The Future of the Web and its Value Creation for Telcos

Trend Report 2008

Other CDTM print publications

M. Huber, A. Franz, S. Vogel (Eds.)
Digitizing, Miniaturization and Convergence in Media and Entertainment Industry
ISBN 978-3-8311-3544-8. 2002.
320 p.

M. Huber, C. Bachmeier, A.Buttermann, S.Vogel, P. Dornbusch (Eds.)
Smart Dust
ISBN 978-3-8311-4297-2. 2002.
X, 280 p.

M. Huber, A. Buttermann, L. Diaz Trigo, M. Möller, P. Dornbusch, M. Zündt (Eds.)
IT Security in Global Corporate Networks
ISBN 978-3-8311-4297-2. 2002.
X, 281 p.

M. Huber, P. Dornbusch, J. Landgrebe, M. Möller, M. Zündt (Eds.)
Visions of Advanced Mobile Communications
ISBN 978-3-9808842-0-4. 2003
VII, 272 p.

P. Dornbusch, M. Huber, M. Möller, J. Landgrebe, M. Zündt (Eds.)
Leveraging Business with Web Services
ISBN 978-3-9808842-1-1. 2003.
VI, 238 p.

M. Huber, P. Dornbusch, M. Möller, J. Landgrebe, M. Zündt, M. Müller (Eds.)
Mobile Application for the Soccer World Cup 2006
ISBN 978-3-937312-53-8. 2003.
VII, 280 p.

P. Dornbusch, M. Huber, J. Landgrebe, M. Möller, U. Sandner, M. Zündt (Eds.)
The Future of Telematics: New Business Concepts and Technologies
ISBN 978-3-9808842-2-8. 2004.
XII, 370 p.

P. Dornbusch, M. Möller, J. Landgrebe, U. Sandner, M. Zündt (Eds.)
Generation 50 Plus - Products and Services in the TIME Sector
ISBN 978-3-9808842-3-5. 2005.
VII, 338 p.

P. Dornbusch, U. Sandner, P. Sties, M. Zündt (Eds.)
Fixed Mobile Convergence
ISBN 978-3-9808842-4-2. 2005.
V, 259 p.

U. Sandner, B. Kirchmair, P. Mayrhofer, M. Zündt (Eds.)
RFID: Leveraging Global Commerce With Tracking & Tracing Technologies
ISBN 978-3-9808842-5-9. 2006.
VI, 357 p.

E.-M. Kern, H.-G. Hegering, B. Brügge (Eds.)
Managing Development and Application of Digital Technologies
ISBN 978-3-5403412-8-4. 2006.
X, 341 p.

B. Kirchmair, N. Konrad, P. Mayrhofer, P. Nepper, U. Sandner, M. Zündt (Eds.)
Seamless Context-Aware Services in Converged Mobile- and Enterprise-Networks
ISBN 978-3-9808842-6-6. 2007.
344 p.

A. Balevic, B. Bozionek, B. Kirchmair, N. Konrad, P. Mayrhofer, P. Nepper, U. Sandner (Eds.)
Effective Collaboration in Dynamic Communities with Service-oriented Architectures
ISBN 978-3-9808842-7-3. 2007.
VI, 150 p.

B. Kirchmair, N. Konrad, P. Mayrhofer, P. Nepper, U. Sandner (Eds.)
The Future of Publishing Trends for the Bookmarket 2020
ISBN 978-3-9812203-0-8. 2008.
260 p.

P. Nepper, N. Konrad (Eds.)
The Future of Social Commerce
ISBN 978-3-9812203-1-5. 2009.
XX, 320 p.

P. Nepper, M.-L. Lorenz, N. Konrad (Eds)
Technologies and Services in the Light of Demographic Changes
ISBN 978-3-9812203-3-9. 2009.
XXIV, 312 p.

M.-L. Lorenz, P. Nepper, N. Konrad (Eds)
The Service Centric Car in 2020
ISBN 978-3-9812203-4-6. 2009.
XXII, 304 p.

M.-L. Lorenz, C. Menkens, N. Konrad (Eds.)
E-Energy
ISBN 978-3-9812203-5-3. 2009.
XXVIII, 382 p.

Patrick Nepper · Nikolaus Konrad
(Editors)

The Future of the Web and its Value Creation for Telcos

Trend Report 2008

Class 2009 Winter

Center for Digital Technology and Management

The Future of the Web and its Value Creation for Telcos. Trend Report 2008

Edited by: Patrick Nepper, Nikolaus Konrad

ISBN: 978-3-9812203-2-2

Biblografische Information der Deutschen Nationalbibliothek
Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet über http://dnb.d-nb.de abrufbar.

The Center for Digital Technology and Management (CDTM) is a joint institution of the Technische Universität München (TUM) and the Ludwig-Maximilians-Universität München (LMU). This report was created by CDTM students and is one element of a comprehensive research project, sponsored by Deutsche Telekom Laboratories. The CDTM is part of the Elitenetzwerk Bayern.

Center for Digital Technology and Management
Barerstr. 21, 80333 Munich, Germany
E-Mail: info@cdtm.de
Web: http://www.cdtm.de

Preface

The telecommunications market is confronted with unprecedented changes. The World Wide Web and its open technologies have become the backbone on which a plethora of services are provided – from simple phone calls to complex location-based multi-layer software applications. Telcos are faced with the imminent threat of becoming a mere bit-pipe for web services without taking part in the value creation for the user and the respective revenue streams. New players such as Skype, Google and Apple enter the market from different sides – further intensifying the competitive environment for telcos.

At the same time, telcos possess invaluable assets: an installed customer base of billions of customers, fixed-line high-speed telecommunications networks, customer-specific data such as the customer's location, frequent contacts or other phone numbers belonging to the same account. If telcos are able to leverage these and other competitive advantages, future scenarios might be more opportunity-driven and might allow telcos to enter new, more service-oriented markets.

Although we have detailed knowledge about the upcoming challenges, little is known about possible solutions. This report reflects interdisciplinary futures research conducted by 20 students at the Center for Digital Technology and Management (CDTM) in fall 2007. It is based on a thorough scenario analysis which enabled the authors of the report to not only shed light on possible future scenarios, but also to come up with innovative ideas of products and services that might help telcos to cope with the future of the web.

The report contains two parts: The first part discusses political, economic, social, technological and legal trends that will have impact on future scenarios in the field. Based on this trend analysis, the second part offers a series of articles that discuss scenarios for 2012 in order to understand the framework for future innovations, namely a future service platform for providing telco services to application developers, a time-tracking geo-location-based personal history application, a vision of future mobile handsets, and the future of net-centric cloud storage solutions.

The seminar was conducted in co-operation with Deutsche Telekom Laboratories, which allowed the participants of the seminar to get in-depth analyses from industry experts and to understand a telco's perspective on the future of the web.

We invite you to read through the report and use it as an inspiration to take an active role for pushing forward telecommunication technologies and services for the future web.

Munich, Spring 2008

Patrick Nepper
CDTM Management Team

For more information about the CDTM and its related projects,
please visit http://www.cdtm.de

The entire trend report was written by CDTM students in 2008. The papers compiled here do not claim to be scientifically accurate in every case; they are rather meant to give a structured and broad overview of trends relevant in the internet context.

Contents

List of Figures

List of Tables

Part I

Trends

1 Chapter 1

Web X.0 - Technology Push

Nelly Markova, Claudius Jablonka, Steffen Wenz, Yang Guo

Today, telecommunications, TV and other digital services providers rely on several redundant proprietary networks such as landline phone, cable TV, GSM, etc. Being faced with increasing requirements for bandwidth and significant cost pressure, telecommunications providers are forced to respond by installing so-called Next Generation Networks (NGN). Providing one unified Internet Protocol, Next Generation Networks facilitate the implementation of third party services. This newly acquired flexibility allows for higher responsiveness to new trends. In order to satisfy the new appetite for higher bandwidth, improved infrastructure based on new technology has to be installed within the next decade. Although this requires significant investments, there are several benefits for all parties involved, such as faster ubiquitous Internet access, lower operational costs and improved scalability. With the Internet protocol becoming the "lingua franca" of global communication networks, the environmental variables are fundamentally changed and applications of the future may transform completely from how we use and perceive them today.

Telecommunications providers today are at a crossroads between becoming commodity bandwidth providers and vertically integrating their value creation towards future Web X.0 applications. Several major national players such as British Telecom and Sprint/Nextel have already begun to open up enablers to Web X.0 applications. Those have already established themselves as technological pioneers by now - with uncertain financial outcome. Following up on

those examples, more and more telecommunication companies such as Deutsche Telekom are completing their endeavors.

1.1 Introduction

When given the task to envision the future of telecommunications in five years, in this market driven by rapidly developing technologies, it is hard to get a good understanding without taking a valuable look into the past first. Two examples will demonstrate how a technology only at the horizon today can become a commodity within five years, and how an application so far unknown can change the way we communicate within only five years. Five years ago, the telecommunications provider Mobilkom Austria, installed the first UMTS network in Europe, allowing broadband access to the world wide web for the first time in mobile communication. In 2002 they were hardly able to satisfy the small, professional demand with a sufficient number of mobile phones. Today, although UMTS has become a basic feature in cell phones, the €50,8 billion investments in the UMTS licenses [26] could not be recovered as of today due to the low sales volumes and price competition.

