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**Conference Paper**

## How Nokia failed to nail the Smartphone market

25th European Regional Conference of the International Telecommunications Society (ITS):  
"Disruptive Innovation in the ICT Industries: Challenges for European Policy and Business",  
Brussels, Belgium, 22nd-25th June, 2014

**Provided in Cooperation with:**

International Telecommunications Society (ITS)

*Suggested Citation:* Bouwman, Harry et al. (2014) : How Nokia failed to nail the Smartphone market, 25th European Regional Conference of the International Telecommunications Society (ITS): "Disruptive Innovation in the ICT Industries: Challenges for European Policy and Business", Brussels, Belgium, 22nd-25th June, 2014, International Telecommunications Society (ITS), Calgary

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# How Nokia Failed to Nail the Smartphone Market

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## Abstract

In this paper we will discuss Nokia's struggle to find a sustainable approach to the Smartphone market. The findings are based on (i) a review of Nokia's history, and specifically on how Nokia dealt with introducing new, more or less smart handsets, (ii) on interviews with managers from Nokia and (iii) on data collected on mobile phone usage in 2003 -2011 in Finland. We contribute to insights on how a company with an active innovation policy, product launch and market segmentation strategy failed to maintain its dominance on the mobile handset market.

## Introduction

Aspara et al. (2011, 2013) discuss the early history of Nokia when the company and its business model transformed from a rubber, paper and cable company to a company that focussed on mobile handsets and mobile telecommunication infrastructure (components). Nokia was in the 1990s and early 2000s one of the largest mobile phone companies in terms of volume, sales, market share and profit, but it failed to make the transition to the smartphone market in the early 2010s. Although, Nokia till 2007 had a market share of 80% in the smartphone market, the main reason for losing ground during the "second coming of the smartphone age" was due to the weak position of Nokia in the "technological system" (or ecosystem) i.e. the network of interacting actors in a specific techno-economic area involved in the generation, diffusion, and utilization of technology and its complements (Aspara et al, 2011, p. 131). Palmberg (2002) explains the relative success of Nokia starting his reasoning from economic, cognitive, organizational and institutional factors. Steinbock (2010) on the other hand looks into factors as culture and diversity expressed in corporate responsibility, the creation and role of shared values, management of human resources, as well as the strength and character of senior management. Next to these factors also the Finnish innovation systems, as discussed by Palmberg (2002) and the R&D within Nokia are important factors that explain the development of new products and businesses. Some studies specifically focus on one specific element of Nokia *modus operandi*, such as the use of agile methodologies (Laanti et al, 2011) or alliances focussed on acquiring production facilities (Rice and Galvin, 2006).

Steinbock pays scant attention to the turnout of new products and patents. Koski and Kretschmer (2010) pay attention to handset innovation and imitative product introduction, studying 16 major handset manufactures, amongst other Nokia. They look into vertical (handset innovations that encompass novel features that are attractive to all consumers, like lighter weight and longer battery life) and horizontal innovations that are only attractive to a subset of the market. A severe limitation of their study is however that it focuses on the period 1992-2002. Typically handset manufacturers introduced between one to three new handsets per month, but during the peak growth years of the cellular market some companies took 10-25 new handsets to the market in a single month.

It is extremely important to reach and keep the technological leadership. Koski and Kretschmer (2010) point out that in the smartphone era; it is not only about product innovations but more importantly about software innovations, and more specifically about hard- and software integration. Therefore we will also explore Nokia's idea and innovations database that consists of patents and patents applications with demonstrations and validated idea descriptions that are available via the Innovation Mill that contains Nokia's unused, non-core ideas (Hossain, 2012). The objective of this paper is *to understand why Nokia failed in capturing the smartphone market while there were many reasons to expect that Nokia was in the position to do so. We use a forensic approach to do so.*

Forensic studies aim at understanding and reconstructing processes after they have run their course and produced (sometimes fatal) outcomes. This follows the logic of abductive reasoning (also known as the logic of Sherlock Holmes) which is used to find and understand the producer-product relationships that generate and guide the processes. We cannot, of course, fully reconstruct the processes as we do not have the necessary inside information to do so, but we have built our storyline with published material from numerous sources and using our experience from more than a decade of research on mobile technology and services and their impact on consumer markets.

The paper (largely work in progress) is structured as follows. First we will give a short history of Nokia presenting a chronological view of events. Next we will discuss eight core, more or less related issues that might explain Nokia's lack of success in entering the smart phone era. Next we will present the research method as used for the more quantitative part before we will combine insights. We will conclude this paper with some discussion, limitations and future outlook.

## **Nokia's History and Nokia's DNA**

We will first present a short factual overview of Nokia's history based on literature (Häikiö, 2001; Palmu-Joroinen 2010; Cord, 2014). We will discuss a number of topics that might be considered as the elements in Nokia's DNA that were problematic. We start with Nokia's leadership and business architecture. We will discuss Nokia's R&D and innovation policy with a focus on patents, R&D-s and venturing policy. We will look into Innovations and new product launch in combination with marketing. We will shortly discuss the problematic relation of Nokia with the American market. Also the shift from a telecom to an Internet reality plays a role. We will pay attention to what role Nokia's platforms played, i.e. Symbian and MeeGo, as well as Nokia's app store Ovi.

### **Nokia's History in short**

Nokia's original antecedent company was established under the name of Nokia Aktiebolag founded by Fredrik Idestam in 1865 as a ground wood pulp mill. This company was acquired by Finnish Rubber Works Ltd. and merged with Finnish Cable Works Ltd in the period 1918-1922. The companies officially merged in 1967, laying the foundation for the Nokia Corporation. In the late 1950's and 1960's Nokia became active in the computer industry, already having considerable experience in electronic engineering and telecommunication since the 1900's. In 1979 Nokia merged with Salora, under the name of Mobira Oy. Mobira developed mobile phones for the Nordic Mobile Telephony (NMT) standard. In 1984 Mobira was fully integrated in Nokia.

In 1988 Nokia-Mobira's market share on the global analogue technology phone market was 13.8% whereas Motorola Inc., being the second largest had a market share of 13.4% (Häikiö 2001).

However, the year 1988 was according to Häikiö (2001) “annus horribilis” as Nokia-Mobira Oy was in its deepest crises. Palmu-Joroinen who joined the company that year, stressed that these problems and solutions paved the way for Nokia’s latter successes (Palmu-Joroinen 2010).

In 1989 the first legal process concerning nine patents were raised in the US by Motorola. This process was settled the same year and Nokia paid Motorola some 20 million dollars, and an important lesson was learnt on how important it is to pay attention to the IPRs when you are among the market leaders (Palmu-Joroinen 2010). In year 1989 Motorola was the market leader with a 20% market share at the same time Nokia’s market share was only 12 % and dropped to 10% in year 1990 (Häikiö 2001).

In 1990 Ollila was appointed CEO for Nokia-Mobira. The next year, 1991, Finland was in financial crises and Nokia made huge losses. The very same year Nokia bought Technophone Ltd and this changed Nokia’s company language to English. Also the meaning of a brand became a focal point for the company and large efforts were made to position Nokia as a strong brand. The name of the company was changed to Nokia Mobile Phones Ltd. The first GSM network was in place in July 1991 and the first call was made the same day with a Nokia phone. The growth in production of the number of mobile phones by Nokia, and some of its major competitors, is presented in figure1. Mid 1990s the mobile market and Nokia’s market share really gained momentum.

