but being a product in the Apple family it will be seen what intentions Apple has for its position on the market⁸³.

Apple is neither a part of LiMo nor Android. Instead they are using the proprietary software OS X, built on Mac OS, like all the other products in the Apple portfolio⁸⁴.

As well known, Apple is a strong brand within multimedia CE, especially with

⁷⁹ www.linuxworld.com

⁸⁰ www.openhandsetalliance.com

⁸¹ www.lge.com

⁸² www.mobil.se

⁸³ Andersson, J, *Sony Ericsson Mobile Communications*, 2007

⁸⁴ www.apple.com

their large installed base of MP3-players. Additionally, Apple are increasing their market share among personal computers and are long gone regarding wireless compatibility between their devices.

Blackberry

Blackberry is a company that started out producing mobile email devices but as a consequence of the converging market, they chose become a player on the Smartphone market. They are mainly present in North America but are slowly trying to enter the European market by starting up sales in France and England.

Blackberry products use blackberry software and are not part of any of the ongoing open OS alliances. It is a company present only on the mobile communication market and so forth has no market knowledge within the CE.

Palm

Palm is, like Blackberry, originally a manufacturer of handheld organizers that entered the mobile handset market in 2003. Their products belong to the Smartphone segment and are operating on Windows Mobile⁸⁵. A part from Microsoft, Palm does not collaborate in any Open OS forum and are not a player on the CE multimedia entertainment market.

⁸⁵ www.palm.com

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6 Micro Delphi

In this chapter the procedure for the Micro Delphi analysis will be described as well as the results after both rounds of questions. The chapter is ended with a final synthesis, creating the foundation for the scenarios.

6.1 The procedure

The authors have followed the guidelines for the Micro Delphi methodology when pursuing this future study. First a number of trends were identified, which all are of importance for the future development of the industry. Second, independent experts in all areas were found and after that the first questionnaire was constructed. This was followed by personal interviews with all experts and a synthesis of their answers. Based on this, a second round of questions was sent to the experts who sent back their written answers. Finally a final synthesis was made.

6.1.1 Identification of trends

When initiating a Micro Delphi study, future trends have to be found. During the pre-study of the thesis, four trends were identified, seen in Figure 13. They are described as follows:

Technology

The technological trend is heading towards convergence of CE devices, especially regarding the case of the mobile phone. Today this development has already reached a level when the digital camera as well as the music player is integrated in the mobile phone. However, it is questioned whether this development will continue in the same pace or stagnate⁸⁶.

⁸⁶ SEMC internal report, Competitive landscape

Intercommunication and compatibility between devices is also of great importance since this makes it easier for consumers to transfer content between different devices. A strong trend is towards increased usage of multimedia in the mobile phone and one possible scenario is that broadcasted content can be streamed between for example the mobile phone and the flat screen⁸⁷.

Market

As described in chapter 5, the competition in the marketplace will significantly influence the future development of the CE industry. Since the mobile phone industry is facing its mature phase, a consolidation of players in the marketplace is taking place, affecting the development of the industry. At least, this will reduce the number of platforms which is of great interest for the problem statement of this thesis.

Possible new entrants have also been identified, described in chapter 5, with new business models that will most likely change the rules of the game.

Digital Home

The development of the Digital Home has been discussed for several years, why this has been identified as a strong trend. However, the pace of this development is more uncertain. Regarding the problem statement, it is of interest to identify the mobile phone's role in the Digital Home; whether it will be central or peripheral. If the mobile phone will have a central position, it will dominate the development of the CE industry to a larger extent than otherwise⁸⁸.

Consumer behavior

How the mobile phone will be used ahead is to a large extent depending on the development of consumer behavior. The development of media consumption in the mobile phone is evolving, which puts higher requirements on the future mobile phone and determines its importance for the consumers.

Another important factor is how personal information in form of CE content will be shared in the future. The trend today is towards a collective way of

⁸⁷ *Use case scenarios White Paper DLNA, 2004*

⁸⁸ Wargo, S, *Special: 2010 outlook, 5 Technologies to watch, 2007*

freely sharing music, film, etc. However, the authors question whether this development will continue or if people will become more restrictive due to a possible loss of integrity⁸⁹.

Finally, a trend to personalize the mobile phone has been identified. The question is how important this is for the future development of the industry and if it will put higher requirements on the possible modularization of the mobile phone.

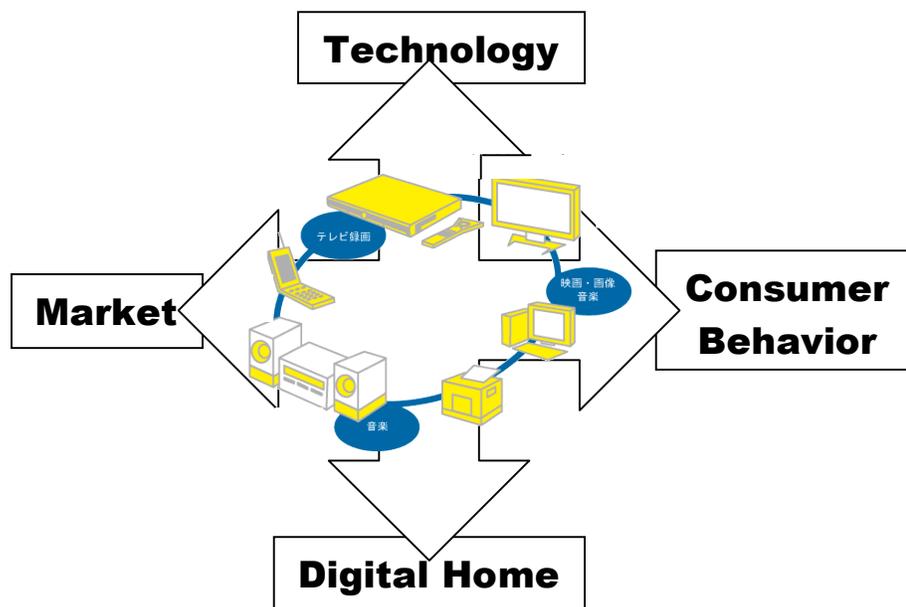


Figure 13 Identified Trends

6.1.2 Identification of experts

The identification of appropriate experts for the panel was made through discussions with the supervisor at SEMC to find relevant internal experts. Further, research articles and other sources were found on the Internet that

⁸⁹ www.e24.se/apps/print/print.asp?path=/dynamiskt/it_telekom/did_17494732.asp

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identified external potential experts. The experts did not get any information about the other participants to diminish the risk of biased results.

The following expert from respective area participated in the Micro Delphi study

Technology

- Professor, Lund University, Department of Computer Science
- Technology Manager, Bang Olufsen A/S
- General Manager SW Platform & Application Strategy CTO office, SEMC
- Senior Application Planner, SEMC

Market

- Senior consultant, McKinsey & Company Sweden
- Journalist, Ny Teknik
- Business Strategy Manager, SEMC
- Senior Manager Product Research, SEMC

Digital Home

- Professor, Lund University, Department of Architecture and the Built Environment
- Senior Manager, Copenhagen Institute for Future Studies
- Associate Professor, Lund University, Department of Ergonomics and Aerosol Technology

Consumer Behavior

- Senior Consultant and Future Strategist, Kairos Future
- Professor in Human-Machine-Interaction, responsible for Mobile Life project
- Trainee, Tele2 AB
- Senior Manager, Ericsson Consumer Labs
- Trainee, Modern Times Group AB

6.1.3 First round of questionnaire

The first round of questions was based on the four identified trends. First of all it was interesting to know whether the experts believed technology would be considered a support or a burden by the consumers in the future. Second, questions regarding multimedia entertainment, sharing of CE content, personalization of the mobile phone, i.e. consumer behavior, were posed followed by questions regarding convergence of devices and the mobile phone's role in a CE ecosystem. Then future software platforms were taken under consideration as well as possible dominating players in the mobile phone and CE market. Finally, the experts were to give their opinion on the most critical factors for the future of the mobile phone and CE industry. The first questionnaire is found in appendix 2. The interviews with the experts were pursued either in person or on telephone. In total, seventeen interviews were held.

6.1.4 First synthesis

After the first round of interviews, a synthesis was created based on the answers. It was found that all experts agreed upon some questions while on others the answers diverged. For the full version of the first synthesis, see appendix 3, a shorter version is the following:

Technology is generally seen as a support rather than a burden, although this is different to different people. Mainly, this is a question of different attitudes toward technology depending on generation. Growing up in a world influenced by technology, young people of today are used to interacting with technology on a daily basis while as the older generation is still struggling with their adoption. In the future, the mobile phone will be the leading personal device and used for multimedia entertainment "on-the-go", however it is very uncertain whether it will be the central device in the home. The consumers push towards a convergence of devices, however excellence-based functionalities will be preferable in special situations where the multi-task device is not sufficient. Regarding personalization of the mobile phone, the opinions diverge to a large extent. Some experts mean that the consumers want to use the mobile phone as a PC by adding applications and features, and others are of the opinion that people are lazy and want to buy a pre-determined product. When asking if

a common platform between CE and the mobile phone could be a competitive advantage, the answers varied. There could be an advantage regarding economies of scale, but no real technological advantage. Further, it appeared like the large players of today, in both CE and the mobile phone industry, will continue dominating in five years. Finally, the most critical factors for the future development of the industry was considered UI, design, ability to reduce complexity by simplification, connectivity and compatibility between products as well as new business models.