The second example is on the application side. In 2002 social communities as we know them did not yet exist yet. Most of them did not kick off prior to 2004. Yet today, Myspace, Facebook and Second Life have become part of our lives. The estimated value of Facebook is already at 15 billion, one fifth of the value of Deutsche Telekom with Telekom's revenues still 650-fold higher, but facebook catching up exponentially every year. [37, 19] The way Web 2.0 applications create value for investors may give a taste of what to expect from future Web X.0 applications.

If a traditional telecommunications provider listed on the capital markets is to sustain a viable business under these conditions, it needs to concentrate on one of two generic strategies: It can either concentrate on becoming a technology and cost leader in providing infrastructure and customer service, or it can expand beyond its former core competencies and provide enablers and applications.

In the following we will first assess the technological environment today and then try and identify some of the trends and key technologies paving the way for Web X.0.

1.2 Status Quo: Current Technologies

1.2.1 Infrastructure

Current infrastructure technologies can be distinguised according their location of usage - home or fixed and mobile technologies.

1.2.1.1 Home

Telephony
In 2006, the majority (25 out of 39 million) of landline telephone connections in Germany was analog, while the remaining 13 million used ISDN. In addition to that, 3.5 million households used Internet telephony (Voice over IP/VoIP) over broadband Internet connections. [11, p.60]

Internet
While it is possible to access the Internet over analog telephone lines or ISDN, the achieved data rate cannot exceed 128 kbit/s and is unsuitable for many applications such as video streaming. However, in 2006, only 36% of all German households had a broadband Internet connection [11, p.64]. The vast majority of those are DSL connections with common downstream bandwidths between 1 and 16 Mbit/s [35, p.10]. It is worth noting that 900.000 German households do not have access to broadband Internet as of 2007, mostly in rural areas [35, p.Z1].

TV/Radio
Internet protocol television (IPTV) is a very different approach from traditional broadcast TV: The television program is individually streamed to each user over the Internet. This enables applications such as video on demand and interactive television. However, IPTV requires a broadband connection. With only 100,000 German IPTV subscribers in 2007, it can be regarded as a niche market [23].

Identity and Location
Landline telephone connections are identified through their unique phone number, and therefore have a known location. When initiating a phone call, the caller can choose to submit his phone number to the callee (Calling Line Identification Presentation, or CLIP) and thus reveal his identity [27, p.2].

With IP-based connections (including VoIP), this is different: Each device connected to the Internet has a unique IP address. For servers, this address is persistent, but single desktop computers usually get assigned a different IP address each time they connect. The Internet Service Provider (ISP) is able to identify a client. Other than that, only rudimentary identification and location is possible through the use of databases, since large businesses and ISPs issue IP addresses in certain ranges.

Since IP addresses are inherently anonymous, security mechanism like password login using HTTP and cookies as well as Virtual Private Networks (VPN) are used to implement authentication. (This also holds true for mobile IP connections.)

1.2.1.2 Mobile

Telephony

The predominant standard for mobile telephony is the Global System for Mobile communications (GSM). This second generation (2G) standard is used by all of the over 84 million mobile phones in Germany [11, p.70].

Internet

GSM uses digital transmission and can be used for services such as short messages (SMS), but at 14kbit/s, it is too slow for practicable Internet access. GSM extensions like GPRS and EDGE improve on this issue by offering a maximum downstream of 384 kbit/s [32]. EDGE is widely available in seven of the German states [40], while GPRS can be used virtually everywhere. These technologies enable multimedia messages (MMS) and reasonably fast Internet access, but are far from broadband speeds.

The Universal Mobile Telecommunications System (UMTS) is a third generation (3G) standard that features downlink data rates of up to 384 kbit/s [35, p.26]. In 2006, 4.5 million Germans used UMTS, which was available in between 55 and 80% of the country, depending on the provider [11, p.72]. 30 million households had access to High-Speed Downlink Packet Access (HSDPA), an UMTS extension that allows downstream speeds comparable to DSL, though at a higher price [35, p.28].

These speeds are only surpassed by Wireless LAN (WLAN). However, public hot-spots are very heterogeneous and have a short range, so that WLAN coverage cannot rival that of UMTS [35, p.30].

Identity & Location

Cell phones today are identified through the Subscriber Identity Module (SIM), which enables caller identification. GSM handsets also provide basic location information, since they maintain a connection with the nearest cell, which can be up to several kilometers in diameter. GPS-enabled devices produce more accurate location information; however, unlike the GSM cell ID, it is only available to the end device and needs to be uploaded to be used in any way. In 2006, 7.7% of German households had a GPS navigation device [17], and 110 million GPS-enabled handsets were shipped worldwide [29].

1.2.2 Applications

Storage

Prices for storage devices continue to fall while capacities are increasing, so it is affordable to store personal data at home. There are media receivers specifically designed for this purpose, such as Apple TV[1]. Limited upstream bandwidths make web-based storage of large files unfeasible - unless they are to be shared with the public on websites like YouTube or Flickr. Also, Google Docs & Spreadsheets and other rich Internet applications store files online, which can then be accessed and edited globally.

Amazon S3 is an example for online storage in the B2B sector. Amazon opened up its global storage infrastructure and offers unlimited web space to businesses. Among their clients is Microsoft, which claims to have saved 90% in storage costs [4].

iTunes Store, Steam and other providers of downloadable content allow purchased software, songs and movies to be downloaded multiple times, thus making local storage optional.

Location

Mobile GPS devices today are mainly used for navigation: The device holds a database of maps for a certain region and uses the GPS location to display its current position. Location information is not published, and as such, services like custom advertisement or updated road maps are not possible.

Some professional cameras include GPS receivers, which save their position along with every picture. This inclusion of geographical metadata is called geotagging. There are web applications designed for automatic handling of location data. One example is Plazes, which can be used to share your position with friends[2]. Yahoo FireEagle, currently in development, will also feature open interfaces, so it will be able to act as a middleware and provide location information to other web applications[3].

IP targeting, the process of extracting (approximate) location data from an IP address, is used to deliver locally targeted advertisements on Google AdWords. Companies like MaxMind offer B2B IP targeting for various other purposes[4].

Presence

Current implementations of presence data generally require the user to enter her/his state manually. Examples include instant messengers, which allow states like *free for chat* or *not available*, or cell phones that can be switched to silent mode if the owner wishes not to be disturbed. Only very limited presence information can be gathered automatically, for example if a user has been idle

[1] http://www.apple.com/de/appletv/
[2] http://plazes.com/
[3] http://fireeagle.research.yahoo.com/
[4] http://www.maxmind.com/

for a certain amount of time.

Web 2.0

Typical Web 2.0 websites (blogs, wikis, social networks etc.) are built upon existing technology. Even AJAX (Asynchronous JavaScript and XML, used by most rich Internet applications) is merely a combination of older standards. Data-intensive Web 2.0 phenomena such as video streaming favor a broadband connection.

There is a trend towards opening up programming interfaces to social platforms. Facebook has seen a steep increase in users since introducing third-party applications. Google responded by developing the OpenSocial API, which allows easy sharing of profile data between different platforms[5]. These open platforms are used by businesses to access the millions of subscribers.

1.3 Future Technologies

1.3.1 Next Generation Networking

Next Generation Network (NGN)

Next Generation Network, also known as All-IP-Network, is a broad term for where telecommunication is heading toward. Instead of having several redundant last mile delivering infrastructures such as GSM network for mobile phone, landline network for telephones, cable network for TV etc (fig. 1.1), one packet based network, independent of access technology, will serve as a platform provide all telecommunication services (fig. 1.2). The key technologies therefore are Internet Protocol (IP) and IP Multimedia Subsystem (IMS). By simplification of the network structure, NGN can offer lower maintenance expenses (by utilizing softswitches, simplifying network structures, etc.), lower power consumption and reduced bandwidth requirements [15] which results in cost savings and higher reliability.

Internet Protocol (IP)

IP is the protocol that has been popular for quite a while for computer networks such as the Internet or local area networks. Basically it converts in-going continuous bit-streams provided by the underlying layers (technologies such as Ethernet or UMTS) into packets that can be handled by applications, and convert out-going packets back into bit-streams that can be sent. This way the applications will not have to concern themselves with the details of the actual transmission.

Although IP is not a brand-new technology, its use as a communication protocol for other than computer networks has only recently became apparent.