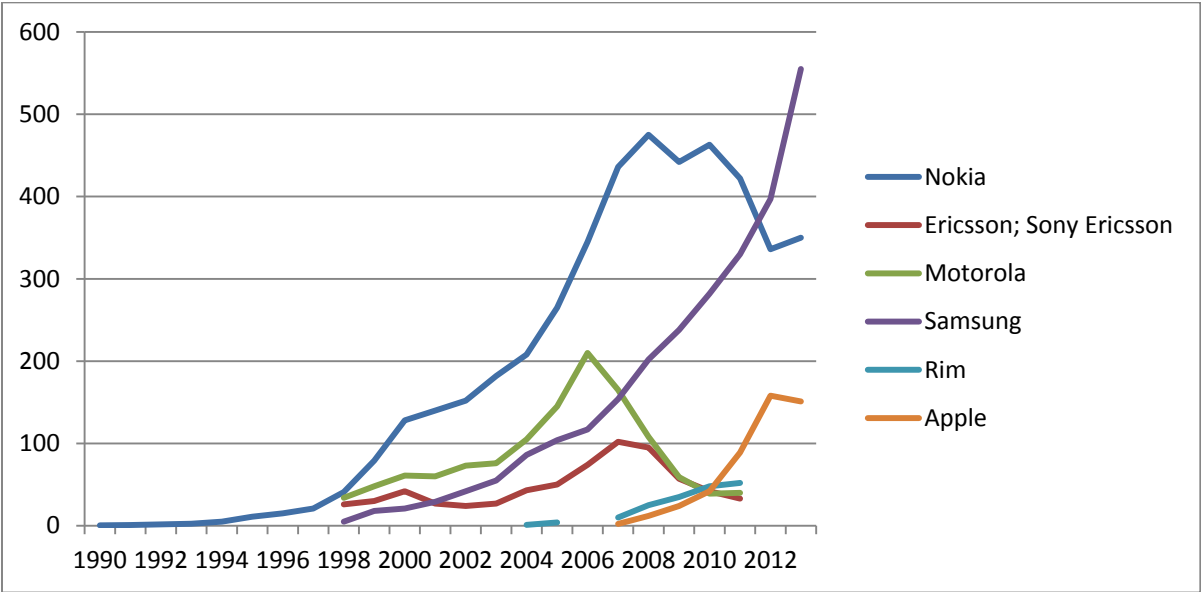


Figure 1 Mobile phones produced per year for selected hardware providers

In the 1990’s Nokia Research Centre also became more prominent and refocused on mobile telecommunications as the CEO Jorma Ollilla believed that know-how would be a long-term effort. Collaboration with universities and knowledge centres was considered utmost important, as were internal education programmes. Nokia played a key role in the shift from NMT to GSM (originally named Group Spécail Mobile, latter capture by Anglo Saxon countries to be labelled as Global System for Mobile Communications). The position of Nokia was reinforced by investments in 1993 in GSM 2+ or GSM 2.5. 1994 was the year that the Nokia 2110 DCT/GSM handset was brought to the market with 618.000 units sold (Häikiö, 2001, p. 165).

In 1994 Nokia made the shift from a Finnish company to a global player. Although Finland remained a pioneer market, the real market was global with Nokia having a rather troublesome relation with the US market. Initially, global markets were served by exports and slow international expansion. Next manufacturing outside Finland was ventured, in the UK by acquiring Technophone and in the US by taking over Tandy shares after an initial 50-50 joint venture owned operations. In 1998 Nokia became the number one mobile phone manufacturer in the world.

In 2002 the company was restructured with four main divisions, i.e. Nokia Mobile Phones, Nokia Networks, Nokia Venture Organization, and Nokia Research Centre (NRC). In this year Nokia started to develop and market what can be labelled as Smartphones. Nokia actually started to create the market that became disastrous for some (Motorola, RIM, and Nokia itself) and for the time being a goldmine for others (Apple and Samsung).

In 2003 the Nokia 1100 handset was launched. Together with the Nokia 1110 phone, the 1100 was one of the most successful phones ever. Each sold 250 million devices worldwide. In 2003 N-Gage, a combination of a game console and mobile phone was introduced, after acquiring a branch of the Sega company to gain gaming competence and know-how. Providing specific products to specific market segments was typical for Nokia's marketing strategy.

In 2006 Nokia launched its flagship and first smartphone N 95. Conceptually the question is what makes a smartphone a smartphone. The first device that combined telephony capabilities with palmtop computer capabilities was IBM's Simon Personal Communicator in 1994. Since 2007, the moment of the "second coming of the smartphones", smartphones are associated with Apple's iOS telephones, and the breakthrough HCI that set the standards for user experience. A core characteristic of smartphones is the convergence of telephony with computer technology in a handset. Nokia gave a lot of attention to convergence of technologies (Burde, 2009) . Specifically Nokia's N- and E-series, focussed on consumers and business respectively, offered integration of converging technology, and focussed on entertainment and business applications, respectively.

Till 2007 Nokia dominated the smartphone market, mainly due to the Symbian operating system, and with the introduction of the N95 Nokia market share jumped in two months from 33% to 36% (Talouselämä30/2009). On the smartphone market Nokia was having a market share around 70% leaving the competitors far behind. Simultaneously Nokia was struggling on the North-American market to get a foothold. The new CEO for Nokia, Kallasvuo, promised to work things out on the North-American market but that did not happen. We will come back to this issue in more detail.

In 2007 Apple launched the iPhone and Talouselämä (30/2009) writes "Apple had begun to eat up Nokia alive in the US". Europe was bound to follow. 2007 was also the year in which Nokia launched the Ovi-store and started focussing on services. The same year Nokia bought Navteq to gain a foothold in the maps- and navigation market. According to some sources, at a too heavy/high price.

In 2010, the year in which Android and iOS made substantial market progress, Nokia hired a new CEO, Stephen Elop. In 2011 the shift from Symbian to the Windows phone was announced by Elop. The OVI store was integrated in the Windows Phone Store. Since then sales dropped, numerous factories and R&D facilities were closed, employees made redundant, as well as the market capitalization dropped considerably, from € 110 Billion to € 15 billion in 2012.

In 2013 the announcement was made public that Microsoft would acquire Nokia's mobile device business, and the deal was closed April 2014. The Nokia handset division and a license to Nokia's portfolio of patents for 10 year, is now moved to Microsoft Mobile Inc. for € 5.44 billion. Nokia, or what is left of Nokia, will focus on its mapping applications (Here), infrastructure (Nokia Solutions and Networks) and on developing and licensing advanced technologies. So for the moment, the end of the successful Nokia handset manufacturing story. But what were the reasons that Nokia failed to absorb the major disruption in the (mobile) telecom industry of the last decade? What was in the DNA of Nokia that made it unable to respond and to retaliate? In this forensic research we will look at the DNA of Nokia to understand why Nokia was not able to continue its dominance and to capture a fair share of the smartphone market.

### **(1) Nokia Leadership**

During the period that Kari Kairamo (1977-1988) was CEO, Nokia was shifting from a conglomerate with a lot of diversity to an internationally large multi-industry company with a focus on telecom but this process was not complete at the time of his untimely death. His successor Simo Vuorilehto (1988-1992) was left with a company with internal conflicts and conflicts with the two main shareholders at that time, the Union Bank and Kansallis Osake Pankki. The appointment of Jorma Ollila as his successor started the era of the modern Nokia Corporation. Nokia was when Ollila took office, a conglomerate with divisions that produced consumer electronics as well as tyres, paper as well as cables. Ollila (CEO from 1992-2006) was leading the digital GSM expansion era, and refocused Nokia by the strategic choice for mobile technology. In 1994-1995 the company was restructured and a cultural change was achieved based on value-based leadership and management. The key values within Nokia were trust, loyalty and commitment, while employees enjoyed freedom and took responsibility. Based on Aspara et al (2011), Nokia under Ollila can be characterized as a company with a clear focus on mobile telephones and telecommunication, looking for organic growth. The strategy was geared towards internal product development based on concentration of intangible assets in know-how, skilled people and filling of critical patents, while operations were based on coherent and efficient process architecture, and strong customer orientation offering that was integrated with technical consumer focussed solutions. Moreover, shareholder value was acknowledged, and financial reporting had a keen eye on shareholders' interest.