6.1.5 Second round of questionnaire

The first synthesis was sent to the experts together with the second round of questions. These were based on the dissimilarities in the answers of the first round and the need of further opinions in certain areas. The first question was supposed to give a more precise estimation of to what extent people will personalize their mobile phone. The second was focusing on the mobile phone's role in the home and the third on future standardization in the industry. Finally a possible scenario of how a mobile phone is used was described as follows:

“Lisa is on her way home from school using the city’s public transportation system. After checking the latest messages on her email and friendship-networks she decides to watch yesterday’s episode of her favorite series for time to pass by quicker. When arriving at home, the episode has still not ended, while as Lisa continues her watching on the family’s flat screen by streaming it from her mobile phone. Lisa’s brother, David, is already at home. He is in his room, listening to music stored on his mobile phone through the expensive speakers he got for Christmas. Lisa, even though slightly disturbed by David’s high volume, likes the music he is playing and would like to download it to her own mobile phone. Since Davis has given her access to his mobile music library, Lisa uses her mobile phone to enter the home network and makes sure she can listen to the music on her way home the following day.”

The experts were supposed to give their opinion of when this scenario was likely to occur. Eleven experts answered in the second round. The full questionnaire is found in appendix 4.

6.1.6 Final Synthesis

Besides what was concluded in the first synthesis, the second round of questions showed that it is most likely that the mobile phone will be purchased on the basis of personal need and taste and ready to use directly. The consumer will have the possibility to download applications of various kinds for further personalization but will not be able to manipulate the software in the same sense as it is possible to do with a PC. Regarding whether the mobile phone will be the central device even in the home environment, the answers continued to diverge. Half of the experts mean that it will be the central device or at least one among several, while the rest believe that it will only be the central personal device. Most experts agree that standardization in the mobile phone industry will be handled through de facto standardization, however this may be different for different parts of the phone and even sometimes a combination of de facto and de jure standardization. Finally, the estimations of when people will use the mobile phone according to the scenario described above diverge. Most experts believe that this will occur within the next five years, but that streaming music between the mobile phone and the TV for example lays further ahead in time. Some experts think that for this technology to be widespread we will have to wait almost ten years.

6.2 Conclusions of the Micro Delphi

Through the Micro-Delphi future study, some of the assumptions made were confirmed and deeper knowledge in several areas was obtained.

- Interconnectivity between CE devices will be of great importance in the future
- Consumers will be willing to adapt to new technology however the rate of adoption depends on how easy it is, i.e. UI and UX
- Future success in the mobile phone and CE markets will depend on the ability to create a superior UI and UX
- The mobile phone will be the central personal device and important for multimedia entertainment

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- The convergence of devices will continue, however excellence-based functionalities will be preferable in special situations where the multi-task device is not sufficient
- A common platform between CE and the mobile phone is of no importance for the consumers and the technological advantages are not obvious, however there might be other advantages as economies of scale
- If the mobile phone will become a “hub” in the ecosystem of CE or one device among other could not be answered. According to the answers received, it could be either
- A mobile phone will never be as modifiable as the PC due to the necessity to control the software to enable telecommunication connectivity. However, the mobile phone reflects the personality and consumers will want to be able to personalize their mobile phones to some extent

7 The scenarios

A foundation for constructing the scenarios has been laid in the two latest chapters. In this chapter the procedure for developing the scenarios is presented followed by a description of each scenario.

7.1 Common scenario drivers

Both the market analysis and the Micro Delphi analysis pointed out several development trends. Some of these are assumed to take place regardless of what direction the development takes. Intercommunication between devices is supposed to be of great importance in all future scenarios and UI and UX will be crucial for success. Furthermore, the mobile phone will be the central *personal* device and important for multimedia entertainment. Finally, the convergence of devices into the mobile phone is perceived to continue.

7.2 Diverging scenario drivers

Although several common trends for the future development of the industry were identified, there were others, more likely to decide the development path. The different diverging factors needed to be evaluated to identify the two most critical ones, since the authors had as ambition to create four scenarios by having the two most critical drivers on separate axes. The identification process was iterative whereas the authors tried to create scenarios by using different drivers shown below:

- Active or passive consumer behavior,
- Different central devices in the Digital Home (PC or game console)
- Level of adoption of new business models from a consumer perspective
- Level of standardization and openness of software platforms

The most frequent problem faced by the authors was the aspect of time. When starting to identify the scenarios, it was found that they were developments of each other, meaning that they were likely to occur but within different time perspectives. Since the purpose of a scenario analysis is to create different potential scenarios, all realistic to take place at the same point of time (in this paper in five years), the iteration continued until this requirement was fulfilled.

Finally, two drivers were put on the axis that made it possible for the authors to identify four diverse scenarios, realistic in five years time. These were:

- 1) Level of consumer integrity
- 2) The Mobile phone's role in the Digital Home – central or non-central

7.3 The scenario chart

7.3.1 Level of consumer integrity

The level of integrity is seen as a critical factor due to the present development of content sharing on the Internet and between mobile phones. The Micro Delphi analysis showed that the trend regarding content sharing is towards collective, where Facebook is a good example of how people upload personal content, like photos etc. However, several experts pointed out the risk of a backlash when it comes to sharing personal information, making people more restrictive in their behavior. This discussion is also supported by articles showing the potential danger of content distribution. These two development paths regarding personal integrity are seen as distinguished trends, suitable to represent different scenarios.

A disruption of the trend could come about either as a radical backlash due to terrorist threats or personal harassments etc, or the fear of sharing content starts in small scale and then accelerates; the so called snowball-effect.⁹⁰ A third possible explanation to a disruption could be a saturation of the consumer

⁹⁰Lomberg, S, *Facebook är som en tatuering du ångrar*, E24, 2007

market's willingness to share content. Assume that each type of content that is shared on the Internet represents a product life cycle model. First, "early adaptors" are willing to share such content, and not until the chasm has been crossed is the majority willing to share the same content. There is a possibility that when reaching a certain level of integrity, the chasm for that particular curve will never be crossed. And consequently the market can be said to be saturated.

7.3.2 The Mobile phone's role in the Digital Home

The second critical driver is whether the mobile phone will become the most central device in the ecosystem of CE, i.e. the hub in the Digital Home, or take a more peripheral role. When looking at the Micro Delphi analysis, the answers to this question truly diverged. All experts agreed that the mobile phone will be the central *personal* device and thereby extremely important, but one half of the experts were of the opinion that the mobile phone will remain one device among many in the home environment. The other half meant that the mobile phone has the potential to become a central device even in the home, although UX was an important enabler for this to be realized.

7.3.3 The scenario framework

Based on the two factors of uncertainty, a framework was constructed as seen in Figure 14. One axis represents the level of integrity, where a high level of integrity indicates that people in general are restrictive in how and to whom they share content whereas a low level of integrity implies a less restrictive behavior. On the other axis the mobile phone's role in the Digital Home is illustrated. *Hub* indicates a central role whereas *spoke* implies a peripheral position.

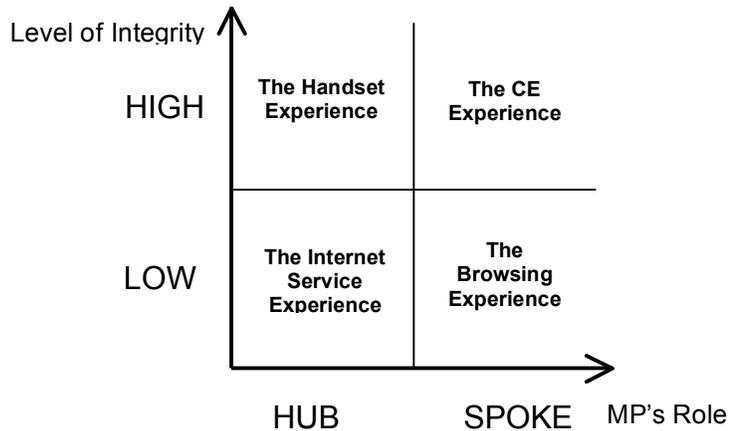


Figure 14 Scenario chart

7.4 Describing the Scenarios

Now the scenarios are to be described. The authors have chosen to do so based on the four trend areas identified in the Micro Delphi chapter: technology, market, the Digital Home and consumer behavior. There are several characteristics that two or more scenarios have in common; however, each scenario has characteristics of its own. The first draft of the descriptions is found in appendix 5 where the specific characteristics are marked in bold. Each scenario is described below.

7.4.1 Scenario 1 - The Handset Experience

This scenario is characterized by a high level of integrity. Some kind of backlash, either a widespread scandal or a saturation of behavior, has made consumers restrictive with personal content sharing. The Internet is an accepted communication medium and information source but the consumers have no trust in it and do not want to store any content there. Furthermore, the explorative behavior on the Internet has stagnated because of risk aversion.