[5] http://code.google.com/apis/opensocial/

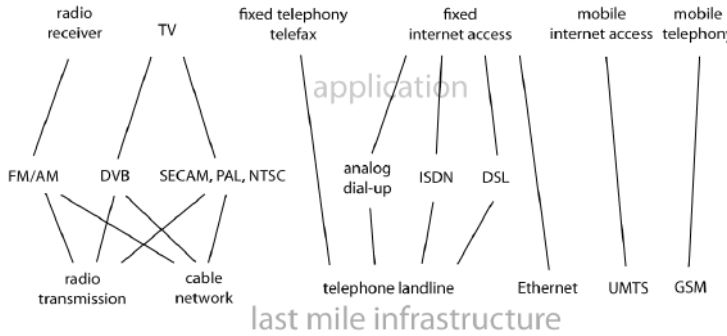


Figure 1.1: Content delivery with traditional infrastructure
Source: Own Illustration

With packet-based applications such as IP-TV or VoIP, IP has become an important key towards an unified telecommunication network.

Another advantage of IP-based communication is the cost savings at operating the infrastructure. Instead of maintaining several redundant networks, one for each type of service, one high-speed IP-network will suffice to deliver a broad spectrum of services. Since most of the IP-based services are implemented in software, replacing and upgrading the hardware infrastructure does not have severe negative impacts such as extended downtimes.

However, in order to enable all applications to run on a IP-based platform, the bandwidth of the last mile delivery to the customer has to be a lot higher than what is prevalent now due to the high data rate requirements of applications such as IP-TV [18]. Therefore investments in newer infrastructure has to be made, for instance a fiber optics network with a good coverage, to enable the high bandwidth.

IP Multimedia Subsystem (IMS)
is a platform developed by 3GPP that utilizes the strength of IP to provide telecommunication functionality to IP-based applications while hiding the actually used data link technologies such as UMTS or DSL under the hood. Isolating the service and the network layer based on SIP[6], IMS achieves fixed-mobile convergence for the access of multimedia content. Using IMS, applications such as IP-TV can be accessed from the home cinema via fiber optic Ethernet as well as on mobile devices via UMTS. With growing high-speed connection coverage, traditional analog technologies such as cable TV network or telephone landline can eventually be replaced. IMS grants features such as QoS[7] and

[6]Session Initiation Protocol
[7]Quality of Service, ability to prioritize packets in order to enable smooth real-time voice and video streams

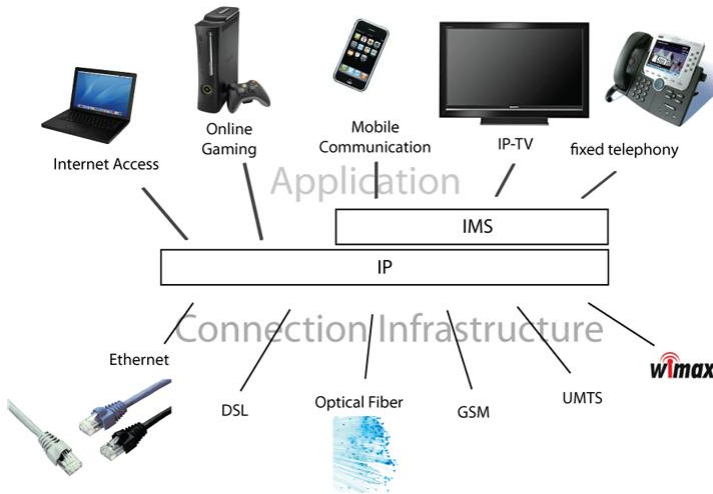


Figure 1.2: Content delivery with NGN
Source: adapted from Dong and Zhao [15] and Alcatel Lucent [3]

AAA[8].

1.3.2 Emerging Infrastructural Technologies

Optical Fiber (physical layer)
Optical fiber refers to fiber, made of glass or plastic, capable of guiding light signals. It is an alternative to copper wires as a communication medium. Optical fiber is just as flexible as copper wire while enabling a much higher bandwidth due to total internal reflection. Besides the fiber, the infrastructure includes a receiver and repeater. The former consists of photodiodes for sending and photodetectors for receiving, and converting light to and from electric signals respectively. The latter compensates for attenuations that accrue on long-distance transmissions. Compared to conventional copper wires, optical fibers

- are cheaper to manufacture
- can be made thinner
- offer higher bandwidth
- draw less power and require less repeaters due to less signal degradation

[8]Authentication, Authorization, Accounting

- are better suited for digital signals
- are safer, since no electricity is involved [22]

The only obstacle for wide-area coverage using fiber optics is the initial large-scale investments that would have to be made in order to replace the current copper wire network.

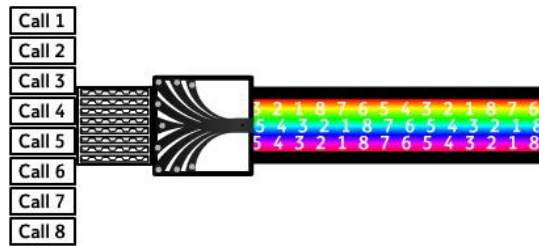


Figure 1.3: WDM
Source: British Telecom [10]

WDM (Wavelength-Division Multiplexing) is a way to extend the bandwidth even more by using multiple wavelengths (multiple light colors) as several channels (up to 40Gb/s [36]). At the receiving end, the mixed light signal is disentangled to monochromatic signals for processing (fig. 1.3).

UMTS LTE

UMTS supports, as explained earlier, download rates up to 384 kbit/s, which is remarkable compared to the 14 kbit/s of GSM. However, for rich multimedia contents, UMTS still represents a bottleneck. To cope with the new requirements, the Long Term Evolution (LTE) project carried by 3GPP[9] is working on "release 8" of the UMTS standard. The aim of this project is to extend UMTS to meet the requirements of a fourth generation (4G) technology, featuring up to 100 Mbit/s download rate, 50 Mbit/s upload rate and around 30 km cell radius [1]. With these specifications, UMTS can be a serious competitor to WiMAX.

WiMAX

WiMAX (Worldwide Interoperability for Microwave Access) is another name for the IEEE 802.16 Standard and is a technology related to Wi-Fi[10], but with a much higher range in order to cover a larger area. Quoting WiMAX Forum (a trade organization formed by companies interested in IEEE 802.16):

[9] Third Generation Partnership Project, a collaboration between telecommunication associations to form standards
[10] IEEE 802.11, the underlying technology for wireless local area networks (WLAN)

WiMAX[a] is based upon the IEEE 801.16 standard and extends the delivery of wireless broadband connectivity to be ubiquitous. WiMAX products can accommodate fixed and mobile usage models. The IEEE 802.16 standard was developed to deliver non-line-of-sight (LoS) connectivity between a subscriber station and a base station with typical cell radius of three to ten kilometers. [...] WiMAX Forum certified systems can be expected to deliver capacity of up to 40 Mbit/s per channel. This adds up to enough bandwidth to simultaneously support hundreds of businesses with T-1 speed connectivity and thousands of residences with DSL speed connectivity. The WiMAX Forum expects mobile network deployments to provide up to 15 Mbit/s of capacity per user within a typical cell radius of up to three kilometers. WiMAX technology already has been incorporated in notebook computers and PDAs to deliver high speed mobile Internet services anytime, anywhere [43].

Being a wireless technology, WiMAX infrastructure is easily set up and offers connectivity to fixed devices as well as mobile ones. The range of the base station however, is significantly shorter than the usual 35 km of TDMA/CDMA[11] systems [2]. Therefore base stations have to be set up with a much higher density to achieve the same coverage. Of course, it also requires the users to have WiMAX enabled devices in order to be able to use the service.

There is, however, a line-of-sight service as well, using 66GHz signals as opposed to the 2-11GHz of the non-line-of-sight service. This service can range up to 50 km. Although it is not designed for mobile applications since the receiver has to have a line of sight to the WiMAX tower, in can help provide fixed broadband Internet access for rural regions inexpensively [7].

IPv6

IPv6 (Internet Protocol Version 6) is the latest version of IP and has been released in 1996. However, IPv4 is still wide-spread and in general use. But with more upcoming IP-based services and devices, each needing an IP-address, IPv4, which uses 32-bit addresses, has been pushed to its limits. According to a study by Cisco Systems, those addresses will be used up between 2009 and 2016 [25]. IPv6 using 128bit addresses, providing a vastly larger address space, solves this upcoming problem. Furthermore, IPv6 eases the configuration efforts, enables multicast[12] and incorporates IPsec[13]. The downside is the cost for modernizing current software and hardware designed for IPv4. Upon investing in a completely new network, most telecommunication providers choose IPv6 over IPv4.

Galileo

Galileo (Galileo Positioning System) is an alternative and complement to the US-based Global Positioning System (GPS). Unlike GPS which has military

[11] Time/Code Division Multiple Access. Examples are GSM, UMTS
[12] broadcast to multiple receiving hosts
[13] a standard for encrypted communication

origins, its purpose is entirely commercial and civilian. Taking part in this project are the EU, China, India as well as several other countries. Having an resolution of down to 1m, Galileo is supposed to be more accurate than what is provided by GPS to non-military customers.

The open service of Galileo will be free of charge, but since Galileo is a pure non-military project, adding functionality for a paid service is conceivable [16].

Due to disagreements between the participating governments, however, the launch of the approximately 30 satellites has been postponed to 2011/2012 [6].