According to some, when Olli-Pekka Kallasvuo (2006-2010) took over, the culture change focussing on control as a result of the logistic crises, see next section, was even more reinforced and became a culture of management by numbers. Partially this can be explained by his background as a lawyer and CFO of Nokia. However this change in the control culture coincidence with the shift of ownership from traditional Finnish investors (banks, pension funds, charity foundations, the Finnish state) and rather powerless international investors, to American mutual funds with short term profit expectations and aggressive and active policies, focussing on high profit margins and short-term gains. As Cord (2014) suggests, the Nordic model of ownership and corporate governance was replaced by American owners who "where near-sighted professional funds who had a hands-off style and little, if any, loyalty to the companies they own" (p.32). With his background Olli-Pekka Kallasvuo was fit to deal with the financial markets and to optimize production, but in the end he was not the visionary that was needed in times of disruptive innovation and market change (De Wit and Meyer, 2010).

Stephen Elop (2010-2013) was expected to have the capabilities to turn around Nokia. Talouselämä (30/2010) commented that Nokia took its greatest risk during its whole history when hiring a CEO from outside the company, as very few outsiders have been able to save a company in crises. Others hold the opinion that it was important that the new CEO was an outsider to Nokia, in order to convince the financial markets that a new wind was going to blow within Nokia. Members of the Nokia management team were less likely to be serious candidates, as they did not succeed to get Nokia on track in time (Cord, 2014).

Although Elop succeeded in changing the Nokia matrix organization structure, his reputation will be always connected to his **Burning Platform** memo, in which he succeeded to express as the CEO his lack of trust in core products of the company, e.g. the Symbian and the MeeGo Nokia platforms. It is therefore not that striking that on August 22, 2011 a group of Finnish Nokia investors made public that they were considering gathering signatures for the removal of Elop as CEO of Nokia<sup>1</sup>. Although this announcement might also be a hoax, but even then it illustrates the lack of trust in Elop as a CEO.

## (2) Nokia's business architecture

As mentioned before, in 1996 due to increasing demand and failing logistics to meet production demand, there was a crisis in production (Steinbock, 2001). Oversupply at one hand and short supply of materials at the other hand, i.e. the well-known bullwhip effect, lead the production to stall. As a consequences the control over logistics, process descriptions and so on were tightened, as well as logistic and financial systems aligned. As a result the logistics of Nokia became known to be superb (Cord, 2014, p. 14). Production of Nokia handsets therefore was cheaper as the production of the handsets of competitors. Although Dell served as an example, there is a fundamental difference. Dell reduced the number of product lines in order to optimize the logistics and to focus its operations. Nokia catered for a broad product range, with a lot of alternative products, and still was able to optimize logistics.

At the downside the logistics crises did lead to more control within the organization, according to some (multiple informants working within Nokia) at the expense of creativity and innovativeness. The metaphor of a jazz band with a limited number of players and a large orchestra is being brought forward multiple times in different sources and interviews. Due to the increasing sales not only the number of employees did raise but also the organizational structure and control mechanisms did get tighter. Nokia had to solve the problem of an increasing bureaucracy and control while being agile and faster due to rapidly changing customer demand. In an analysis of Nokia's business model dynamics, Aspara et al. (2011) state that *the routines and capabilities of a corporation is a necessary requirement for the swift refocus of the business model to successfully fit to the evolving business environment* (p. 642).

In order to deal with external demand factors, different approaches were used based on a market segmentation strategy (see latter on), on technology (TDMA vs. CDMA), on high-end-low end markets, and on the distinction between entertainment and mobile services. As long as Nokia had a major market share of the mobile phone market these approaches did work well. Nevertheless, at the end of 2004 a matrix organization was introduced leading to unclear and complicated, and therefore slow, decision procedures, multiple lines of responsibility and multiple managers to report

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<sup>1</sup> ([http://www.phonearena.com/news/Nokia-Finnish-investors-considering-gathering-signatures-to-get-CEO-Elop-sacked\\_id33611](http://www.phonearena.com/news/Nokia-Finnish-investors-considering-gathering-signatures-to-get-CEO-Elop-sacked_id33611), retrieved May 6, 2014).

to. In the end, this matrix organization did lead to an expanding growing bureaucracy and people spending less time on their jobs, and more time in meetings and bureaucratic procedures, waiting for clear decisions. As Cord states (2014, p. 202), “in the late 2000s Nokia still had innovative talent but their organizational structure and culture was such that their skills could not be deployed”.

**(3) Nokia’s R&D Policy and venturing policy**

R&D within Nokia was initially mainly focussed on product development. Only a fraction of Nokia’s effort was in basic research. In the 1990s research was channelled towards basic development of mobile phones and mobile data communications. In 1999 Nokia had besides Nokia Research Centre, 44 additional business units based international research centres in 12 countries.

Nokia Research Centre was closely connected and embedded in the Finnish education and research infrastructure. Access to highly trained and skilled IT professionals never has been an issue. Collaboration with universities has always been part of Nokia’s open innovation policy. Tampere University of Technology is the core partner, but also collaboration with Aalto and Oulu University and top American (MIT, Stanford) and Chinese (BUPT, Tsinghua) universities were established.

Nokia spent a very large amount of revenues in R&D (see figure 2), also as a proportion of the sales, sometimes close to 10% (Sölvell and Porter, 2011). At the end of 2006, 31% of the Nokia employees worked in R&D, although mainly in product development (Cord, 2014, p. 38).

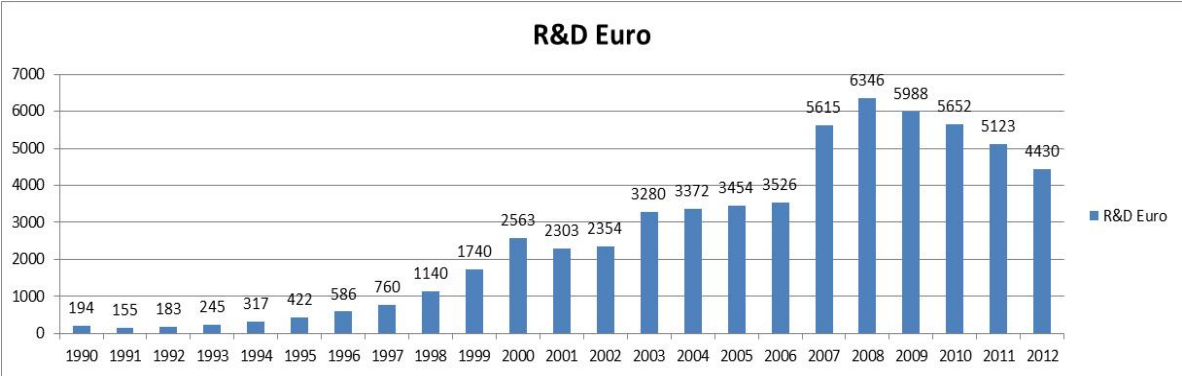


Figure 2 R&D spending Nokia in Euros (multiple sources; data recalculated towards Euro’s 2014)

The list of Nokia innovations is quite impressive, ranging from network components, to handset features, digital camera capabilities (together with Zeiss) to software-solutions. The number of patents filed steeply increased at the end of the 1990’s, from about three hundred each year in the period 1992-1994, to increase to more than two thousand in 1998 to increase gradually to over 6500 in 2008, and then to be drop dramatically from 2009 to 2012<sup>2</sup> (see figure 3). From these patents, mainly related to the mobile network and handsets, 3,000 actually resulted in royalties being paid to Nokia (Cord, 2014).