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The mobile phone has become not only the central personal device but also the central device in the home. Among CE the mobile phone is used as game control, remote control, music player, laptop etc. This is possible partly due to technological development such as processor- and battery-capacity etc. leading to that the high-end phones of today will be commodity in this scenario. Instead there will be a mini-laptop filling the high-end role, to fully fill the central role in the Digital Home. Another factor contributing to the central role of the mobile phone is the consumers' perception of the device of being sufficient, not only "on-the-go" but also at home. This is a consequence of a successful UX and integration of new functionality into the mobile phone.

The most remarkable characteristic of this scenario is the unwillingness to be connected to the Internet all the time. As a consequence technology has been developed for the consumer to be able to regulate the level of Internet access. Imagine a lever that the consumer can manage between full access and no access to the Internet. The lever is used to turn on the connectivity when needed and most of the time it is turned off, while as the CE and your mobile phone communicate on a closed network with WLAN or Bluetooth. The lever can also be in between on and off, indicating that the Internet access is neither fully off nor fully on but rather there is a restricted availability (comparable to being away on the messenger although you are actually away from the Internet).

Digital content is preferably stored on a multimedia library due to the skepticism towards the Internet or on a safe Internet storage. The multimedia library is reached and managed through the mobile phone while other CE, such as the TV or computer, are only projecting screens. When someone wants to watch a movie this person switches on the TV screen, enters the multimedia library on the mobile phone, finds the movie and projects it on the TV screen. The same thing goes for the computer. Either the mobile phone or the multimedia library plays the role as computer, and the old computer located in the home office is now basically a screen projecting content from another device. To stream music or videos will most likely not be very popular due to the requirement of a lasting connectivity. If there are several mobile phones in a household they are used one at a time on the screens. The first to access has the priority.

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The handset manufacturers have potential to occupy a strong position in the value chain in this scenario since the mobile phone has such an important role in the Digital Home. Due to the consumers' restrictions in content sharing, Internet service providers will be less trusted where as traditional software providers have the opportunity to deliver a UI that the end-user adapts to and that will set the standard. Handset manufacturers will be leading the software development and it will be an advantage for CE producers to be compatible with strong mobile phone brands, since that is the device controlling the Digital Home.

Furthermore, consumers in this scenario have a larger faith in the development of mobile broadband (3G, turbo 3G etc.). The user-model of obtaining a phone-number to be connected to a telecommunication network is familiar and trusted while as fixed wireless Internet (WiMAX) is perceived more risky. Consequently, carriers have potentials of becoming trustworthy distributors of connectivity in this scenario. By realizing the consumers need of integrity models regarding Internet access and content sharing they may even have a competitive advantage since they would hold on to the end-user relationships they currently have.

Security and reliable models for how to access and utilize the Internet will, as already mentioned, be a crucial factor in this scenario and companies offering such solutions will have potential. Internet service providers will have to come up with security solutions and assure to obey integrity regulations to have a chance to survive on this market. Instead, consumers may encourage mobile phone software to include antivirus applications and to remain proprietary or at least closed in some sense, to insure integrity and avoid software that has been openly developed by a community where anyone is welcome. To create a trustworthy brand, whatever your position in the value chain may be, could become a competitive advantage.

Due to the advanced technology of the mobile phone, specialized retailers will dominate the sales of mobile phones in this scenario. This may be in collaboration with carriers for the customer to easily sign a network contract during the mobile phone purchase. Alternatively, brand owners will come to open stores offering only their specific products and services. When buying a

mobile phone the consumer demands some kind of expertise to guide them in their purchase and to help them with any compatibility issues they may have regarding the Digital Home. Carriers are not considered to possess such resources, at least not in the present.

7.4.2 Scenario 2 - The CE Experience

In this scenario the level of integrity remains high, once again due to a backlash of some kind (see scenario 1).

However, the mobile phone has not become the central device in the home but rather this role is filled by another CE device (supposedly the computer, multimedia library or game console). One explanation to why the mobile phone never becomes central in the home may lay in technological constraints such as battery or processor capacity. Another is that the consumer may consider the mobile phone as a device suitable “on-the-go” but that it is insufficient when at home. Because of compromises made when integrating different functionalities into the mobile phone, it has the role of a “Swiss Army knife” while as “the real tools” are used at home. The UX provided by the mobile phone is simply not competitive with the one of CE but “on-the-go” the mobile phone is undoubtedly the central device.

Since the mobile phone will no longer have a central role at home, the user will put the mobile phone to the side when at home. Simply interpersonal communication will be handled on it and it will automatically synchronize itself to the adjustments relevant to the mobile phone’s applications made on the central unit. The central device will be another CE device, which one will vary between different users, and personal content will most certainly be stored on the device possessing this role, since the Internet is regarded unsafe for content storage. If content is stored on the Internet it is taken care off by a trustworthy company offering secure solutions.

The integrity level is still high, so the unwillingness to be connected to the Internet remains. Like in the previous scenario, the consumer is able to regulate the level of Internet access with a lever and the CE can additionally communicate on a closed network with WLAN or Bluetooth. However, the communication will mainly be performed via the central device. When

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watching a movie, the user will turn on the TV and use its user-friendly menu-system and a remote control to find the movie, stored on the central device. Once again, streaming of music and videos will most likely not be very popular due to the requirement of a lasting connectivity.

Further similarities to the previous scenario are, first of all, the consumers' faith in the development of mobile broadband (3G, turbo 3G etc.). Consequently, carriers once again have potentials of becoming trustworthy distributors of connectivity while as Internet service providers face a less promising future. Second of all, companies offering security and integrity solutions remain competitive. Consumers will encourage mobile phone software to include antivirus applications and to remain proprietary or at least closed in some sense, to insure integrity and avoid software that has been openly developed. To create a trustworthy brand will bring the company a competitive advantage.

But as a consequence of the mobile phone's peripheral role at home, it will not be as intelligent as in the previous scenario. Instead, each CE device will be managed directly by the end-user through a simple menu-system. This will lead to a strong position of CE companies, being the providers of both hardware and software including UI. For firms on the CE market to be able to deliver a complete UX to the consumer, one could imagine that there will be a consolidation on the market. A partnership between two firms with complementing product portfolios would be able to offer a complete set of CE and thereby make a seamless integration of them in the Digital Home.

Handset manufacturers could of course have an advantage of being integrated into such a CE ecosystems but because of the mobile phone's role as a spoke they will be forced to adapt to the CE' software. To remain compatible will be a must to be competitive. Finally, the mobile phone will most likely be purchased at a retail store, offering all kinds of CE and the network connectivity will be provided by carriers, probably the same one delivering Internet access to the home.

7.4.3 Scenario 3 - The Internet Service Experience

In this scenario the level of integrity is different. There has not been a restriction of the consumer integrity and the behavior of contributing personal content has not been saturated but rather crossed the chasm and reached the majority of people. The Internet is widely accepted as a communication medium, information provider and content library. Most people have a “digital identity” that can meet people, go shopping etc. on the Internet.

However, once again the mobile phone has a central role both “on-the-go” and at home and is used among the CE as a game control, remote control, music player, laptop etc. and the high-end phone has become commodity (see scenario 1).

In the home, the mobile phone is always connected and is the remote control of all your CE devices. Imagine that you would like to watch TV. When turning on the TV, the mobile phone will be used as remote control, with which you enter your personal multimedia library, that is stored on the Internet, and watch the desired program. The TV fills the role of being a screen on which you project content that is stored on the mobile phone or the multimedia library.

By letting devices in the home communicate over the Internet, continuous Internet access is crucial, whereupon the development of wireless Internet communication (Wi-Fi, WiMAX etc.) is encouraged and financially supported, providing consumers with cheaper connectivity deals.

As a consequence of the browsing business model, service providers on the Internet have a strong position in this scenario. This business model is predicted to also enter the mobile phone market. Assume an increased Internet access on the mobile phone. Due to their simple UI and an already well-established business model on the computer, Internet service providers have strong potential to succeed also there. By becoming the player in the value chain providing the mobile phone’s UI, services and applications to the end-user, these service providers will conquer the role as service provider from carriers. Consequently, carriers will be confronted with competition on the mobile service market and may need to focus solely on providing communication infrastructure when loosing their consumer relation to the Internet service

providers. In addition, the new business model will affect the handset manufacturers. Due to the Internet service providers' offer, they will take over a part in the value chain from the handset manufacturers, namely the software development regarding UI, services and applications.

The mobile phone is an intelligent device in this scenario. It is part of the CE ecosystem in the home and definitely has the central personal role there. Due to the advanced technology of the mobile phone, specialized retailers will dominate the sales of mobile phones in this scenario. When buying a mobile phone the consumer demands some kind of expertise to guide them in their purchase. The Internet access for using the device will be obtained by signing a flat-rate contract. The cost is predicted to be rather low due to the strong support of the development of wireless Internet.

7.4.4 Scenario 4 - The Browsing Experience

In this scenario the level of integrity remains low. Accordingly, the behavior of contributing personal content has not been saturated but rather crossed the chasm and reached the majority of people.

But, unlike the previous scenario, the mobile phone has not become the central device in the home but rather this role is filled by another CE device (supposedly the computer, multimedia library or game console) or there exists no central device (see scenario 2).