1.3.3 Enabled Applications

AAA

While mobile commerce (m-commerce) will be state of the art by 2012, appropriate user authentication mechanisms will have to be developed in order to guarantee safe payments. As conventional password protection will not suffice, biometric data is required to identify the user. Therefore the mobile terminal devices should be equipped with such mechanisms.

AAA will also tackle the problem of age restrictions when purchasing for instance cigarettes, alcohol and adult movies. Therefore AAA should take into account certain identity details such as age.

Identity

While AAA is about verifying exactly who the user is and what he is authorized to do, the term identity describes users' profiles. We believe identity will be an essential future enabler for telecommunication providers. There is an ample variety of features to be offered.

To begin with, network operators will be able to provide a personal centralized address book. They can even make a contract with the most common online social communities (e.g. Facebook, StudiVZ, Xing etc.) and enable customers to import all their buddy contact details from these platforms. This address book can be offered completely free of charge, however the user should not be able to transfer the contacts, when changing the mobile provider, in order to create a lock-in effect. Ideas of how to implement this solution have been in existence for some time, but have not been widely used yet. For instance, the infrastructure could be developed based on the Open Profiling Standard, which offers an upgraded profile managing system. It is a more secure and standardized solution comparable to today widely used cookies [24].

Telekom could use its brand image of solidity and trustworthiness to offer a centrally managed privacy central: it would allow, at the discretion of the user, limited, temporary access to otherwise encrypted contact details for third party websites. The online profile stored with the telecommunications provider would then become the sanctuary of an online privacy central, where only the user himself would be in control over what site can access his contact information

when and with which parameters, for instance as a sandbox environment for online subscription lists.

Furthermore another appealing feature to be offered will be the semantic search for personal information published about the customer himself. Thus the user will always be aware of his "online reputation" as it can be traced by inquisitive colleagues and headhunters.

Most e-commerce systems request clients' membership for some time before they are accredited trustworthy membership status. By using the available information collected at various platforms together with an individual credit worthiness rating the telecommunications provider can request from the bank, can help avoid this trial period. This is an excellent way for telecommunication companies to support their customers in their private transactions and it can be additionally exploited for creating a lock-in effect. The network provider could extend its service, by closing a deal with his client that gives accreditation in return for bank details and financial guarantees [44].

Location Information

One of the greatest problems of VoIP currently, which is why it is not widely used, is the lack of a way to indicate the exact location. This, however, is which is essential concerning emergency calls.

However, the telecommunication provider can offer an alternative solution to it. When the user dials an emergency number, the provider is able to locate the user based on the connection technology (for example GSM triangulation) and transfers the location back to the user over IP. The location information can then be forwarded via IP by the terminal device to the callee, for instance to notify the emergency call center.

Presence

There are a lot of innovations in the pipeline in the field of presence, which are due to enter the market in the next years. Soon we will be able to use services similar to Skype and ICQ on our mobile devices. For instance, Alcatel's "Rich Presence" provides online communication services for using phone and computer in a coherent manner. Aggregating user information from multiple devices and networks, it offers more comprehensive view of user status [14]. Further development is required for "intelligent" mobile devices which are able to recognize the surrounding environment or even interact with other mobile devices in the vicinity. The following embarrassing situation probably has happened to everyone: a mobile device ringing during a conference. This problem could be solved using the following technology: when the mobile phone realizes that all other mobile devices in its surroundings are switched to silent mode , it suggests the owner to mute the device as well. The technical implementation will be easy due to technology that is already available for wireless devices for instance via bluetooth or even supporting detection of environment sound level and activity [28].

Storage and Processing Power

There are many reasons why we consider storage to be one of the crucial enablers for future applications.

While hard disk storage is becoming cheaper, portable memory is still comparatively expensive. Therefore it is practical to save large amounts of data not on your mobile device but on a central storage location. The necessary bandwidth can be provided by wireless Next Generation Networks. The broadband connection will allow for more cost-efficient and equally quick upload of data to a central storage server.

Uploading files to a central storage location allowing users to access them anywhere at any time without worrying about synchronization provides extra convenience to the customer. As users own more and more computers and portable devices, this ubiquity becomes increasingly important. Promoting central storage allows for clear cut digital rights management may keep the customer locked in.

The competitive edge of a telecommunications provider is its position in control of the network. The telecommunications provider has direct access to the nodes of the network and can therefore place its own storage capacity on these strategic points. As it is aware of the capacity utilization of the network it may distribute the load more efficiently than any third party. Thus the customer is able to upload data to the nearest node. Then it can be further disseminated to other storages within the network during times of low load in order to balance utilized bandwidth.

When user A sends a file to user B, the file does not have to travel the whole distance from user A through the node N to user B, but A will simply grant user B access to the file on N so that the distance the file has to pass through is reduced by half.

As an opposing trend, P2P file transfers are becoming increasingly important means of distributing files. For instance some legal music download sites are relying on P2P today as well as many file sharing portals. While today all P2P networks use proprietary algorithms routing within the network, central coordination by a telecommunications provider would help avoid congestion [42].

Besides data storage, even processing power can be relocated to remote servers. Thin-clients offer twofold benefits: On the one hand they have most of their memory outsourced to a central storage location. On the other hand, they use external processing power from remote servers. They thereby offer great mobility and cost-efficiency [5].

Search

Search represents another valuable yet ambiguous enabler. Since there are impressive competitors in this field such as Google it might be near impossible establish a market position against them. But still there are some valuable applications to be offered by mobile service providers.

The network operators can only target a niche market and be aware of positioning their search products. For instance, offering search engines for different age segments. In particular, developing clearly structured and easy to use search for inexperienced people. Moreover, they could concentrate on local searches, offering an ample and detailed amount of information concerning just a certain region. This service would need to differentiate from Google local search (i.e. Google maps) however, which seems like an insurmountable challenge.

An interesting development is the evolution to web 3.0 (Semantic Web). The telecommunication provider might want to examine closely the opportunities it offers, because transforming the web into a database and making it accessible by artificial intelligence technologies opens many new search design possibilities. An additional advantage is the ability to provide a really well-structured search result to the customers, avoiding advertisement and landing pages.

Omnipotent Mobile Terminal Devices

Having large amounts of functionality enabled by the IP platform and bundled by an appropriate API, developing and implementing new services becomes much easier, if not possible in the first place. On the other hand, small mobile devices has been becoming more and more popular, growing in functionality, processing power and connectivity capabilities [41]. The iPhone and the upcoming Google Phone/operating system Android are just two examples. Smart phones in general, even sub notebooks, can serve as the entry point for the costumer to access the IP platform. Because of the handy size and the mobility, small mobile devices will play an essential role for the content delivery of NGN, since they can accompany the user everywhere while offering connectivity. Provided with an open API, service providers can utilize their own client software for the terminal devices to communicate over the IP platform with the service provider itself.

Examples for proprietary service intended for those devices are plentiful: an integrated emergency medical service for instance, could be established by adding functionality to monitor the critical patient's health conditions. Once an emergency occurs, an alert, possibly containing GPS data, could be sent and help for the endangered can be ordered. The mechanism for sending such an alert can be similar to sending a simple HTTP-request, which happens today billions of times world-wide, enabled by IP. Another possible scenario could be live photo hosting service: as the user takes photos with his camera phone, he can immediately upload these pictures to his favorite picture hosting service, adding location and time tags automatically. His friends could, when subscribed to his live photo album, be notified and enjoy the shared photos. Both applications wouldn't need a specifically developed device; one featuring GPS, camera (which most mobile phones today offer already) and access to the IP platform as well as an open application API would suffice.

Considering that modern terminal devices combine mobility and vast amount

of functionality with connectivity to the IP platform, a lot of new applications and services can be envisioned [41]. The key to these visions however, is being able to offer good coverage and a high popularity of those devices since some of these services benefit from network effects.

1.3.4 Challenges and Risks for Telcos

The overview of enabled application by NGN shows, how vast the opportunities are that next generation networks are offering for telecommunications providers and how many new products and services they can introduce in addition to their core business. They represent a real chance for increasing the revenues of telecommunication companies and counterbalance the stagnation of subscriptions of the recent years. Furthermore, they will make the already saturated telecommunications market more attractive. Many of our propositions additionally allow to engender switching costs for customers, which may help reduce price elasticity of demand as well as churn rates. Unfortunately, there are not only benefits but also problems. In general the most successful companies are focused on their core business, an attribute closely monitored by the stock exchange. As the competitive edge of telecommunications providers is providing network and connectivity, not implementing applications and additional features, the chance of failure is very high. The traditional telecommunications providers are stuck in a dilemma and will have to decide whether they want to engage in competition with the global Internet developer community or whether they need to concentrate their resources on their core competencies. From our research we can conclude that there is an obvious trend to modular services, which has to be considered in the design and implementation of these applications [13]. Generally we suggest that wherever a telecommunication provider can generate added value and has exclusive and unique qualities in implementing these applications, it engages in these activities. If not we suggest to keep off in order to maintain a low risk product portfolio.