<sup>2</sup> (<http://envisionip.com/blog/2012/07/19/530/>)



It is well known that there have been multiple conflicts with regard to IPR (Intellectual Property Rights), with the first conflict with Motorola as mentioned before, between main providers of (smart) phones and network components delivery companies, leading to costly court cases and settlements. These settlements sometimes had positive and sometimes negative effects on the balance sheet

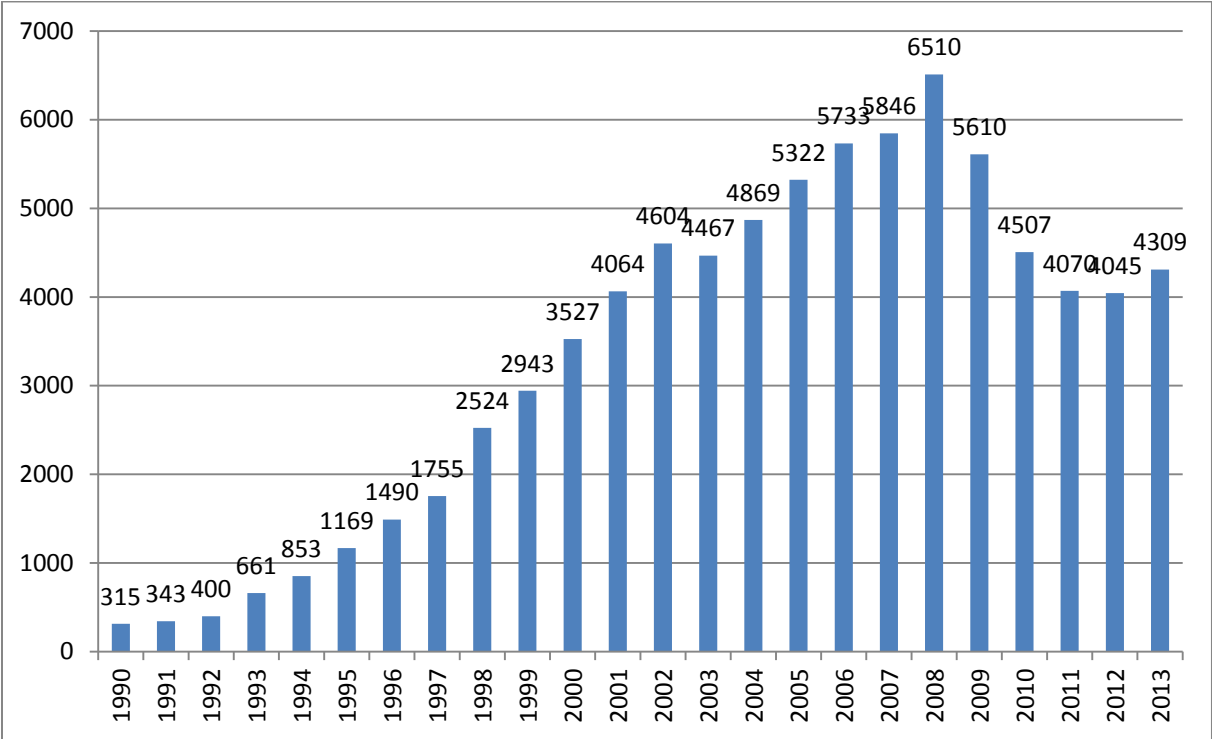


Figure 3 Nokia Patents application by publication date (based on wipo.int data, thanks to Conor McGlynn)

Due to its patents Nokia was not only the biggest mobile phone producer and key to network components, but also became the largest maker of digital cameras. Nokia also developed a tablet prototype in the late 1990s, large colour touch screens in early 2000, and was one of the first to adopt and experiment with NFC technology for mobile payments. Nokia typically had an engineering culture in which requirements and functionality, and technological excellence more than design were driving innovation. UI design and research got careful attention (Lindholm, et al. 2003). The common opinion was that the timing of innovative products was unfortunate, they were accomplished too early.

**(4) Innovations at Nokia**

The leadership of Nokia was quite aware of the caveats of having a well-defined superior technology and having a competitive advantage based on their high-tech products. The work of Clayton Christensen (1997) was not unknown, and also the Open Innovation concept proposed by Chesborough (2003) was adopted by Nokia leadership as well as Nokia engineers. In order to not only focus on optimizing existing technologies and on hard core engineering, an ambidextrous approach was followed. At one hand exploiting existing technologies was important, and preferably on a cost effective basis and with high volumes, on the other hand Nokia tried to stimulate exploration by establishing a Venturing Fund in 2000. Next to Venturing, an acquisition strategy was followed not only to absorb the most advanced technologies (Sega.com, Intellisync Corporation, Twango, Cellity,

Scalado), product concepts (MetaCarta), access to content (music: Loudeye Corporation; maps: Navteq) but sometimes also to acquire top-talent. In that sense Nokia followed the open innovation concepts quite clearly. Nokia Ventures however was not very successful, many ideas, projects, and plans, with few exceptions did not materialize. In 2004, with the introduction of the matrix organization Nokia Venture was abandoned. Cynically enough, the most successful Venturing approach was followed after 2011, when promoted by Esko Aho the Bridge program was launched. Those made redundant were offered 25.000 Euro to start their own company, and up to four could jointly receive 100.000 Euro. Next to funding also training and support was made available. 18.000 people went through this program and more than 100 companies were established with a sustainable outlook and creating labour positions (Cord, 2014, p. 226).

## **(5) Product launch and product families, marketing and segmentation**

Nokia's many different designs of mobile handsets have been a result of their production and market segmentation strategy. We will first discuss the products launched and then turn to market segmentation.

### **Product launch**

In 1996 Nokia launched the first digital multimedia device, the Nokia Mediamaster. Nokia launched the Nokia 8100 series with an ergonomically comfortable design, the Nokia 2160 with dual mode telephony and the Nokia 9000 communicator, an all-in-one mobile communication tool. The Nokia 5100 series was the first mobile phone that could be personalized by changing covers. In 1997 the Nokia 6100 was the first GSM product. In 1999 the Nokia 7110 was the first media phone using WAP, and which offered access to Internet. Latter followed by the more stable Nokia 6210. In 2002, the upgraded 9200 Communicator series and the N7650 camera phone were introduced. In 2003 the N-gage game telephone followed. Nokia succeeded in reducing the weight and the volume of the handsets and at the same time improved the User Interface (Lindholm et al, 2003); in that way Nokia more or less set the standard for mobile phones for a long time.

In 2003 the first smartphone was launched, the Nokia 6600 based on Symbian OS v7.0 kernel software. In 2004 the Nokia 6630 phone was the first NFC phone with worldwide coverage. The Nokia 770 Internet tablet, introduced in 2005, was the first Nokia communicator that could make use of Linux OS instead of Symbian to connect to the Internet via WiFi.

Latter on Nokia made a distinction between E-, N- and X-series. The E-series, i.e. E60, E61, E70 and E71, made use of the Symbian OS version. 9.1, which combined mobile email and advanced voice calling functions. The E-series were RIM phone look-a-likes, specifically focused on the business user (see Table 1).