In the home, all of the CE are connected to the Internet and managed by using a browser. Imagine that you would like to watch TV. When turning on the TV screen it would directly log onto a browser since Internet connection is available around the clock. Through this browser you would be able to enter your personal multimedia library, that is stored on the Internet, and watch the desired program. Additionally, the same browser would be used for all CE devices making it possible to personalize the browser functionalities. This would mean that new devices purchased for the home directly would adapt the same browser design and contribute to an easier usage for the consumer.

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By letting all devices in the home communicate over the Internet, technology standards, such as DLNA, become less important. Instead Internet access is crucial, whereupon the development of wireless Internet communication (Wi-Fi, WiMAX etc.) is encouraged and financially supported, providing consumers with cheaper connectivity deals.

As a consequence of the browsing business model, service providers on the Internet once again have a strong position and the business model is predicted to also enter the mobile phone market. Consequently, the Internet service providers will control the UI and carriers may come to focus on providing infrastructure. In addition, the new business model will affect the handset manufacturers. Due to the Internet service providers' offer, they will take over a part in the value chain from the handset manufacturers, namely the software development regarding UI, services and applications.

The mobile phone in this scenario runs a risk of becoming a commodity. Due to the boosted usage of the Internet on the mobile phone and its importance for the value creation, the mobile phone as a device possesses less value. The handset manufacturer's value creation rather lays in the hardware and the ability to quickly enable the service providers' requests of functionality. Imagine that you want to purchase a new mobile phone. In this scenario this would be done at a retailer who would offer you a mobile phone with hardware and basic software enabling and making the best out of your browsing experience. You would have the option to let an Internet service provider reduce the price, by allowing mobile advertisement, or you could also buy the mobile phone as it is and pay full price for the device. Thereafter, you would need to sign a contract with a network provider. This will most likely be the role of today's carriers since they have the processes for payments, number distribution and network access in place. However, the business model will be more of a flat-rate model giving the consumer access to the Internet. Perhaps will mobile Internet access be included in the Internet contract in the home.

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8 Analysis

In this chapter, the scenarios will be analyzed on the basis of the theory described in chapter 3. The most relevant theories to be used are; standards war, platform leadership, first mover advantage and attacker's advantage. First, there will be a discussion of general developments followed by an analysis of each scenario one at a time. Finally, an Open Source based platform strategy at SEMC will be looked upon from a cost and benefit perspective.

8.1 General development

The pre-study showed that connectivity and intercommunication between CE devices will be of great importance in the future, which was further confirmed by the Micro Delphi analysis. Connectivity could be obtained by developing standards for communication, as the DLNA initiative is striving to do. Another strategy to attain connectivity is to implement a common software platform in both the mobile phone and the CE devices. Apple has managed to pursue such a strategy by integrating their operating system into all products in the portfolio. This way, a common UI can be offered to the end-users, making it easier for them to adapt to new technology, which creates a competitive advantage, as the consumer only has to adopt one user behavior for all the devices of this specific brand.

An additional advantage with a common platform between the mobile phone and CE devices is the possibility to create an appealing and well functioning ecosystem. However, as seen in the scenarios created in this paper, the role of the mobile phone in this ecosystem is uncertain. Depending on if the mobile phone will be the central device or not, its software platform will be of more or less importance. If the mobile phone will become the central device in the home, it is likely that CE devices will have to adapt their software to the mobile phone

software, to be compatible. If another device is central, the mobile phone will be more dependent on the CE software.

Furthermore, both the mobile phone market and the CE market are mature markets, whereupon a consolidation on both markets is to expect. Additionally, the requirement of connectivity is likely to reduce the number of software platforms. It is impossible to be compatible with all existing software platforms and therefore players on the mobile phone and CE markets will make their devices compatible with the strongest platforms. Consequently, the most attractive ones will survive, possibly through a standards war and thereby further strengthen their position.

8.2 Theory snapshot

Based on the general development, standards wars are likely to occur on these markets but the platforms fighting will depend on scenario. By winning a standards war, a platform owner has the potential to become a platform leader and control the ecosystem around the platform and attract other players to develop applications on the platform. As a result, network externalities can be gained, an ultimate state for all platform owners.

To become a platform leader, one has to make a move towards creating a strong platform. As described in the theory of first mover's advantage, it can be of importance to be the first mover towards such a position. However, it is also said that under certain circumstances, it is very difficult to get hold of a leadership position by being the first mover. The two factors affecting the circumstances are market development and technology development; two factors that both vary in the scenarios created in chapter 7.

Finally, the theory of *the Attacker's Advantage* will be discussed under SEMC Open Source Strategy. Investments in R&D do not create payback forever. Eventually, it becomes difficult and expensive to make technology improvements, that are valued by the market and the risk of being surpassed by competitors who have invested in developing a new technology is high.

8.3 Analyzing the scenarios

8.3.1 Analyzing the Handset Experience

In this scenario, the mobile phone will have a central role and its software will be of great importance. If a standards war occurs, the most likely platforms to survive are Nokia's Series 60, Windows Mobile and Linux Mobile. These speculations are based on carriers request to only develop applications for these three platforms. Apple have potential to become one of the attractive platforms after entering the mobile phone market, however for this it is required that their platform is opened up for third party development and licensing.

Series 60 in combination with Symbian have a large installed user-base, an ability to innovate, manufacturing capabilities, industry reputation and a strong brand name. However, Nokia lacks compliments among CE. To strengthen their potentials, the authors believe that Nokia should move towards the CE industry either by expanding their product portfolio or through partnerships.

Windows Mobile has access to Microsoft's installed base due to their leadership of PC operating systems, an important advantage in the development of connectivity between CE and mobile phones. They also have intellectual property rights, ability to innovate, deep pockets, strength in complements and a well-known brand name and reputation. However, if the Microsoft brand is a strong asset or not can be questioned since Microsoft often is considered having a monopolistic behavior. Furthermore, their strength in compliments is due to the compatibility with Windows and X-box but would need to be expanded to include more CE devices. The authors mean that Microsoft has potential to gain a first mover advantage if they manage to quickly get an installed base among handset manufacturers and could get hold of manufacturing capabilities by partnering with strong hardware producers.

Linux Mobile may have the potential to control an installed base in five years if the development continues in their favor. Linux strongest advantage is by the authors considered to be the brands goodwill in comparison with Microsoft. They also have intellectual property rights due to the open source legislation and their ability to innovate is strong due to the large number of loyal

developers engaged. To succeed, it is crucial that a player with a strong brand name and manufacturing capabilities uses Linux Mobile and invests in the platforms' future development. To make Linux the software choice within CE would peak Linux potentials, giving the platform compatible compliments.

The circumstances in this scenario are considered to create a situation were *The Market Leads* with the technology being relatively mature but the market being growing as a consequence of the fast user-adoption of using the mobile phone as the hub. When the market leads, a firm's resources are crucial to succeed as a first mover and obtain a long-term advantage. Both Nokia and Microsoft have the resources to be able to be a first mover but a large player that decides to go for Linux Mobile is not to count out of the game.

8.3.2 Analyzing the CE Experience

In this scenario, the CE software platform will be central as the role of the mobile phone is not central in the Digital Home. If a standards war occurs, the strong players that can be seen today are Microsoft and Apple. However, the strong CE position favors all large CE manufacturers initiating a platform leading strategy.

Today, there is no such platform, but Microsoft, who is trying to create an ecosystem of CE by partnering with Toshiba. As described in the previous scenario, they are possible to succeed and maybe even more in this scenario since they already dominate the PC market, with the PC being the most likely hub. However, they have not yet introduced a platform ecosystem between CE and the mobile phone, which would be crucial to be able to compete.

Another potential combatant in a standards war is Apple. They have a base of loyal and partly locked-in customers and even if not being a large player today, it has the potential to grow. They have intellectual property rights, a great ability to innovate, a strong first mover's advantage, being first with a working ecosystem, and finally a strong reputation of excellence and brand name. However, the authors assume that their manufacturing capabilities might be limited in a situation of rapid market growth. However, such capabilities could of course be attained during a period of five years. A fact contradicting Apple's

potential to become a platform leader is without doubt their closed platform, which prevent others from developing complementary products on it. This makes their platform less attractive to consumers that do not wish to be locked into a certain brand's products. As already claimed in the handset experience scenario, Apple has to open up their platform and maybe even license it to others to implement in their products, to have the potentials to dominate this market in the future.

The authors find Sony as a third player to have potential in this scenario if they decide to take advantage of SEMC and create an ecosystem of their own products and the mobile phone. They would possess advantages in their ability to innovate, their manufacturing capabilities, complementary products, intellectual property rights as well as their reputation and brand name. However, they need to invest in a common platform and make it attractive to their already installed base of users quickly to be able to compete.

In this scenario, the technology is mature and there is only a gradual market evolution, which corresponds to *Calm Waters* conditions for a first mover. These conditions are optimal and put Apple in a good position due to their early start of this development.

8.3.3 Analyzing the Internet Service Experience

In this scenario the mobile phone is the central device in the ecosystem of CE devices. At the same time, Internet service providers have taken control over the UI and are operating on the basis of a software platform. Since CE are forced to be compatible either with mobile phones or to Internet applications, a platform supported by handset manufacturers or by Internet service providers is preferable to use among CE manufacturers. Further, Internet service providers will want to develop applications for the mobile phone industry, resulting in a guaranteed development of applications to the mobile phone platforms. Consequently, the mobile phone platforms will have a strong position if a standards war occurs in this scenario.