1.4 Selected Approaches

1.4.1 British Telecom's Web21C SDK

In the past years, British Telecom frequently announced its shift from traditional telecom business to becoming a "provider of networked IT services" [8]. This shift consists of two separate projects, which British Telecom refers to as 21CN and Web21C.

British Telecom's 21CN, which stands for 21st Century Network, is an ambitious project aimed at the roll-out of a next generation network infrastructure in Great Britain. Commenced in 2007, the project is due to be completed by the year 2011. By then, Britain's Public Switched Telephone Network (PSTN)

is to be completely replaced by an IP-based, fiber optic broadband network. According to BT figures, the upgraded infrastructure will require an investment of £10 billion, but is also expected to bring annual cost savings in excess of £1 billion [31]. In addition to this, increased bandwidths and the convergence of formerly separate networks will make it easier to deploy technologies such as IPTV.

But British Telecom sees this infrastructure investment as part of a bigger "open innovation" strategy, which revolves around combining innovative ideas from BT employees with the creativity of outside developers [34]. As such, certain network capabilities are exposed to third party developers by bundling them in the Web21C SDK (Software Development Kit). It currently allows programmers to place (conference) calls, send/receive messages and authenticate users. The SDK is available for the most common development environments and can be downloaded for free. Developers are then charged per usage of the features [8]. Also, British Telecom has introduced CallFlow, a service that allows rapid development of voice-enabled applications. This signals a departure from traditional software engineering processes to keep up with the speed at which Web 2.0 applications are deployed, especially when created using mash-ups [33].

British Telecom plans to further enhance their Web21C SDK once the first functionalities of their 21CN are ready to be commercialized [31]. The SDK could prove to be a success, as it enables a drastic facilitation of the application development process, especially if more development aides like CallFlow are introduced. Also, it is not completely dependent on the Web 2.0, since its features might also be used in other business models or internal business processes.

Ever since first announcing its NGN initiative, British Telecom has extensively publicized its plans and advancements. For the hardware suppliers involved in the roll-out of the upgraded infrastructure of 21CN this implied positive effects [30], but marketing has not significantly helped speed up demand for BT's Web21C SDK. As of February 2008, there have been 8000 downloads, with only 20 commercial applications released (and some of those by BT employees) [31]. As a consequence, some features (Location, Contacts, Information About Me) had to be retreated "due to lack of use by the existing customer base" [9]. Also, BT was forced to place restrictions on the call feature due to (criminal) abuse: Calls to more than 40 countries are currently blocked; in addition to that, the maximum duration of a call is limited. These measures give the impression that British Telecom's 'open innovation' strategy might have backfired thus far, perhaps because the Web21C SDK was published very early in its development, before it could fully realize its designated potential.

1.4.2 Sprint Ecosystem

The Sprint ecosystem for WiMAX is an effort by the third largest mobile services provider in the United States [20], Sprint Nextel, to upgrade its mobile telecommunications network to WiMAX by 2008 [38]. Sprint owns the majority of the licenses for WiMAX frequencies in the United States. The framework which Sprint has founded to allow it to introduce the new technology in such a speed is based on intense cooperation with all major players: Sprint has set up joint operations and headquarters with Intel, Motorola and Samsung in order to determine the standard with which WiMAX will be set up in the United States.

Sprint being one of the largest customers of the cell phone industry, has so far convinced Samsung, Motorola and Nokia, to design phones ready to use Sprint's WiMAX specification by 2008. Motorola and Nokia are furthermore involved in the roll-out of WiMAX antennae in various areas of the United States [39].

The estimated investments total about $ 3 billion in the United States in 2007 and 2008. As the cost per megabit is expected to drop sharply compared to 3G (UMTS) technology, cost savings are expected in turn [12].

Sprint is the first western telecom provider to make the effort to push this technology which still is in its infancy. As the standard allows for many variations and consequently entails many uncertain developments, Sprint has taken a considerable step forward by bringing together some of the most important OEMs to set a standard for the Northern American market. It is possible that this standard set by Sprint will transpire to Europe, where a common specification has not yet been agreed upon [21].

1.5 Conclusion

The developments in the Internet and telecommunications technologies are dependent on numerous uncertain exogenous factors, some of which have been exemplified in this paper. Having described and evaluated what we believe to be the major trends in the telecommunications industry until the year 2012, we are able to identify mainly two relevant general scenarios. For the Future of Deutsche Telekom the following scenarios entail different consequences for their research, development and investment strategies: In the first scenario the most prevalent mode of access will continue to be the landline Internet access. In this scenario, increasing bandwidth requirements may force Deutsche Telekom to roll out a landline Next Generation Network based on fiber optics technology. Although mobile devices will continue to be important, in this scenario they will not become the only dominant means of communication and Internet access. The growth in bandwidths requirements of mobile devices would be further slowed if portable storage and processors become ever smaller and less expensive. As a consequence in this scenario central storage would not be economic. In this

scenario Deutsche Telekom would focus on the infrastructure and channel other resources into the development of enablers for multimedia home entertainment. In the second scenario, mobility becomes the ultimate virtue. The current trend of telephony volume shifting from landline to mobile would transfer to Internet usage correspondingly. The comfort of being absolutely flexible and using one omnipotent mobile device at home and on the move will be greater than the drive for more and more bandwidth at the cost of flexibility. Technologies such as WiMAX or an enhanced UMTS standard would be a prerequisite to providing the necessary bandwidth. Telecommunications providers could leverage on these network capacities by offering central storage founded on the availability of fast wireless upload and download services. Furthermore they would need to offer reliable AAA mechanisms to better protect these omnipotent devices from theft and fraud. Numerous other enablers specifically targeted at mobile devices would be within reach for telecommunications providers to develop.

Whichever scenario will come true, whichever strategy Deutsche Telecom will follow, the most important element of any strategy is to excel at Telekom's core competency, the provision of an infrastructure that enables high bandwidth at low cost. Beyond that, in the domain of applications, Deutsche Telekom will have to be selective and focus resources for proprietary development on niches and targeted audiences. For its applications high quality and usability targets need to be achieved in order to be able to sustain Telekom's leadership position in Germany and to maintain credibility with its customers. The move into the center of the value chain has to come about decisively but securely taking into account the history and political environment of Deutsche Telekom.

References

[1] 3GPP Mobile Competence Centre. Long Term Evolution of the 3GPP radio technology, 2006. URL http://www.3gpp.org/Highlights/LTE/LTE.htm. Accessed on 22.11.2007.

[2] United States Patent 6101177. Cell extension in a cellular telephone system, 2000. URL http://www.patentstorm.us/patents/6101177-description.html. Accessed on 22.11.2007.

[3] Alcatel-Lucent. Why Operators are Turning to Mobile NGN. URL http://www1.alcatel-lucent.com/lead/mobileNGN.htm. Accessed on 27.11.2007.

[4] Amazon. Amazon S3 Press Release, 2006. URL http://phx.corporate-ir.net/phoenix.zhtml?c=176060&p=irol-newsArticle&ID=881131. Accessed on 26.11.2007.

[5] Axel GmbH. Ultra Thin-Client Technology. Advantages of an Operating System - Less Thin-Client, 2005. URL http://www.axel.com/articles/wp0002_e.html. Accessed on 29.11.2007.

[6] BBC News. Galileo firms miss key deadline, April 2007. URL http://news.bbc.co.uk/2/hi/science/nature/6644697.stm. Accessed on 22.11.2007.

[7] Brain and Grabianowski. How WiMAX works. URL http://computer.howstuffworks.com/wimax1.htm. Accessed on 28.11.2007.

[8] British Telecom. Web21C SDK FAQ, . URL http://web21c.bt.com/faqs. Accessed on 26.02.2008.

[9] British Telecom. Web21C SDK News, . URL http://web21c.bt.com/news_items/all. Accessed on 26.02.2008.

[10] British Telecom. Wavelength-Division Multiplexing, 2007. URL www.btplc.com/21CN. Accessed on 22.11.2007.

[11] Bundesnetzagentur fuer Elektrizitaet, Gas, Telekommunikation, Post und Eisenbahnen. Jahresbericht 2006, 2006. URL http://www.bundesnetzagentur.de/media/archive/9009.pdf. Accessed on 26.11.2007.

[12] cnet news. Sprint CEO looks toward 4G wireless, 2006. URL http://www.news.com/Sprint-CEO-looks-toward-4G-wireless/2100-1039_3-6088508.html. Accessed on 30.11.2007.

[13] J.C. Crimi. Next Generation Networks (NGN) Services. URL http://www.mobilein.com/NGN_Svcs_WP.pdf. Accessed on 27.11.2007.

[14] Jachner Petrack Ozugur Darmois. Rich Presence, 2005. URL http://www1.alcatel-lucent.com/doctypes/articlepaperlibrary/pdf/ATR2005Q1/T0503-Rich_presence-EN.pdf. Accessed on 29.11.2007.

[15] L. Dong and Y. Zhao. Embracing NGN - Embracing the future, December 2005. URL http://www.huawei.com/file/download.do?f=346. Accessed on 26.11.2007.