The Nokia convergence strategy became most apparent with the N-series, i.e. the N71, N73, N80, N82 N90, N 92, N 95, and N97, enabling Universal Plug and Play, mobile TV, music, photo sharing, games and sending emails over multiple networks. The N-series was the advanced smartphone series with multimedia and advanced connectivity features. The N95 released March 2007 was a real smartphone, it contained GPS in combination with Nokia maps. It had a high end rear-end camera, a front-end camera for video calls, could play audio and video, and included business applications. It

could make use of alternative wireless networks, run JAVA as well as Symbian. The N97 was released in June 2009. See figure 4 for the number of phones released by year.

**Table 1** Nokia product series

Nokia 1000 series; most affordable ones, mostly targeted towards developing countries and users needing only calls and SMS, alarm clock, reminders
Nokia 2000 series; entry-level phones, more advanced features than the 1000 series, newer models with color screens and some feature cameras, <a href="#">Bluetooth</a> and even <a href="#">A-GPS</a>
Nokia 3000 series; mostly mid-range phones, later targeted towards the youth market
Nokia 5000 series; similar in features to the 3000 series, often more features towards active individuals, extra features for music playback
Nokia 6000 series; mid-range to high-end phones, high amount of features, conservative, unisex designs, business use
Nokia 7000 series; targeted towards fashion-conscious users, especially women; consumer-oriented; fancy design, test features
Nokia 8000 series; ergonomics and attractiveness; exclusive, high-end materials
Nokia 9000 series; Communicators prior E90 (the latest Communicator)
C-series; affordable series optimized for social networking and sharing; OS Series 40 and C-5xx Symbian 60 5th ed., C-6/7 Symbian^3
E-series; enterprise-class, business-use; Symbian S60 and E7 Symbian^3
N-series; highly advanced smartphones, with strong multimedia and connectivity features; mainly S60 3rd ed., but Maemo in N900, MeeGo in N950, N8 Symbian^3
X-series; targeted to a young audience with a focus on music and entertainment; OS mainly Series 40, but X5 (updated) and X6 with S60 and X7-00 with Symbian^3
Source: <a href="http://en.wikipedia.org/wiki/List_of_Nokia_products">http://en.wikipedia.org/wiki/List_of_Nokia_products</a>

The Nokia N8 was the last device based on Symbian OS, e.g. Symbian ^3, shipped one week after Elop became CEO. The N\* was followed by the E7 for business users, C7 for social networks, and C6 as a low-end smartphone. The Nokia N9 was making use of Maemo/MeeGo and was the only telephone that actually runs MeeGo.

The MeeGo development team started in 2005 under the name of Open Source Software Operations. In 2007 this team was relabelled as the Maemo team. The Linux based-Maemo software platform integrates a set of open-source technologies with proprietary in-house components. In 2010 the Maemo team was renamed as MeeGo, after Intel and Nokia in 2010 decided to develop the OS jointly. The Maemo teams used subcontracting relations extensively in order to reduce internal development costs, leading to quality management issues as a result of poor coding and language issues with software providers. After the MeeGo decision was taken compatibility issues with regard to Maemo and MeeGo had to be solved. Many problems with regard to the User Interface had to be tackled as well. In 2011 Nokia succeeded to bring the N9 to the market. However the eco-system around the MeeGo platform never expanded beyond the Nokia and Intel. Neither other hardware providers, nor operators supported the platform after some first orientation talks.

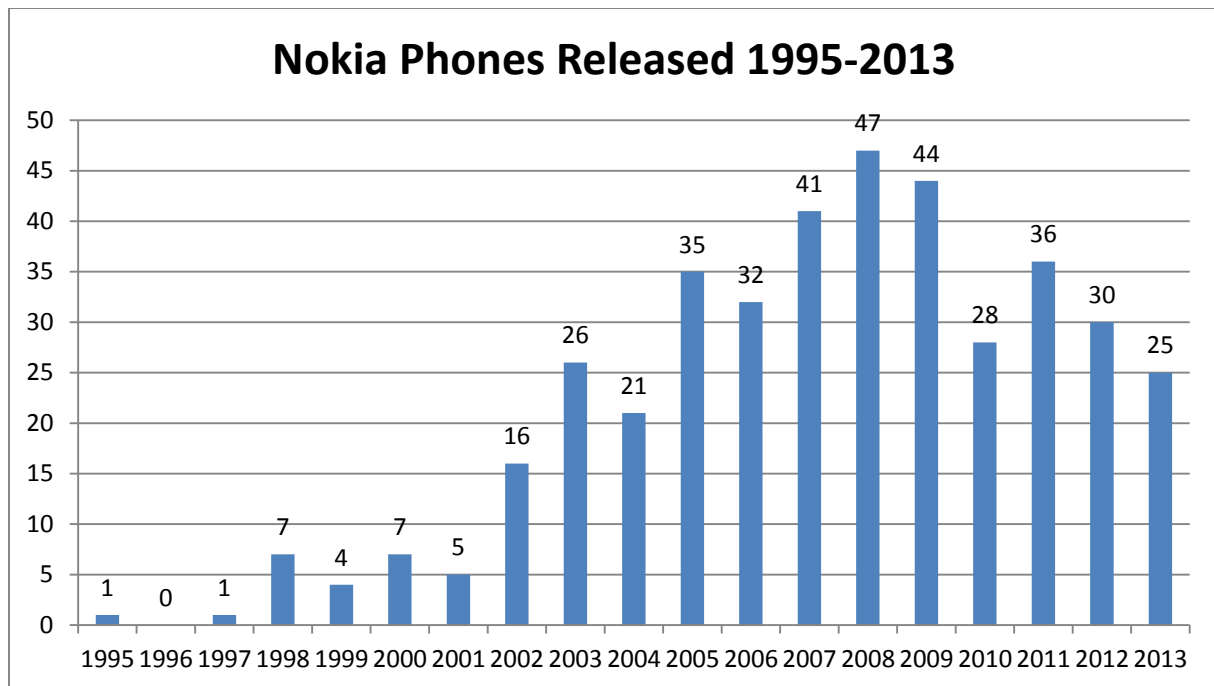


Figure 4 The number of Nokia phones released by year, 1995-2013 (based on data from [www.gsmarena.com](http://www.gsmarena.com))

The parallel investment in Symbian and MeeGo did lead to an inefficient spending of resources, budget, and manpower; the development of User Interfacing caused similar problems to be solved at the same time and in parallel. As a result the **Burning Platform** metaphor of Elop was not incorrect, but from a public relation perspective an example of poor leadership.

The Mobile Windows Lumia phone was introduced in 2012, but lagged behind the sales of the N8 smartphone in the same first quarter in 2012. There was also the announcement of the Nokia X-series that was realized in 2014. The X-series was supposed to be focussed on music and entertainment for a young audience. This X-series is rather unique because it was an Android back up option in case the Windows phone would fail.

### Market view and segmentation

Lifestyle segmentation, as described by Ketola (2002) in the context of mobile phones, is based on a detailed or deep knowledge of a user's actual desired usage patterns. *Today, everyone is a potential mobile phone customer. As the market has become increasingly segmented, the ability to master various product categories has become crucially important. In a segmented consumer market with high volumes, the critical success factors include a comprehensive product portfolio, a strong and appealing brand as well as efficient global logistics (Nokia 1998)*

Nokia launched their first ideas on lifestyle segmentation of mobile phone use in the early 1990s after which the company has come forth with many different ways of segmenting the mobile phone market. The most important lifestyle segments that Nokia focused on were *trendsetters* (technology oriented, male, wants latest gadgets and functions), *high-fliers* (career-oriented, male, want efficiency, heavy use of text and data), *social contact seekers* (family and friends important, female,

use mobile phone for personal use) and *posers* (want to impress others, more male, trendy, fun-loving) (Ketola 2002).