As in the first scenario, there are a few potential combatants among the mobile phone platforms, more precisely Series 60, Windows Mobile and Linux Mobile.

As discussed in scenario 1, they all have potential to win this war or at least be among the survivors. There might be an additional advantage in this scenario to collaborate with a provider of a UI platform to extend the underlying platform and make it an attractive platform for the Internet service providers to build their applications on.

As of today, Google has taken an incentive to create an UI platform based on a Linux software platform. However, for this scenario to be realized there has to be a fast technology development and a rapid consumer acceptance at the same time providing the conditions characterizing *Rough Waters*. In such a situation, the conditions are changing rapidly whereas a first mover is very vulnerable. Therefore, the authors suspect that Google's current advantage might not be long-lasting and that other players with the same strategic ideas can have an opportunity to surpass Google's advantage by offering superior technology or additional value creation to its customers.

Due to the rapid market change, it is important for a platform owner to have a long-term strategy and to create a platform that is appealing to both Internet service providers and CE producers, creating an attractive ecosystem to develop consumer-attractive applications for. Finally, *Rough Waters* implies potentials for player with deep pockets, putting especially Microsoft and Nokia in a good position to compete in this scenario.

8.3.4 Analyzing the Browsing Experience

In this scenario the mobile phone has not developed to become the central device in the Digital Home. However, as in the previous scenario, the UI will be developed and delivered by new players on the market. This will most likely be Internet service providers, who have attained a strong relationship with end-users by dominating the service business on computers and delivering a simple UI. They also provide an attractive business model with mobile advertisement.

Software developed by handset manufacturers will not have that large of a potential in this scenario, due to the mobile phone's more peripheral role. Instead, most CE, as well as mobile phones, will be managed by a browser; making Internet capabilities crucial. Therefore, an attractive software platform

on which Internet service providers can develop applications to many devices will be competitive. A standard war in this scenario would consequently be between platforms with a large installed base and that are attractive for Internet service providers to develop applications on. This could be a platform both among CE or mobile phones, probably similar players to those in the CE experience. Additionally, it could even be a proprietary platform that is opened up by a player for Internet service providers to develop on. Since the platform no longer adds value to their business, it is likely that handset and CE manufacturers would want to promote their already existing platform as an open one, since this would be the cheapest platform alternative to them.

As in the Google experience, both the technological and market change is rapid and being a first mover does therefore not have to imply success. This created an attractive environment for new entrants or existing players with deep pockets.

8.4 SEMC Open Source strategy

Even if SEMC has a successful platform strategy today, there is a risk that this platform will not remain competitive in five years. The theory of *the Attacker's Advantage* rather suggests that there might be an opportunity for SEMC in investing in new technology before this happens and thereby manage a probable discontinuity.

When analyzing the scenarios it was seen that their current platform most likely will be too small to compete with larger and more attractive platforms. For example Windows Mobile and Series 60 will be more attractive to both carriers and third party developers and SEMC would take the risk of losing both market share and profitability.

It is further concluded that the Linux platform has potentials to gain market share in several of the scenarios. This somehow confirms the beliefs that the authors had when initiating this research and is very much related to the purpose of this paper – to investigate an Open Source based strategy at SEMC. Initially, the purpose was to look into a more general Open Source strategy but as the analysis shows, such a strategy involves Linux software in some way or

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another. Therefore, the opportunity for SEMC to support an Open Source based strategy was narrowed down to investigating the opportunities with supporting a Linux Mobile platform, to remain competitive into the future. Additionally, the authors suggest that such a strategy should be initiated in collaboration with other players in some kind of Open Source based community. Below, this strategy is analyzed from a cost and benefit perspective.

8.4.1 Cost and benefits found in all scenarios

The general costs and benefits for all four scenarios are the following:

Costs	Benefits
The expensive risk in supporting a platform that does not succeed the standards war	Economies of scale R&D cost reduction Open Source software contributes to goodwill As an Open Source platform, Linux is attractive to third party development

8.4.2 SEMC in the Handset Experience

In this scenario the following cost and benefits have been identified:

Costs	Benefits
Many different wills and initiatives regarding a Linux Mobile platform could contribute to a scattered and slow platform development	Linux is one of the strong players in this scenario
SEMC will loose value in their proprietary platform	Not dependent on the strong players Nokia or Microsoft
The Linux platform is already behind both Microsoft and Series 60 in creating a platform	Sony is using Linux, giving this platform a relation to CE and a possible competitive advantage
No first mover advantage	Linux has the potential of becoming a platform leader in this scenario
Nokia and Microsoft both have high manufacturing capacity to remain first mover advantage	Carriers support Linux as on out of three strong platforms

8.4.3 SEMC in the CE Experience

In this scenario the following costs and benefits have been identified:

Costs	Benefits
SEMC dependent on CE players choice of platform	Linux is an attractive platform for both CE and handset manufacturers
Apple's platform has potential to become leading, and already have a first mover advantage	Linux is a potential platform among CE, making it a possible competitive advantage for SEMC to have a Linux platform for the purpose of intercommunication in an ecosystem
Linux is behind in the development of a mobile platform	SEMC should spread their risks in this scenario to be able to follow the CE players. This will be done by investigating in a Linux platform.
Players in the CE market are inexperienced with platform thinking in comparison to handset manufacturers	
CE may introduce new attractive platform with potential to become leading	

8.4.4 SEMC in the Internet Service Experience

In this scenario the following costs and benefits have been identified:

Costs	Benefits
<p>A diverging and scattered Linux platform due to many wills and different initiatives</p> <p>Competition faced among Internet service providers make them support different development paths for Linux, which is made possible due to its open nature</p> <p>Nokia and Microsoft have more potential to control platform development.</p>	<p>Linux one of the three attractive platforms in this scenario, where the choice of platform is a strategic question since the mobile phone is a hub</p> <p>Google is developing a Linux platform for their applications</p> <p>Google is first mover in creating such a platform</p> <p>Linux is an Open Source platform, that could be attractive also for new entrants on the Internet service provider market</p> <p>A condition characterizing rough waters is to be prepared for changing circumstances on the market. To support Linux is to be spreading risks</p> <p>Linux as an Open Source platform has potential to attract many players and obtain a strong platform position</p>

8.4.5 SEMC in the Browsing Experience

In this scenario the following costs and benefits have been identified:

Costs	Benefits
<p>The expensive risk in supporting a platform that does not succeed the standards war</p> <p>The risk of supporting a platform that is not attractive as a browsing platform</p> <p>Possibly it is even cheaper to open up a proprietary platform in this scenario</p>	<p>Google is developing a Linux platform for their applications</p> <p>Google is first mover in creating such a platform</p> <p>Since the mobile phone platform is more of a commodity, a cheap platform is crucial to remain competitive. A Linux platform does not require licensing and is a low cost alternative</p> <p>Software platform not core competence among handset manufacturers anymore. Focus rather on design and software</p> <p>Good was to remain compatible with Internet service providers, being an attractive platform to develop applications on</p>

9 Conclusions

In this chapter, conclusions are made on the basis of the research. Industry trends will be presented and the scenarios will be briefly described. Thereafter, conclusions will be made whether there are incentives for SEMC to initiate an Open Source based strategy on the basis of the future development. Finally, the authors will comment the results of the paper and provide the reader with suggestions of future studies.

9.1 Industry Trends

9.1.1 Technological Trends

At present date, the technological development is striving towards connectivity and compatibility among CE. In the Digital Home, the importance of connectivity between multimedia devices is increasing as well as their connectivity with mobile phones. A leading company is Apple, who enables connectivity within their product portfolio due to a common software platform. Sony actively try to unify their various platforms by using a Linux platform, however, they are far from realizing their goal.

Furthermore, it is not solely a platform that is crucial for enabling the technological trends mentioned above. For consumers to adopt the new technology it is crucial for manufacturers to deliver a user friendly UI and to offer a UX that creates value to the end-user.

9.1.2 Market Trends

Both the CE and mobile phone market are becoming increasingly mature, resulting in consolidation on both markets. Consequently, there will be fewer players on each market and on these specific markets the amount of software

platform providers will decrease to a limited number. Another identified trend is that platforms, that up to today have been mainly closed software, tend to be opened up to a larger and larger extent. This development is encouraged by third party developers and implies cost reduction.

The consolidation of the mobile phone market has come to attract new business models among which one is in particular interesting and threatening. Companies are able to provide Internet services for free by reducing costs through Internet advertisement and are of course very interested in integrating their business model into the mobile phones. This is a trend that, if successful, can have a large impact in the value chain. Carriers may, in the worst of cases, get out of business and handset manufacturers may have to abandon software development and instead focus entirely on hardware production and design. In other words, the future roles in the front of the value chain are uncertain and likely to change in the coming five years.

Finally, multimedia in the mobile phone is an upcoming trend that is a consequence of the convergence of multimedia devices. Once again, the development of this trend relies on the ability to deliver a UX.