[16] European Commission. GALILEO - European Satellite Navigation System. URL http://ec.europa.eu/dgs/energy_transport/galileo/faq/index_en.htm#4. Accessed on 22.11.2007.

[17] Federal Statistical Office. Einfuhren von Navigationsgeräten um 48 Prozent gestiegen, 2007. URL http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Presse/pm/zdw/2007/PD07___022___p002.psml. Accessed on 26.11.2007.

[18] B.E. Fernandes. NGN Mobile Networks - Meeting the future Traffic and User demands, 2007. URL http://www.itu.int/ITU-D/tech/network-infrastructure/Bahrain2007/Abstracts/Day3/Abstract_Bahrain_BFernandes.pdf. Accessed on 27.11.2007.

[19] Financial Times Deutschland. Allianz ist bei Forbes spitze, January 2006. URL http://www.ftd.de/unternehmen/industrie/39327.html?eid=24262. Accessed on 30.11.2007.

[20] Financial Times Deutschland. Sprint Nextel laufen die Kunden weg, November 2007. URL http://www.ftd.de/it-medien/it-telekommunikation/:sprint-nextel-laufen-die-kunden-weg/273446.html. Accessed on 30.11.2007.

[21] K. Fitchard. Inside Sprint's WiMAX Ecosystem, March 2007. URL http://nxtcommnews.com/technology/features/telecom_inside_sprints_wimax/. Accessed on 28.11.2007.

[22] C.C. Freudenrich. How Fiber Optics Work. URL http://electronics.howstuffworks.com/fiber-optic4.htm. Accessed on 28.11.2007.

[23] Goldmedia GmbH. IPTV 2012, 2007. URL http://www.goldmedia.com/aktuelles/info/news/iptv-2012-studie-marktpotenziale-fuer-internetbasiertes/-fernsehen-in-deutschland/247.html. Accessed on 26.11.2007.

[24] Haas and Ziegelbauer. Datenschutz - Personenbezug. URL http://www.heise.de/ix/artikel/1997/09/044/. Accessed on 29.11.2007.

[25] T. Hain. A Pragmatic Report on IPv4 Address Space Consumption. URL http://www.cisco.com/web/about/ac123/ac147/archived_issues/ipj_8-3/ipv4.html. Accessed on 22.11.2007.

[26] heise online. Hintergrund: Die Wanderung der UMTS-Milliarden, 2000. URL http://www.heise.de/newsticker/meldung/11377. Accessed on 30.11.2007.

[27] J. Hoffmeister. Woran VoIP krankt, 2007. URL http://www.sikom.de/www/German/Download/Computerwoche11_04_2007.pdf. Accessed on 26.11.2007.

[28] Humphrey and Moore. Method of controlling the auditory response of wireless devices, 2006. URL http://www.patentstorm.us/patents/7050796-fulltext.html. Accessed on 29.11.2007.

[29] iSuppli Corporation. Shipments of GPS-Enabled Mobile Handsets to More than Quadruple by 2011, 2007. URL http://www.isuppli.com/news/default.asp?id=8609. Accessed on 26.11.2007.

[30] R. Le Maistre. BT's Learning From Google, March 2006. URL http://www.lightreading.com/document.asp?doc_id=91605. Accessed on 26.02.2008.

[31] R. Le Maistre. BT Inches Toward Telco 2.0, 2008. URL http://www.lightreading.com/document.asp?doc_id=145324. Accessed on 26.02.2008.

[32] K. Manhart. Enhanced Data for GSM Evolution (Edge), 2007. URL http://funkschau.de/heftarchiv/pdf/2002/fs0402/fs0204059.pdf. Accessed on 26.11.2007.

[33] C. Matsumoto. Why Telcos Need Web 2.0. *Light Reading*, 2007.

[34] I. Morris. Open innovation drives 21 CN value, says BT. *Telecommunications International*, -:10, 2007.

[35] PLAN online GmbH. Zwischenbericht und Zusammenstellung der Indikatorenwerte zum Breitbandatlas, 2007. URL http://www.zukunft-breitband.de/Breitband/Portal/Redaktion/Pdf/zwischenbericht-breitbandatlas-2007-01,property=pdf,bereich=breitband___portal,sprache=de,rwb=true.pdf. Accessed on 26.11.2007.

[36] S. Ramachandran. *Higher-order-mode dispersion compensation: enabler for long-distance WDM at 40 Gb/s.* 2001.

[37] T. Riedl. Facebook - web-wunderknabe und milliardär, October 2007. URL http://www.sueddeutsche.de/computer/artikel/315/140021/. Accessed on 30.11.2007.

[38] Sprint. WiMAX rollout. URL http://www2.sprint.com/mr/news_dtl.do?id=15841. Accessed on 28.11.2007.

[39] Sprint. Sprint Nextel Announces 4G Wireless Broadband Initiative with Intel, Motorola and Samsung, August 2006. URL http://www2.sprint.com/mr/news_dtl.do?id=12960. Accessed on 28.11.2007.

[40] T-Mobile. GSM Modernisierung, 2007. URL http://www.t-mobile.de/unternehmen/presse/pressemitteilungen/1,12219,19588-_,00.html. Accessed on 26.11.2007.

[41] G Venkatesh. Next Generation Mobile Devices Introduction. URL http://www.sasken.com/downloads/articles/Next_Gen_Mobile.pdf. Accessed on 27.11.2007.

[42] Harry Wang. P2P Makeover: Showtime for DRM, 2005. URL http://www.ctamnetforum.com/eweb/images/graphs/parks-p2p.pdf. Accessed on 29.11.2007.

[43] WiMAX-Forum. WiMAX Forum FAQ, 2007. URL http://www.wimaxforum.org/technology/faq. Accessed on 22.11.2007.

[44] Yu and Singh. Distributed reputation management for electronic commerce, 2002. URL http://people.engr.ncsu.edu/mpsingh/papers/mas/ci-reputation-02.pdf. Accessed on 29.11.2007.

Chapter 2

2 Market Pull

Andreas Hackel, Herbert Mangesius, Sebastian Reinartz

Analyzing changes on the Internet one finds, that online and offline world merge and social web applications as well as interactions in B2B and B2C constellations develop to the most important issues in Web X.0. Regarding changing communication paradigm and the growing number of *Digital Natives* in society, broadband connectivity becomes more import. Trust and security concerns gain importance due to stronger network relationships of businesses and users, as well as the trend to outsource e-business applications by using *Software as a Service* and hosting models. In the end, the flexible, mainly communicating, entertainment seeking consumer will get the right information, for the right environment, in the right environment, in the right time from interacting parties in 2012.

2.1 Introduction

Due to rapid changes in the world of information technologies and the amazing success of innovative IT-companies, the analysis of the customer needs in the ICT-market is of crucial importance. Since the decline of clients in the classical telecommunication area is a clearly visible trend, the telcos have to adapt to the changes of new customer needs within communication and the upcoming Web X.0. Different drivers above various age groups affect the development in the future and create room for emerging trends. For being able to seize what might happen the next years, a clear data basis in combination with qualitative human attitudes should allow to narrow the possible outcomes. On this tightened argumentation basis it will be possible to debate on a, as far as possible, scientific level about the results. The conclusions will offer different perspectives and application proposals.

2.2 Technologies

2.2.1 Communication Technologies

For a description of the current German ICT market, this paragraph will give a rough overview of the development within relevant areas. Based on the status quo, further developments will be estimated.

2.2.1.1 Communication Paths

The development in Germany shows a light decline in fixed line access paths. The main driver is the mobile sector with a growth rate of 6.4% form 2005 to 2006. [48]

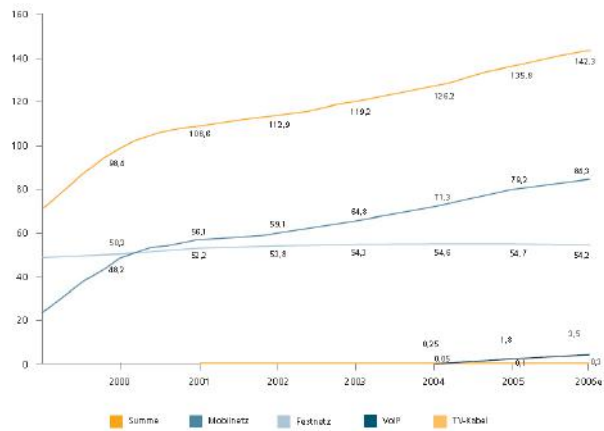


Figure 2.1: Development of communication paths in Germany
Source: Bundesnetzagentur [48]

VoIP shows a stable growth rate, but nevertheless could not be a competitor in terms of current market share.

2.2.1.2 Cellular Mobile

In Germany there are 51.5 % subscribers and 48.5 % prepaid customers in the mobile sector. These are 96 % of the whole population and therefore 79.2 million people. [52] Taking figure 2.2 into consideration, this will state the upward trend of the last years. No trend to saturation can be found.