In 2000 two additional lifestyle categories were added, *reachable* (sports, adventure, outdoor life, value reliability and durability) and *assured* (rational, hard-working, want established and reliable technologies) (Baffoy 2000). In 2002 another revision was made with the resulting categories *trendsetters*, *hi-flyers*, *social contact seekers* and *assured* (Kiljander 2004). Concurrently, Nokia was also employing an approach called 'user interface segmentation', meaning an understanding of different user interface styles and interaction styles that were used in product development (Kiljander 2004).

In 2003 Nokia established a new consumer segmentation model for mobile phone users with the introduction of "Mindstyles" (Nokia 2003). Mindstyles was based on large-scale consumer surveys conducted in key markets, e.g. the United States, China, Brazil, Japan and Germany. The respondents were asked to evaluate statements regarding their attitudes and values, which were converted to six life strategies employed in today's global society. The six segments in Mindstyles were called *experiencers*, *impressors*, *controllers*, *maintainers*, *balancers* and *sharers*, and outlined behavior, cost-sensitivity, loyalty, aesthetics, desired functionality and core life strategies within each group.

In the years 2007-2008 Nokia was operating based on a different view of the consumer mobile phone market. In the new Nokia segmentation model, twelve user categories were plotted according to two dimensions, e.g. higher involvement vs lower involvement, rational vs aspirational. The involvement axis was created to portray technology needs, whereas the rational / aspirational axis portrayed technological desires. Nokia saw consumers as falling into four quadrants (see figure 5):

- Rational, low involvement: mobile communication only when necessary
- Aspirational, low involvement: mobile communication trend followers
- Rational, high involvement: mobile communication as empowerment tool
- Aspirational, high involvement: mobile communication trend leaders

Each of the quadrants was further split into more specific segments. One of the user categories described as low involvement and rational was e.g. 'simplicity seekers', whereas one of the user categories described as low involvement and aspirational was 'style followers' (see Figure 5). In the high involvement – aspirational quadrant Nokia placed 'technology leaders', one of the target groups for N-series telephones (e.g. N82, N95), whereas the Nokia 3110 was targeted at 'Life builders', in the same quadrant but scoring lower on both dimensions. Nokia's main target segments were those displaying higher involvement, e.g. the Young explorers wanting immediate connectivity, advanced communications functionality, music, and an all-in-one handset with computer capabilities; Life builders desiring data services for personal productivity, high quality camera, convergence, and an all-in-one handset with large number of features (Metsäranta, 2007).

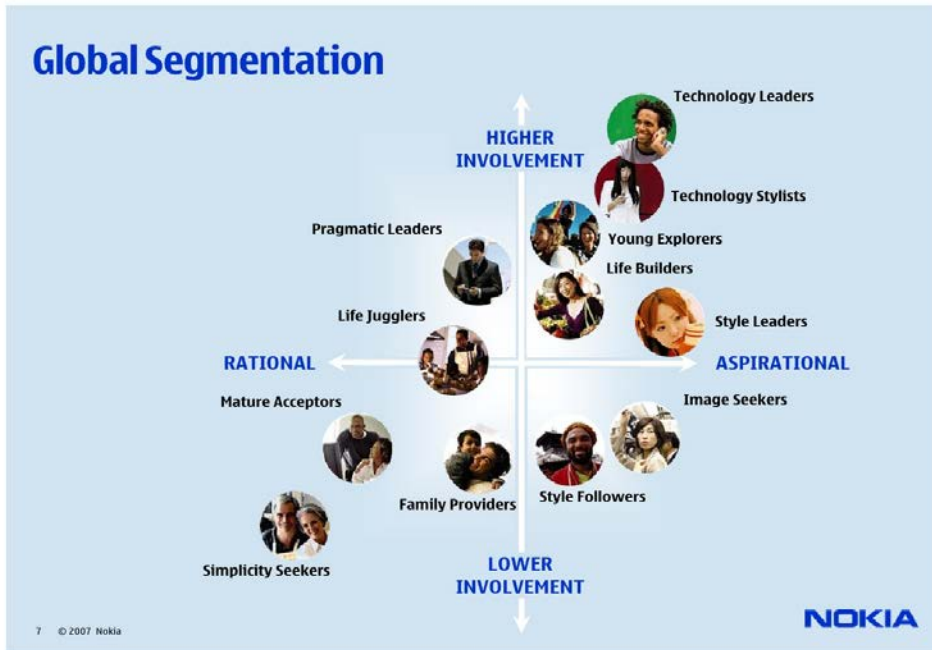


Figure 5 Nokia global segmentation strategy (Öistämö, 2007)

The many product launches as well as the fine-grained market segmentation did lead to a plethora of product-market combinations. This lack of focus might have been one reason why Nokia wasn't able to deliver the one product that would counter the threat of Apple and Samsung. Being successful on many markets did not help Nokia to focus. Although Nokia had a thoughtful product launch and marketing strategy, it was not successful on all markets. Specifically the American market proved to be cumbersome.

### (6) Nokia and the US market

Nokia has been highly successful in the European, Chinese and Indian markets. However, the American market has been troublesome from the very beginning. The core issue in penetrating the US market was, next to standard issues with regard to CDMA, that Nokia was accustomed in Europe to promote its own brand, advertising directly to the consumer market. This did lead to pressure on operators to offer Nokia telephones. In the US the control within the ecosystem was with the operators, specifically Cingular and Verizon had dominant positions. Bundling of handsets by operators was common practice in the US; operators were the main advertisers in the US market and not the handset providers. Nokia could not brand its products as they were dependent on contracts with operators. Moreover, Nokia was not very sensitive to US operators' requirements on technology and the look and feel of handsets (Cord, 2014, p. 45). Moreover, for a long time the US mobile network standards (CDMA) were lagging behind Europe. The different technology requirements and the different frequency bands required investments for at that time a relative small market segment (10%) of the global market. The operator power became very apparent when Nokia tried to introduce the N95 to the US market in 2007/2008. As Cord (2014, p. 90) puts it, "the N95 was unsubscribed and unsupported, and so it went unnoticed and unsold". At the end of the Olli Pekka Kallasvuo era the North American market was lost (Kurri, 2012). Elop however had the view that trends in the mobile world start in the US and will prevail, a market in which Nokia never had been dominant.

## **(7) Nokia and the Internet: the shift to services**

Nokia in 2006 focussed on MP3 players. In order to compete in this market Nokia needed to offer an alternative to the iTunes. In 2006 Music recommender was started, soon to be followed up by Nokia Music Store. This was an attempt to get control over the flow of content that at that time was with Apples' iTunes. But the iTunes gave Apple control over customers, and customer billing; Nokia was left to be dependent on revenue streams from handsets, and had no control over customers, customer relations or customer billing processes. It was clear to the Nokia leadership that controlling platforms was the next big thing. The MP3 example should have been a clear sign to Nokia that due to the Internet the control was no longer defined by the intelligence in the core of the network as managed by telecom operators, but had shifted to the periphery of the network. In the periphery all kinds of new devices will enable access to content and communication. Establishing a core platform either based on an Operating System for a device or as a service-based platform like Facebook or Google would drive developments. The relevance of OS in combination with developer platforms for applications would only increase. Nokia needed to reconsider their OS and platform approach.