9.2 Future Scenarios

9.2.1 Scenario description

On the basis of the Micro Delphi analysis, four scenarios were created in a scenario framework consisting of two axes. The two drivers representing the axis of the scenario framework were chosen to be:

- Level of consumer integrity
- The mobile phone's role in the Digital Home – central or non-central

The framework is presented in Figure 15 including the name followed by a short description of each one of them.

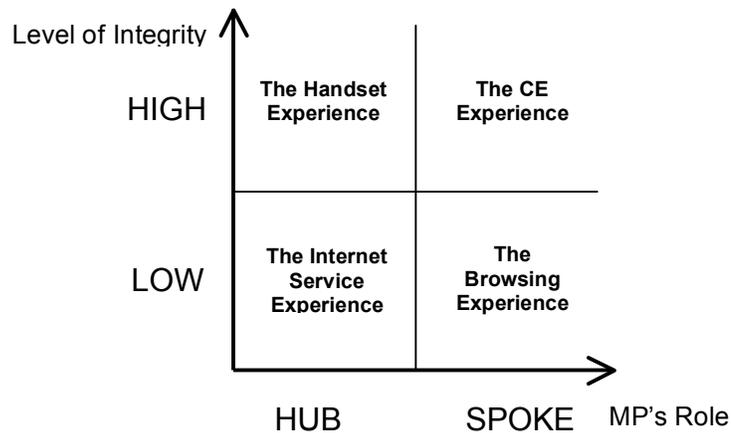


Figure 15 The scenario framework

The Handset Experience

Characterized by a high level of integrity and the mobile phone as a central device, this is the scenario where the handset manufacturers have the largest potential to control the software platform, not only on the mobile phone but also among CE. Consumers are unwilling to be continuously connected to the Internet, whereupon the Internet service providers face problems introducing their business model. Consequently, the handset manufacturers continue to control both mobile phone hardware and software.

The CE Experience

Characterized by a high level of integrity and the mobile phone as a non-central device, this scenario is more influenced by CE in the Digital Home than mobile phones. Another CE will be the central device and it will be important to make mobile phones compatible with CE software platforms. However, the software will still be delivered by the manufacturers, since Internet service providers fail to gain the consumers trust.

The Internet Service Experience

Characterized by a low level of integrity and the mobile phone as a central device, the Internet service providers will gain power in the value chain in this scenario. Their services will create the UI and represent the UX. Consequently,

it will be important for both mobile phone and CE manufacturers to use a software platform that Internet service providers find favorable to develop services on to remain competitive. However, the handset manufacturers remain power in this scenario due to the central position of the mobile phone and a close collaboration between them and Internet service providers will be seen.

The Browsing Experience

Characterized by a low level of integrity and the mobile phone as a non-central device, makes the mobile phone a commodity in this scenario. Handset as well as CE manufacturers will basically focus on delivering hardware design to a low price while as the UX will be obtained by browsing the Internet. Once again, the Internet service providers will be successful and the importance of making devices compatible to the software platform preferred by them remains.

9.2.2 The author's comments

An interesting aspect of the scenarios is that they represent an independent part of the thesis. Even though they create a foundation for the analysis of this paper, they can also be used in other contexts. Within Sony Ericsson, the authors have already experienced such practice of the scenarios, with employees utilizing the scenarios as a basis for analysis and discussions of different kind within the telecommunication industry.

In addition to common driving forces, the empiric part of the study identified several diverging driving forces, which were all tested on the framework axes. The authors were well aware that the choice of drivers on the axes would have an impact on the scenario creation. In the aim of objectivity, all diverging drivers were considered when choosing the two drivers forming the framework. Different options were discussed by the authors as well as with their supervisors and other persons familiar with the topic. In addition, all drivers were included in the scenarios independent of being common or diverging drivers.

Finally, the scenarios have the characteristic of being independent of technology development and are instead based upon market and consumer behavior evolution. A normal approach at the software department, as well as

within a high-tech business such as telecommunication, is to create scenarios based on technology development. Therefore, it can be considered to be “thinking out of the box” when investigating a software strategy by applying it to these scenarios. However, it is the authors’ belief that this is an appropriate and interesting approach to apply in this investigation as well as it could be to use it in future investigations related to technology strategy. The reason for this is that market as well as consumer behavior development to a large extent influence the realization of a technology development. Several historical examples show that new technology has failed to succeed, not because of technical insufficiency but rather due to limitations on the market or in consumer behavior. This is something that tends to be forgotten among people with a technological focus.

9.3 Open Source based Strategy

9.3.1 Strategy analysis

To use Linux as an open software platform would, first of all imply economies of scale and reduction of R&D costs. However, these are benefits obtained by implementing any open software platform, for example Windows Mobile or Series 60. What Linux offer in addition to these benefits are; free software, goodwill by being an *Open Source* platform and, as a result of this, attractiveness to third party developers.

The openness of the platform, does not only attract third party developers but also makes Linux an appealing option for new entrants among Internet service providers as well as CE manufacturers initiating a platform strategy. By implementing a Linux platform SEMC would make a strategic positioning. They would invest in a platform that has potentials of becoming the leading one in all future scenarios and most importantly a platform on which collaborations with Sony could become a competitive advantage.

Additionally, by initiating a Linux platform strategy, SEMC would utilize a platform that is not developed and delivered by a company, but developed in a community created by industry players and other developers. Even though

some players will have a stronger opinion than others regarding the development in such a community, SEMC would be independent of software releases and license costs controlled by competitors. Besides, to invest in a Linux platform could be a good way for SEMC to encourage future distribution of their technology by becoming a platform leader. This might be the only way for them to succeed with being a platform leader since their platform of today is too small and they are in the risk of being “eaten up” by larger players if they invest in another platform.

The arguments mentioned above are all incentives to initiate a Linux platform, however, there are some arguments contradicting this strategy. First of all, a Linux platform runs a risk of becoming scattered into several branches as a consequence of dissonances in the community. This would diminish its attractiveness as a software platform to develop on as well as it would imply greater development costs for each existing branch.

Moreover, the existing efforts of creating a mobile Linux platform are, as far as the authors know, far behind the Series 60 and Windows Mobile platforms that are licensed by several manufacturers in the industry. The forums that have been formed in the aim of developing a mobile Linux platform have so far not released a platform to be implemented in devices. Finally, by investing in a Linux platform, SEMC of course run the risk of committing to a platform that will not succeed in a standards war.

To sum up, there are many arguments creating incentives for SEMC to initiate a Linux platform strategy in all of the scenarios presented in the paper. Doing so, would definitely put the company in a good position if Linux will be one of the leading platforms in the future. It would contribute to the opportunity of a common platform with Sony as well as the possibility to be supporting a platform attractive to Internet service providers. However, due to the instable value chain and the uncertainty of its structure in five years, it is the authors’ belief that a Linux platform should not constitute the single one platform strategy followed by SEMC. To do so would be to neglect the fact that it is behind in development and runs the risk of becoming branched until a solid development strategy has been worked out. However, it is time for SEMC to start to apply a software platform portfolio thinking and a Linux platform

should definitely be one of the long-term software strategies within such a portfolio.

9.3.2 The authors' comments

Coming to an end of the paper, the authors find that the theory that was chosen to support the investigation has been relevant to the problem. In particular, the Micro Delphi method turned out to be a very suitable approach for this research, which will be discussed separately below. Perhaps some further theory regarding the value chain could have been helpful since the structure of the telecommunication value chain has such an impact on the future. However, this is something that the authors did not realize until the research was further gone. Besides, the authors mean that they, as well as the target group, possess adequate knowledge of value chain theory.

The presentation of the results of this paper at Sony Ericsson was successful and contributed to an interesting discussion. It is the authors' meaning that it was fruitful for the company to take part of theories relevant to the problem statement. It is the authors' perception that decisions in many cases are made without applying theoretical material and instead on the basis of experience and market analysis. However, it is considered that academic theory is a good way for a company to get access to an objective source of accumulated experiences from various times and industries. Consequently, it could be rewarding to include theories in a strategic decision even though it may seem to make it even more complex.

This paper is a future study of the telecommunication industry and was performed to investigate the incentives for initiating an Open Source based platform strategy at SEMC. Due to the character of the task, a qualitative research approach was chosen accomplished by a market analysis combined with Micro Delphi analysis. The market analysis was based on written sources read by the authors while as the Micro Delphi analysis was founded on oral interviews with a number of various experts. The wide range of experts in the panel supports a reliable result as well as the number of written sources that have been studied. Furthermore, the authors have strived to attain validity by

using written sources, interviews and surveys as methodological approaches and to find various and reliable sources as well as interviewees.

9.4 The Micro Delphi Method

The Micro Delphi Method was chosen for its brilliant and simple way of collecting data that reaches accurate conclusions within a limited period of time. During this study, this has definitely been the case. The authors have found the Micro Delphi Method easy to pursue as well as the results obtained holds up to the requirements set regarding objectivity, reliability and validity. Honestly, the authors are surprised how well suited the chosen method was for this research.

Looking back on the study, it can be concluded that the outcome benefited from well-chosen experts. The participants were found within different fields of expertise as well as they were of diverse geographical backgrounds. The contact with them was professional and they were very familiar with the studied topic.