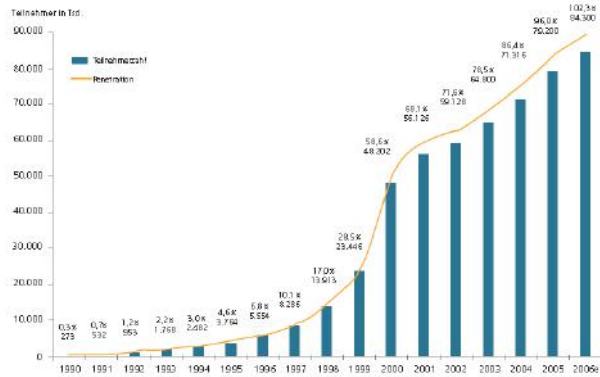


Figure 2.2: Mobile user development
Source: Bundesnetzagentur [48]

2.2.1.3 Broadband

While DSL in Germany with a coverage of 92% and a subscriber rate of 12.6% reaches about 10.5 million people, cable modem technology with a coverage of 15% and a subscriber rate of 0.3% reaches only about 0.2 million people in 2005 [59]. *Sonstige* besides cable modem includes technologies like, satellite, WiFi or WiMAX standards.

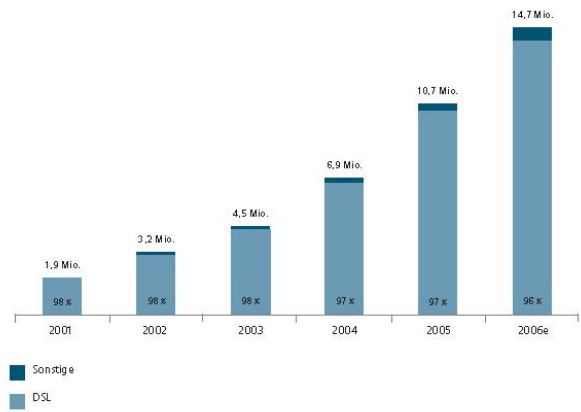


Figure 2.3: Broadband user development
Source: Bundesnetzagentur [48]

2.2.2 Communication in 2012

In 2012 the people will have two main different communications paths. First, the fixed line broadband at home, with the possibility to make phone calls over VoIP and to watch TV, and second, a mobile device (e.g. smart phone, laptop), with data transfer rates above to current DSL speed. It will be possible to work and access the Internet everywhere. The broadband connections will allow to use applications with really high data rates, like movies or web services at home or at work. The mobile connection will make the user independent for most of the usages. But there will be applications or web services that cannot be reached by mobile devices, due to a lack of highest data transfer rates. Services like this does not exist at the moment but will come. In total, there will be a shift to using what is possible now everywhere and getting new high capacity driven applications at home or at work.

2.3 Needs as Drivers of Change

2.3.1 C2C - Customer Needs

Since the Internet comes along with many new possibilities to communicate, it increasingly becomes part of the users every-day life and changes the communication paradigm.

2.3.1.1 New Communication and Information Channels

As discussed in [49] there are different drivers of the development in the web. Today people have the possibilities to create their own videos at home, using their own computers and professional software tools. Quality of these technologies is improved and differences to professionally produced videos decrease. Prices for large memory drop as well as the costs for broadband Internet access. Since many people already make use of the web, it is used as a possibility to communicate to all friends.

In [58] it was investigated for which private purposes people make use of the Internet. Sending and receiving e-mails is a major aspect 85 % of the users make use of. Instead of using ordinary phones, software like *Skype* is preferred, giving the user an interface for e-mailing, calling, chatting and providing presence-information. According to their own statement, *Skype* has more than 100 million users worldwide. As the access to the web got faster, more than 80 % of the users search for information on goods and services. Also selling goods directly by using the web is a quite new and growing market, where more than 26 % participate in [58]. The number of transactions through the web increased by 58 % from 2002 to 2006. This made *Amazon* a very successful business since books and magazines are the most ordered products in the web. [58]

2.3.1.2 Reputation and Relationships

Especially for the users of online banking, but also for buying decisions and networking other users also have to rely on trusted sources when gathering information. This results in the need for people to communicate as quickly and free as possible. According to [65], the most important impacts of the social web that have to be expected are an improved communication between business and consumers by social-web applications, a drift of social activities into the web and a strong driving force on business and social environment coming from web-communities. Clients appraise the possibility of being in interaction with other people who bought a product before and who can report to them about their experiences. Other clients are more credible to them, compared to the companies providing the products. This increases transparency for the whole web-community. For 30.2 % of the interviewees in [65] the reputation of the social web service is crucial. Therefore recommendations of specific services play an important role in the Internet. People want to join the communities their best friends already visit. They want to buy the same products the other community members tested before. This kind of online reputation plays a strong role for sellers at *eBay*, where their reputation is important for their future business [62].

Relationships are one of the possibilities that are used to structure the content of the social web. In [61] it is pointed out, that not contents but users are linked together in a social web. The content may than be rated very fast by relationships between the users. As an example of a social web application a shared *Google* search for a group of users is suggested. The idea is to show the used links of the other group members when searches are performed with *Google*. In principle important links should then be made available faster.

2.3.1.3 Knowledge Sharing and Tagging

The general need of "knowledge sharing over social networking systems" is investigated in the equally named dissertation [50]. It is pointed out that individual space and group space both play a crucial role for making social communities work. One kind of platform for sharing knowledge is *Wikipedia*, a very successful online encyclopedia, which in principle is nothing else than a weblog. It reflects the demand of people to make their knowledge available for others and to be able to learn from others. As every community, it has its own rules, similar to real life, regulating the behavior within the community and controlling the content. A quality standard is assured by interaction of the community of authors and the possibility to change and delete articles. This is an example of collaborative tagging and filtering. Tagging is a way to comment special web content and thereby ranking the contents importance or quality. As described in [66], different user groups are identified. There are people who provide resources, those who add the resource to a tagging system, those who

actively tag resources and the users who just read tags to search for resources. Therefore tagging, also called folksonomy, is a way to influence the trust people set in user generated content.

2.3.1.4 Self-portrayal by User Generated Content

According to [60], a growing number of users use the social networks and work on user generated contents in blogs, photos, music, journalism, virtual content, wikis, feedback sides, podcasting and social networks. Among the fastest growing web pages in the USA are image hosting, photo and video sharing, and social network sites with growth rates above 200 % within one year. Within the developing Web 2.0 user generated content will play the most important role. In Germany people at the age of 16 to 24 extensively participate in creating user-generated content, compared to other EU countries [60].

One of the largest social networking sites is *YouTube*. Users upload and download content according to the site's motto 'Broadcast Yourself'. There are more than 100 million downloads per day [51]. A number of 70 million users makes *YouTube* frighten the classical television broadcasters. As in the case of chatting and communicating with other users, the interactive component is very important for *YouTube*, where mostly user generated content is shared. In [47] a general analysis of social networks, using the examples of *YouTube* and *Flickr*, a photo sharing platform, is performed.

2.3.1.5 Contact Management and Business Networking

Social networks accomplish the appetite for more interaction in the web. Young people discover the possibility of giving themselves a profile in the web. In communities such as *StudiVZ* and *Lokalisten*, which gained amazing numbers of new members in Germany, users organize their personal contacts, their friends birthdays, communicate with their friends and find people with similar interests. As a user of *StudiVZ* one finds out who knows whom and how many friends the users have. At the end of 2006 there were 1,074,574 profiles in their database, nearly all of them visible for every user [64]. This shows that the need to be available for friends among student is crucial.

The social communities in the web still have a close link to the local place in the real world [65]. Therefore these communities can be understood as an extension of the offline social environment of the user, as further discussed in [60]. It is found, that "the Internet can best be seen transforming community such that it becomes integrated into rhythms of daily life, with life online integrated with offline activities" [60].

Xing offers a social platform for career networking. Professional contact management is offered and contact to experts is supported. The clientele are business people interested in expanding their social network and presenting themselves in a professional environment. *Xing* is positioned as a trustworthy

community, where each part of a profile can be hidden. Social communities are still growing [49], while serious problems with data security at *MySpace*, *Facebook* and *StudiVZ* occurred, as was reported in the media, e.g. [55]. It seems to be more important for the users to be part of the online community and to share a communication channel with their friends, than saving the personal privacy.

2.3.1.6 Escape to Virtual Realities

Especially young users like to use the web for gaming and amusement. Virtual realities are a quite new form of social networks. As stated in [54] about 70 % of the Internet users heard of the game *Second Life* while only one percent actively uses it for chatting, communicating and contacting other people in a self-constructed world. In [60] it is investigated how social networks are created by online-games and what their effects on the real world are. According to [56], 56 % of people in a survey agreed with the statement that businesses in the virtual world will have a larger productivity than in the real world in the year 2020. Today companies already are present in the virtual world merchandising their products and influencing the opinion of a whole (online) community. The networks of the social web will be a part of the society as important as the offline world.