## **(8) Nokia, OS and platforms**

Core to the phone is its operating system. Originally Nokia phones were provided with the Nokia OS. The devices produced belong to the Series 40 also labelled the rich call- platform. This platform was a closed proprietary platform consisting of an in-house developed operating system, a cellular subsystem managing the cellular connectivity, and a subsystem managing applications and user interface (Bosch, 2005).

In 1998, together with Ericsson, Nokia started the Symbian initiative, as an alternative to the Nokia proprietary OS. Originally Symbian was launched by Psion, a PDA-provider. Symbian was originally developed as an open system by an eco-system; however the eco-system consist of partners that were also competitors and had other technological options for the Symbian OS as well, making the platform vulnerable for opportunistic behaviour.

For Nokia, software platforms built on top of the Symbian OS became more important for defining Nokia products. These software operating platforms were layers on top of the Symbian kernel and libraries, and were indicated by Series numbers. For instance Series 30 were used for basic phones, the S40 for mid-range telephones. The S60 was introduced in 2002 and was the basis for Nokia's Symbian smartphones, by incorporating the game software of N-gage. Symbian was core to Nokia Series 60, but also other device manufacturers and telecom providers, specifically Japanese, used the OS and built sometimes proprietary, applications on top of it. The kernel of the OS was operated by Symbian Ltd.

Nokia's series 60 - text input- platform was explicitly intended for 3<sup>rd</sup> party application providers, making use of C/C++, Java or a scripting language like Python or Perl. The architecture consisted of an adaptation layer between hardware and Symbian OS, Series 60 layer and an application layer (Bosch, 2005). The S60 would later be "rebranded" as Symbian ^3, and initially specifically built for touchscreen. Touchscreen technology was a technology that Nokia took some to master, specifically the captive touchscreen proved to be problematic.

Series 80 was focussed on Nokia's software platform for communicator devices with keyboards. The series 90 was used for touch screens. The S90 was not well developed and ill-documented (Cord, 2014). Although the software families, and the related User Interfaces (Lindholm et al, 2003), were related to certain type of phones, for instance the N-series devices mainly made use of the Series 90, the inverse reasoning is not applicable. There were devices that made use of the Series 90 software as well, but had alternative functionalities at their core. In practice there were too many flavours of Symbian and of related software families leading to incompatibilities between versions and to less support for aftermarket (or non-native) app developers (Orlowski, 2010).

In 2007 not only Apple's iOS but more importantly the Linux based Android open platform became an important threat to Nokia's Symbian based phones. The Open Handset Alliance, as promoted by Google, was a direct threat to Nokia's eco-system organized around the Symbian OS. Operators, component providers and competing device manufacturers joined the Alliance. Although Nokia was aware of possible lock in and path dependency due to the support of Symbian, Nokia tried to keep options open for developing alternative platforms, for instance by developing the Meamo Linux based open platform and by making the Symbian platform open source. Nokia's retaliation strategy was based upon acquiring Symbian Ltd in 2008 and licensing the Symbian and Series 60 Software for free under an open source licence. However the openness of the OS and the shift in eco-system was not the core issue at stake that did lead to the downturn of Nokia (alone). Nokia saw the shift in power basis to Over The Top Providers and responded internally to the threat, but in general the response was too little, too late and lacked focus. The way Nokia dealt with its own developer and content platform is illustrative.

The first content related platforms were Club Nokia and Nokia Entertainment services. Soon to be followed by Ovi in which also map services were offered based on the acquired Navteq maps and navigation technology. Ovi was the platform that would serve as an access point to Nokia's internet services, like providing games, maps, media content, music and apps in general. Next to Navteq other companies were acquired (Twango, Avvenu, Cellity and Dopplr) to realize the objective to provide an alternative to the iTunes platform. Nokia proposed to offer Ovi in a rather complicated way, per country in an open as well as a closed platform. The latter offered the possibility to collaborate with individual operators (Cord 2014). However, due to the different Nokia-product families and dozens of different devices, new interfaces had to be built for every single device to enable access to Ovi. Ovi went to market almost two years after its announcement.

Moreover, although Nokia made it possible to have add-on apps next to native apps as early as 2002, the conditions under which app developers worked were not very favourable. Support was very limited, access to the development community relative expensive (€ 60 fee to be accredited by Ovi, € 200 for Symbian) and revenue sharing favoured Nokia and not the developers (initially Nokia took more than 50%, compared to 30% by Apple). As a result app developers rather would work for other platforms, the number of apps soured, and so the revenues were limited. Nokia did not see the two-sided market opportunities that others did see. When in May 2009 OVI was brought to the market, the initial response was overwhelming, but did lead to the platform to stall due to scalability issues and not to be accessible. Major technological flaws became apparent. The interface was considered to be poor and the user experience troublesome, at the least. So the OVI store actually never took off both in terms of number of Apps offered as in the number of downloads.



In 2011 the strategic alliance of Nokia and Microsoft was announced. Seeing the problems Nokia had on the US market and the fact that the North American market is a core market for Windows this was bound to become a big failure. As a result of the alliance Nokia smartphones would make use of the Windows mobile OS. So the Nokia Lumia came about and the OVI store was integrated with the Windows Phone Store. Since then Nokia collapsed, i.e. sales went down, and the share prices fell dramatically. In the end it wasn't about devices or platforms alone, but about the eco-system that supported the platform. The battle between platforms became a battle between eco-systems.

### **Discussion, future research and conclusion**

This is the first part of our forensic analyses of why Nokia did not succeed to maintain a dominant position in the mobile (smart) phone market. As in a traditional Whodunnit- story, we first looked into the persons involved. The Nokia leadership is partly to blame for not being able to translate their strategic insights with regard to disruptive innovations, technological know-how and capabilities, as well as know-how on platforms into executable strategies. As De Wit and Meyer (2010) make clear leadership of one dominant person is in the long counterproductive. Small boards with mixed personalities, one preferable being a visionary and another being a builder would have made Nokia a more stable company. Now a visionary Ollila, was succeeded by a builder, Kallasvuo. Elop tried to be both, and dramatically failed in offering a new vision. As a result of the fast growth in the 1990s and the early 2000s the Nokia organization had to be redesigned, and processes had to be managed. As a result the control culture conflicted with the culture of an innovative, engineering and design oriented start up. From a R&D policy perspective Nokia leadership was aware of pitfalls and was looking for strategies to circumvent path dependency. However the many product releases and strong market segmentation did lead to a lack of focus. Be aware that Nokia's many product releases are in glaring contrast with the five iPhone versions that Apple introduced to the market in 6 year time. Nokia understood the relevance of building an eco-system around their products but miserably failed. Not only was Nokia rather arrogant towards their natural allies but they failed to see the relevance of actors with an Internet background. Nokia have been too long a champion of the telecommunications industry, focussing on technical integration and excellence, while the market and eco-systems shifted towards service, Internet and information providers. The late shift from the Symbian platform to alternatives is illustrative, both with regard to not grasping in time that the technical life cycle of Symbian came to an end, as well as not putting all efforts, resources and capabilities in developing a viable alternative. Cynically put, yet another version of a device for a specific market was more relevant, and illustrative for lack of focus and strategic choices. Next of course the lack of understanding the American market was more a failure on a tactical level than structural.