The second round was conducted by written survey, a choice that deserves to be commented. One should be aware that written surveys result in a bigger risk of experts not answering or delayed responds. When carrying out a Micro Delphi study, the authors recommend the researcher to take this into consideration before compromising due to a limited time frame.

Finally, the authors warmly recommend the Micro Delphi Method as a suitable methodology for the scope of a master thesis. Additionally it contributes to a structure easy to follow throughout the study and to base the thesis writing upon.

9.5 Future Studies

During the work with this thesis, the authors have realized the size of the topic and the need for future investigation due to the opportunities it imposes for SEMC. First of all, the authors suggest SEMC to clearly define their software platform strategy and what their perceptions are of a software platform portfolio.

Thereafter, it would be interesting to look into what opportunities it would imply for SEMC to join different Open Source projects such as LiMo or Android. The projects will most certainly imply different possibilities as well as the possibilities will differ depending on which scenario that is investigated. However, by mapping existing forums as well as their pros and cons, SEMC would get a clear understanding for their future choice of platform strategy. However, for this to be of value, an investigation should be done as soon as possible in order not to fall too far behind competitors that are already members of the incentives. It may be the case that more than one of the existing forums is considered appropriate to include in a SEMC platform portfolio.

Finally, the authors consider it being of interest to make an invention of the different Linux platforms Sony possess and look further into the possibility of the development of a common Open Source platform between the two companies. For this to be valuable, it is crucial that Sony internally make commitments to one single Open Source platform.

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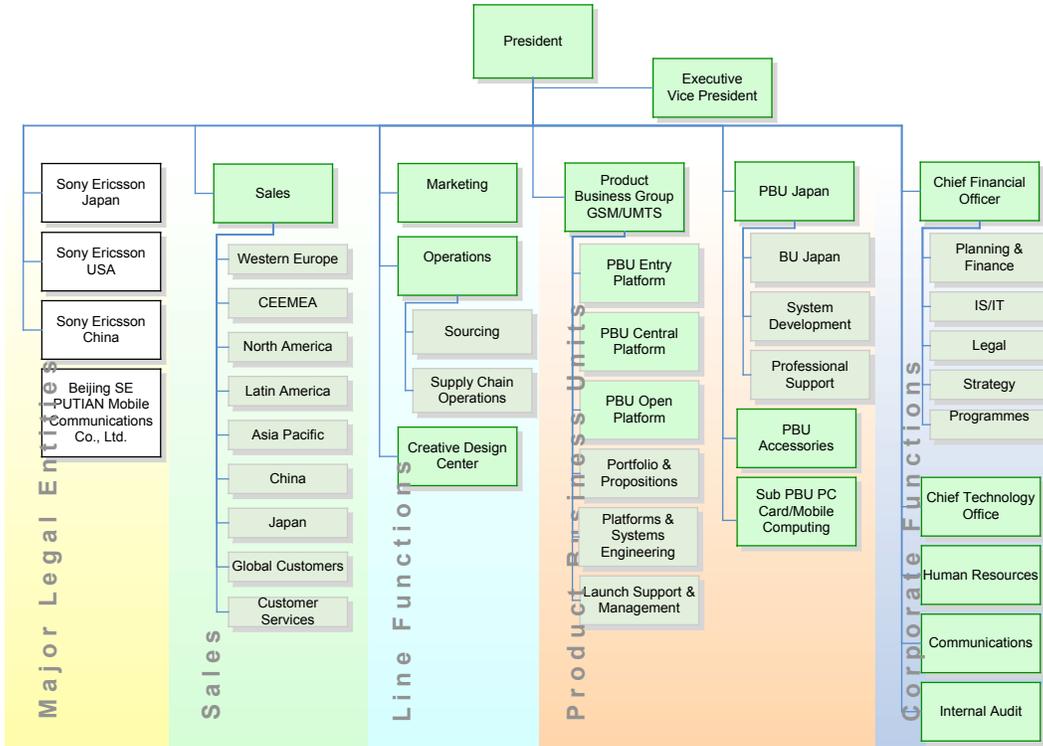
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11 Appendix 1



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12 Appendix 2

Masters Thesis

Future study of the mobile phone and consumer electronics market

Lund Institute of Technology

Sony Ericsson, Software Business Development

Dear Participant,

With this Micro Delphi analysis we aim to study the future (approx. 5 years) of the mobile phone and consumer electronic devices and a possible development of an eco-system between these. To define consumer electronics we would like to mention a distinction made between consumer electronics that are shared in the home and those that are personal. Personal includes the following devices: the mobile phone, MP3-player, personal camera, laptop and calendar. Home consumer electronics include devices shared in the home such as a commonly used computer, DVD-player, game console, TV, stereo system etc. Consequently the term of consumer electronics include both personal and home consumer electronics.

During the pre-study for the thesis we have observed trends in the industry and our intention is to create scenarios based on those. However, our observations need to be confirmed and deepened and for the result of our thesis, we depend on opinions of expertise. The study is based on different aspects of the topic and we would appreciate if you answer the questions you feel falls under you area of expertise and try to give a general estimation of the rest. Finally, we would like to inform you that all data will be treated confidentially.

Thank you for your participation!

Elin Dahlberg & Kajsa Ahlgren

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Question 7

Do you see that a common software platform between consumer electronic devices and the mobile phone can become a competitive advantage in the future?

- Yes No

Why (not)?

Question 8

Which do you think will be the future dominating players in the consumer electronics market?

Comment:

Question 9

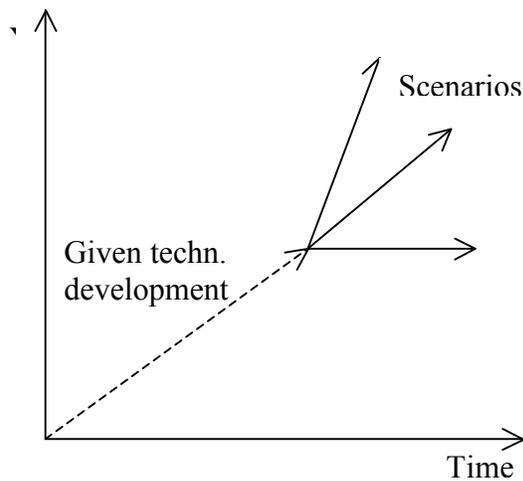
Which do you think will be the future dominating software platform(s) in the mobile phone market?

- Series 60 Windows mobile OS X Linux mobile
Other.....

Comment:

Question 10

Consider a market in which the technological development is assumed to be given. In the case of consumer electronics this would be a development towards convergence of devices on all levels (see question 6), implying increased intercommunication and multi functionality. What would then be the most critical factors when creating scenarios for the future consumer electronics market?



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13 Appendix 3

Dear Participant,

First of all, we would like to thank you for an interesting interview and discussion! We have now studied all the answers and created a synthesis based on these. During the creation of the synthesis, we found that all experts agreed on some questions but on other, the answers diverged. Therefore, we would very much appreciate if you would like to answer this second round of questions which can be considered as complementary to the ones of the first round. Both the synthesis and the questions are found attached.

Thank you for your participation!

Elin Dahlberg & Kajsa Ahlgren

First Synthesis

1. Technology in general is mainly seen as a support as long as it is easy to use. As soon as the user interface is too difficult or the device malfunctions it becomes a burden. This can be different to different people or target groups.
2. When discussing the importance of the mobile phone, many experts answered that it will be the leading personal device “on-the-go”. It will be important for the spontaneous usage of multi media and will provide a new marketing channel. However, this will depend on lifestyle and need.
3. The trend regarding content sharing is towards collective. A good example is how young people upload pictures on Facebook and download music. However, people could be more restrictive with personal information and some experts highlighted the risk of a backlash when it comes to sharing critical personal information.
4. Regarding the question concerning personalization of the mobile phone, most experts agreed that personalization itself would become even more important for the users, but the opinions whether this would be done in an active or passive way were diverge. Some experts pointed out the trend towards an active behavior and said that people would be even more active if it was technically possible. The consumers want to use their mobile phone in the same way as a computer. Other experts say that this depends on social segments or generations. Both an active group as well as a passive group will exist and none of them will be dominating. Additionally, a final group of experts say that people are in general lazy and want to buy a pre-determined product and that the large mass will have a passive behavior. Therefore brands will be important and the producers will make most part of the decisions for the consumer.
5. When it comes to the question if the consumer rather pushes towards a convergence of the devices he uses or prefer excellence-based functionalities, the opinions were separated. However, most experts believe that the large consumer mass is heading towards convergence but that excellence-based devices will remain the ultimate in particular situations and for certain needs. The argument mentioned is that one device is much more convenient to carry around and the mobile phone is a good device to integrate other functions into since it is the device that you always take with you. The questions raised are

mainly concerning complexity, if a multiple device can have a good user interface and be simple enough to understand. The loss of quality is also regarded as a critical factor.

6. Most experts agree that the mobile phone will be the central personal device in the future and that communication between different consumer electronic devices will be of importance. Some comments were the following:

- The mobile phone will be the personal “hub” in an ecosystem of devices on which you store your personal content but there will also be another “family hub” in the home
- The computer is to become a “digital library”, for storage only
- Since for example Apple’s iPod is possible to become a “hub” in their ecosystem; this “hub” could just as well be a mobile phone in another ecosystem. Therefore the mobile phone has the potential to be the central device.