As a next step in our research we will connect the presented insights based on literature review, and a limited number of interviews with Nokia employees and insiders, we will relate some of the insights with our own data. We collected data on mobile phone usage between 2003 and 2011 (Carlsson et al, 2006; Bouwman et al, 2007; Bouwman et al., 2008; Bouwman et al., 2009). The data have been collected on a yearly basis mainly in Finland and can be related to issues like number of devices used, expected functionalities, market segmentation (see also papers of Bouwman et al 2012; Hamka et al, 2014; Sell, Mezei and Walden, 2014) and on OS and platforms. We used a simple random sampling method and the sample frame we used offered a complete representation of the target population, which was defined as the Finnish population between 16 and 64, whose mother tongue was either

Finnish or Swedish. Based on this data including type of handsets people owned and are planning to buy, as well as preferred features, we analyse shifts in interest towards smartphones or at least find indications for what kind of functionalities people opted for.

In all samples for the period from 2003 to 2011 (N= 3130), Nokia phones are the dominant devices used by respondents. Most people are able to specify what type of phone they have. Only 15% indicate that the mobile phone is a Nokia without further specification. In total 227 different types of phones are mentioned by respondents. The most popular phones are the Nokia 3310 (330 respondents) and Nokia 3210 (157). The combined Nokia 3510 and 3510i is used by 139 respondents. If we consider the C-,E-, N- and X- series to be smartphones then 388 (12%) of the respondents have a smartphone, mainly E and N series telephones (both total to 5%). Typically the first Smartphones are being reported in 2006, with an exception for the Nokia N9000 communicator (20, in the period 2003-2009) and the N-Gage (2, in the period 2004-2005). In our analyses we will focus on the differences between traditional phones and smartphones, wishes as expressed by respondents with regard to functionalities. But we also will look into handset related issues that are mentioned by respondents hindering usage of mobile applications as desired. We expect that combining the results of this paper with our empirical data will lead to more DN-based evidence.

## References

- Ali-Yrkkö, J., and R. Hermans (2002). *Nokia in the Finnish Innovation System*. Helsinki: The Research Institute of the Finnish Economy, Discussion Paper no. 811.
- Aspara, J., J-A Lamberg, A. Laukia, and H. Tikkanen. (2013). Corporate Business Model transformation and Inter-Organizational Cognition: the case of Nokia, *Long Range Planning*, 46(6), pp. 459-474.
- Aspara, J., J-A Lamberg, A. Laukia, and H. Tikkanen. (2011). Strategic Management of business model transformation lessons from Nokia, *Management Decision*, 49(4), pp. 622-647.
- Baffoy, S. (2000). *Segmentation of the Mobile Phones Market-A Study in the Strategies of Ericsson, Nokia, and Motorola*. Mater Thesis, Stockholm.
- Bosch, J. (2005). Software Product Families in Nokia. In; H. Obbink and K. Pohl (eds). *Software Product Lines Conference*. 2005. LNCS 3714, pp. 2-6.
- Bouwman, H., C. Carlsson, F. J. Molina-Castillo and , P. Walden. (2007). Barriers and drivers in adopting actual and future mobile services in Finland, *Telematics & Informatics*, 24(2), pp. 145-160.
- Bouwman, H., C. Carlsson, F. J. Molina-Castillo and P. Walden. (2008). Trends in Mobile Services in Finland 2004-2006: From Ringtones to Mobile Internet, *Info*, 10(2), pp. 75-92.
- Bouwman, H., C. Carlsson, P. Walden and F. J. Molina-Castillo. (2009). Reconsidering the actual and future use of mobile services, *Information Systems and E-Business Management*, 7(3), pp. 301-317.
- Bouwman, H., C. López-Nicolás, F. Molina-Castillo and P. van Hattum (2012) Consumer Lifestyle: Alternative adoptions patterns for advanced mobile services, *International Journal of Mobile Communication*, 10(2), pp. 169-189.
- Burde, D. (2009). *Nokia's convergence strategies*. IBS research centre.
- Carlsson, C., P. Walden and H. Bouwman. (2006). Adoption of 3G+ services in Finland, *Journal of Mobile Commerce*, 4(4), pp. 369-385.
- Chesborough, H.W. (2003). *Open Innovation: The new imperative for creating and profiting from technology*. Boston: Harvard Business School Press.

- Christensen, C. (1997). *The Innovator's dilemma: When technologies cause great firms to fail*. Boston: Harvard Business School Press.
- Cord, D.J., (2014). *The decline and Fall of Nokia*. Schildts & Söderströms.
- De Wit, B. and R. Meyer. (2010). *Strategy Synthesis. Resolving strategy paradoxes to create competitive advantage*. Andover, Cengage Learning EMEA.
- Häikiö, M. (2001). *Nokia, The Inside Story*. Helsinki: Edita, pp. 13-33.
- Hamka, F., H. Bouwman, M. de Reuver, and M. Kroesen. (2014). Mobile Customer Segmentation Based on Smartphone Measurement, *Telematics & Informatics*, 31(2), pp. 220-227.
- Hossain, M. (2012). Open innovation Mill: Utilization of Nokia's Non-Core ideas, *Procedia- Social and Behavioral Sciences*, 58, pp. 765-773.
- Ketola, P (2002). *Integrating usability with concurrent engineering in mobile phone development*. Thesis, Department of Computer and Information sciences, University of Tampere, Tampere.
- Kiljander, H (2004). *Evolution and Usability of Mobile Phone Interaction Styles*. Thesis, Department of Computer Science and Engineering, Helsinki University of Technology.
- Koski, H., and T. Kretschmer. (2010). New product development and firm value in mobile handset production, *Information Economics and Policy*, 22(1), pp. 42-50.
- Kurri, S. (2012). *The Story of Nokia MeeGo*, Accessed 6th June, 2014:<<http://taskumuro.com/artikkelit/the-story-of-nokia-meego>>.
- Laanti, M., O. Salo and P. Abrahamsson. (2011). Agile methods rapidly replacing methods at Nokia, *Information and Software Technology*, 53(3), pp. 276-290.
- Lindholm, C., T. Keinonen, and H. Kiljander. (2003). *Mobile Usability: How Nokia changed the Face of the Mobile Phone*. New York: McGraw-Hill.
- Orlowski, A. (2010). *Symbian, The Secret History*.  
[http://www.theregister.co.uk/2010/11/23/symbian\\_history\\_part\\_one\\_dark\\_star/](http://www.theregister.co.uk/2010/11/23/symbian_history_part_one_dark_star/).
- Palmberg, C. (2002). Technological systems and competent procedures- the transformation of Nokia and the Finnish telecom industry revisited, *Telecommunications Policy*, 26(3-4), pp. 129-148.
- Palmu-Joroinen, A. L. (2010). *Nokia –vuodet. Mitä johtamisesta voi oppia. (Nokia-years. What you can learn from leadership)*. Atena Kustannus Oy, Jyväskylä.
- Rice, J., and P. Galvin. (2006). Appliance patterns during industry life cycle emergence: the case of Ericsson and Nokia, *Tchnovation*, 26(3), pp. 384-395.
- Sell, A., J. Mezei and P. Walden. (2014). An attitude-based latent class segmentation analysis of mobile phone users, *Telematics & Informatics*, 31(2), pp. 209-220.
- Sölvell, Ö., and M. E. Porter (2011). *Finland and Nokia: Creating the World's Most Competitive Economy*. HBS-cases 9-707-427.
- Steinbock, D. (2001). *The Nokia Revolution. The story of an extraordinary company that transformed an industry*. New York: AMACOM.
- Steinbock, D. (2010). *Winning Across Global Markets: How Nokia Creates Strategic Advantage in a Fast-Changing World*. Chichester: John Wiley Publishers.
- Talouselämä (several issues). *Talouselämä* is a Finnish business magazine.