However, if the mobile phone is to become a “hub”, this development will take time. Experts saying that the mobile phone will stay one device among many still thought that it will be a source of content and that it will serve as a link between different ecosystems of consumer electronic devices, for example in the home, the car, the summer house etc. Some experts were saying that the mobile phone will not be a “remote control” within five years, others that it will never be one since people want their devices in a certain shape.

7. Several experts were of the opinion that a common platform between consumer electronics and the mobile phone could become a competitive advantage. The arguments varied but some comments were the following:

- It could make it more attractive for third party developers to write applications
- It would be easier to connect the mobile phone with the computer, which is seen as an advantage
- There will be less integration issues and it will be easier for the consumers to transfer content between the devices

Economical advantages were mentioned, as cost savings, network advantages and economies of scale. Finally, having the same user interface among several

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devices could make it much easier for the consumer and therefore become a competitive advantage. The danger though is the loss of control regarding the development when it comes to cooperating on a common platform among several partners. The experts not seeing a common platform as a competitive advantage said that:

- There is no technical advantage
 - It would be too hard for several players to agree upon a common platform
 - From the consumers' point of view, there will be no need since they do not choose devices due to the operating system and the actual communication between the devices is more important, something that can be solved in other ways
8. It seems like the large players of today will dominate in the future consumer electronics market. Frequently mentioned are
- Microsoft – dominating operating system and large customer base
 - Nokia - strong brand and a large installed base
 - Apple - a possible large player but could also stay an icon brand
 - Google - large threat due to its business model, large customer base and the fact that they take advantage of browser capabilities that are more and more common in consumer electronic devices
 - Traditional players like Samsung, Toshiba and Philips - some experts believe that they will keep their importance in the industry but some believe that since they today only produce and sell “black-boxes”, not experience or usability, they have to change their strategy if they want to survive
 - Sony - is in a bad position for the moment but in combination with Sony Ericsson they could provide something more to the consumers than just “black-boxes”
9. Some experts believe that there will be no dominant player among future software platforms in the mobile phone industry. Others have mentioned Microsoft and Series 60 as the largest ones followed by Google who is able to change the rules in the industry due to its, for the industry, new business model. Some experts believe that a convergence of operating systems for mobile

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phones will take place and what is seen as most important is to have a platform attractive for third party developers to build upon.

10. The most critical factors for the future development of the industry are

- User interface and ease of use
- Design
- Reducing complexity by simplification
- Connectivity and compatibility between devices
- New business models

Other factors mentioned are

- Infrastructure
- Future development of the Internet
- Social factors and values
- Standards
- Flexibility
- Openness of the systems
- How web services in the mobile phone will be integrated
- Media producers
- Payment models
- Energy consumption

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14 Appendix 4

Question 1

Personalization of the mobile phone is considered important according to all interviewees. The interpretation made is that mobile phones will be purchased on the basis of personal taste and need and will be ready to use directly. The consumer will have the possibility to download applications of various kinds for further personalization but will not be able to manipulate the software in the same sense as it is possible to do with a PC. Does this image correspond to your opinion?

Yes No

If no, comment:

Question 2

It is agreed upon that the mobile phone will be the central *personal* device. In five years, will the mobile phone be the central device even among multimedia consumer electronics in the home?

Yes No

Question 3

In the future, how will the standardization be handled within the telecommunication industry?

- De Facto Standardization
- De Jure Standardization

Question 4

Finally, we would like you to picture yourself the following scenario and make an estimation of what year you think it will be reality.

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“Lisa is on her way home from school using the city’s public transportation system. After checking the latest messages on her email and friendship-networks she decides to watch yesterday’s episode of her favorite series for time to pass by quicker. When arriving at home, the episode has still not ended, while as Lisa continues her watching on the family’s flat screen by streaming it from her mobile phone. Lisa’s brother, David, is already at home. He is in his room, listening to music stored on his mobile phone through the expensive speakers he got for Christmas. Lisa, even though slightly disturbed by David’s high volume, likes the music he is playing and would like to download it to her own mobile phone. Since Davis has given her access to his mobile music library, Lisa uses her mobile phone to enter the home network and makes sure she can listen to the music on her way home the following day.

Year: _____

15 Appendix 5

Scenario 1 - the Handset Experience

Technology

- Standardized communication (DLNA, Bluetooth, Wlan etc)
- Ability to choose degree of Internet access on connected devices
- Encouraged development of 3G etc
- Antivirus software/integrity software important
- Less potential for streaming
- Mini laptop = new Smartphone
Old Smartphone = commodity
- **Mobile phone software central/strong position**

Market

- Trustworthy brands important
- Google's business model less potential
- Companies offering security solutions have potential
- Retailers with technical expertise of mobile phones are important
- Operators potential network providers
- **Integrate CE with mobile phone → important for CE to partner with mobile phone producers**
- **Strong power among mobile phone producers**
- **Nokia has the potential to become an influent player (due to the dominant position on the market today)**

Digital Home

- Intercommunication between CE and mobile phone without being on the Internet
- Content stored in multimedia library
- Mobile phone has multiple functionality (i.e. game consol, remote control etc) at home as well as "on-the-go"
- Mobile screen projected onto larger screens in the hone, one at the time
- TV and computer are only screens

- **When logging on an account, content on the multimedia library is reached**

Consumer Behavior

- Mobile phone is the central device
- Openness on the Internet backfires (breakpoint, Snowball effect, integrity limit)
- No content storage on the Internet
- Consumers demand integrity models
- Less explorative behavior
- Greater demand for “closed”=controlled software platforms

Scenario 2 – The CE Experience

Technology

- Technological constraints (battery, processor etc) → mobile phone remain complementary
- Mobile phone less intelligent
- Standardized communication (DLNA, Bluetooth, Wlan etc)
- Ability to choose degree of Internet access on connected devices
- Encouraged development of 3G etc
- Antivirus software/integrity software important
- Less potential for streaming
- **CE software central/strong position**

Market

- Consolidation of CE market
- Trustworthy brands important
- Google’s business model less potential
- Companies offering security solutions have potential
- **Microsoft potential competitor since they have a large installed base and potential to enter the CE market, possibly through partnering with for example Toshiba**
- **Apple’s business model has potential although Apple itself might stay a niche brand**

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- **Desirable scenario for Sony**
- **Integration of mobile phone with CE → CE has the power in relation to the mobile phone**

Digital Home

- Mobile phone used as game console etc “on-the-go”
- Intercommunication between CE and mobile phone without being on the Internet
- Content stored in multimedia library
- **One central unit among CE (computer, multimedia center etc)**
- **Intercommunication through central unit**
- **Mobile phone updated to central unit at home (dock/home mode)**

Consumer behavior

- Mobile phone purchased at retailer
- Mobile phone “on-the-go” (Swiss army knife)
- Mobile phone found insufficient in the home
- Openness on the Internet backfires (breakpoint, Snowball effect, integrity limit)
- No content storage on the Internet
- Consumers demand integrity models
- Less explorative behavior
- Greater demand for “closed”=controlled software platforms

Scenario 3 – The Internet Service Experience

Technology

- Mini laptop = new Smartphone, Old Smartphone = commodity
- Encouraged development of Wi-Fi, WiMax etc
- Standardized communication
- Service provider software central/strong position
- Internet access always available

Market

- Retailers with technical expertise of mobile phones are important
- WiMax spread → access to WiMax cheaper
- New business models to provide services
- New businesses take over part in the value chain from the mobile phone producers (UI software)
- Google and other service providers have the power by delivering the UI and having the consumer relation
- **Service providers gain power through their business model, reducing the price of the mobile phone for the consumers**

Digital Home

- Mobile phone has multiple functionality (i.e. game consol, remote control etc) at home as well as “on-the-go”
- Mobile screen projected onto larger screens in the home, one at the time
- TV and computer are only screens
- Content stored on Internet library
- Internet access required among CE devices
- **When logging on an account, content on an Internet library is reached**

Consumer behavior

- Mobile phone is the central device
- Consumers trust Internet service providers
- Virtual identity (dating, organizations, shopping etc)
- All kinds of content is shared among the consumers

Scenario 4 – The Browsing Experience

Technology

- Technological constraints (battery, processor etc) → mobile phone remain complementary
- Encouraged development of Wi-Fi, WiMax etc
- Service provider software central/strong position
- Internet access always available
- **Standardized communication less important**
- **Mobile phone less intelligent → commodity**

Market

- WiMax spread → access to WiMax cheaper
- New business models to provide services
- New businesses take over part in the value chain from the mobile phone producers (UI software)
- Google and other service providers have the power by delivering the UI and having the consumer relation
- **Service providers gain power by advertisement business model reducing the price of mobile phones and CE**

Digital Home

- Mobile phone used as game console etc “on-the-go”
- Content stored on Internet library
- Internet access required among CE devices
- **All devices in an ecosystem communicate over the Internet**

Consumer behavior

- Mobile phone purchased at retailer
- Mobile phone “on-the-go” (Swiss army knife)
- Mobile phone found insufficient in the home
- Consumers trust Internet service providers
- Virtual identity (dating, organizations, shopping etc)
- All kinds of content is shared among the consumers