2.3.2 B2B and B2C - Business Needs

In B2B, adoption of e-business solutions became one of the most important competitive factors, despite of high sums of investment costs [57]. Germany's B2C trade volume in e-commerce in 2007 has an overall volume of 39.5% in mail order businesses and therefore comprises a growth of 9% compared to 2006.[58] In the following driving forces will be introduced.

2.3.2.1 Efficiency and Standardization

At firm level the use of ICTs and online applications results in a faster communication and a more efficient management of resources. Knowledge Management Systems (KMS) and Enterprise Resource Planning (ERP) are an example of increasingly sophisticated ICT applications, which cover the needs of a more effective management of existing knowledge and know-how. Small firms in comparison to large ones, face generic barriers to adoption of e-commerce, such as management skills, a lack of time, information and knowledge. Therefore they usually tend to avoid risks and investments arousing through the establishment and maintaining of e-commerce systems. However, as collaboration with other firms is crucial for a business to survive, the trend to adapt and therefore adopt such systems states an ongoing process in B2B constellations.[62]

After having successfully automated their internal processes, companies now go for automation of their inter-firm processes, such as buy and sell transactions. At inter-firm level a great potential in all issues of inter-cooperation is notable. "Adopters of e-commerce tend reduce transaction costs, increase transaction speed and reliability, and extract maximum value from transactions in their value chains" [62], as the coordination between firms can be improved. Implications of e-procurement are for example the automated process through the whole supply chain, communicating demands and orders through different levels of suppliers and companies. Referring to this, the drivers efficiency and cost decrease by providing a better communication afford interoperability and standards, in order to accomplish flexible and reusable inter-company networks.

"More and more B2B marketplaces and exchanges are launched and begin to establish critical mass" and "as it stands, hundreds of e-commerce and e-procurement systems will not permit a user to access different marketplaces without incurring the cost of software of membership fees" [46]. Therefore the issue of interoperability again gains great importance. The exchange of content between different e-marketplaces for instance relies on standardized interfaces.

2.3.2.2 Web Services

Since 2002 Web Services are an ongoing hype. Though a service-orientated architecture (SOA) designed for flexibility and reuse an easily linking of various services, the integration of systems, data, processes and applications is enabled. Existing in-house solutions, locally installed software, can dynamically be extended through Web 2.0 and other software and service applications. Fitting solutions are for instance provided by SAP or Microsoft with the *On-Demand-Software Business ByDesign* or the *Software as a Service* (SAAS) and the hosting model. Those models rely on service providers and solution hosts. In 2006 the adoption of hosting raised about 60%, hence future perspectives seem to be very good. [65] Customers obtain the possibility to rely on tools with a known functionality and usability which covers an important need, but as a consequence the demand on a high-capacity and robust infrastructure emerges, in order to smoothly implement and perform such interdependent models.

The customer orientated modeling of services enables simple usability for consumer and rises the acceptance of consumers to adopt e-business. An example is the interaction of airline companies with travel agencies. Through standardized interfaces, customers are able to compare and book flights of different airline companies from the central travel agency's platform during runtime. This covers the need of ergonomic, simple and robust use of online-applications, which usually is emphasized by the Technological Acceptance Model [57].Online services are more and more likely to be integrated in every-day life issues, such as e-healthcare. Therefore a number of key constituents that provide different capabilities have to be integrated, in order to make

processes easy on the consumer. In the context of e-healthcare this could mean an integration of financial service organizations and available physicians in a health plan provider. All information concerning the consumer himself can be handled in an easy-to-use portal. “Standard point-to-point solutions (...) simply can not provide the kind of business agility and efficient cross enterprise integration now required to support a robust customer service model”. [60]

2.3.2.3 Trust and Security

Dealing with the need to establish E-Commerce and E-Business solutions, respectively the necessity to inter-cooperate, exchange and confirm transactions, high demands on issues concerning security arouse. Those are for instance payment, contract, delivery and guarantee uncertainties. Companies “are likely to face increasing costs for system protection and security measures. Statistical surveys show that security issues (viruses, hackers) are among the most important perceived barriers to Internet use by businesses (B2B and B2C).” [62] Concerns about privacy and legal protection are particularly important to large firms that have already established e-commerce and e-business in their complex supply chains. SME’s are affected by doubts regarding trust and transaction security, but also IPR concerns. In [56] experts consider it as “foolhardy to underestimate the fragility and vulnerability of any online system to attacked manipulation. Anything that can be made secure can be hacked”.

2.3.2.4 Dilemma of Confidence

Transaction process take place between consumers, business or administration on one side and consumers on the other side. It is the used way for consumers to arrange transactions by face-to-face interaction. Often those customer groups are irritated by the virtuality of the medium Internet, as no visible interaction partner exists. This leads to a dilemma of confidence: The consumer usually has the demand on privacy but in contrast to this the demand on safety and security affords control and observation. The high dynamics of the e-commerce market additionally irritate groups of consumers, as they can not cope with the complexity and diversity of online applications, due to a lack of knowledge and willingness and also safety concerns. Efforts towards a natural trust in socialization, institutional safety authorities, and experts knowledge in order to compensate a lack of own knowledge and services have to be made, as not the factual security but the felt one is crucial. According to a study of the IfD (Institut für Demoskopie Allensbach) German consumers feel more concerned about their data and data security. 61% of them assume that companies with which they came in contact would misuse their personal data. [65]

2.3.2.5 Mobility

As we live an a highly dynamic environment the issue of mobility rapidly gains importance. According to [49] the mobile Internet stands shortly before break through to mass market. This implies a shift of customer needs, resulting from fixed line Internet, complemented by the opportunities of mobility. High investments into enabling technologies like UMTS show high expectations for business opportunities, but still there is a lack of quality regarding displaying functionalities, and a manufacturer independent setting of a browser standard.

Focusing on B2C constellations the highest potential seems to be in mobile advertising, respectively marketing, regarding business needs to reach customers. Moreover there are high expectations on customer relationship management (CRM) as today it states one of the most under developed opportunity for brands.

The shift of web services to mobile devices, respectively web services in mobile platforms, could offer possibilities in business critical applications such as financial services.

Considering mobile business and mobile commerce the most important driver is the development of trust and security in mobile services. In addition mobile access to Internet should be cheaper and faster and standardized payment models be offered. Speed of data transmission has to be increased providing a convenient way to use m-commerce. Besides a technological possibility to pursue mobile transactions, there is also a need for sufficient media competence, in order to integrate m-commerce applications into every-day life. Mobility states a very powerful driver as through mobile Internet customer needs and therefore business opportunities can be matched almost anytime and at anyplace!

2.3.3 Drivers in 2012

Due to new possibilities broadband Internet offers, the Internet in the year 2012 will be used differently and more extensively than today. Virtual realities will be accessed more frequently as a platform for self-realization and merchandising, thereby gaining greater profits for all participants. Since the online and offline world merge the social position of an individual will be nearly as important as the real-world social standing. UCC, self-portrayal and the need to share ones life implicate “life-streaming” as an emerging trend to opened up online existence. Standardization and open APIs will extend user participation to user created services. The shift to mobile Internet therefore affords enabling platforms as new business opportunities. By outsourcing e-business solutions and data the aspect of trust and security will grow in importance. New business and consumer needs demand sensor based and intelligent applications that will handle huge amounts of personal and business information, provide with flexibility and integrate ICT more into every-day life.

2.4 Market Segmentation

2.4.1 Segmentation of Customers

There are different possibilities to conduct segmentation. In this paper different customer groups based upon their medial usage are described for Germany.

2.4.1.1 Time Spent

Relevant customer groups above different age classes differ according to time spent within the Internet. Only about 50% of the German habit ants are online.

	Internet users	weekly usage
Age	in mio	in hours
14-19	4.76	13.9
20-29	7.09	13.9
30-39	7.78	10.9
40-49	8.64	9.0
50-59	4.93	9.1
60-64	4.62	6.8
total	34.5	11.0

Table 2.1: Time users spend in the Internet
Source: Stern [63]

In the following table, the main activities according to the percentage of usage are displayed.

	percentage of
Internet activities	*all users*
Communication	
email	85
chats/forums	40
telephony	15
Information Research, Online-Services	
information of goods and services	83
usage of travel services (e.g. booking, flights)	55
Internet radio / TV	17
playing and download of games / music	28
downloading software	36
reading Internet newspapers / magazines	26
job-seeking / sending applications	22
information on health topics	46
information or usage of other online services	38
Banking, Selling of Goods and Services	
Internet banking	42
selling of goods and services	27
Education	
school or university education	22
further education of private interest	40
further education job-related	27

Table 2.2: Main user activities in the Internet
Source: Destatis [53]

The first priority, for using the Internet, is to check and write emails as well as to gather information about products and services. At a second priority, Internet chats and forums, the usage of travel services, gathering information on health topics and further education in fields of private interests as well as Internet banking have to be named. The lowest usage is at telephony, Internet radio and IPTV. According to a survey conducted by [63], today only 7.2 % (2.5 million) of all Internet users in Germany are into user created content. That is almost the same percentage of 7.0 for persons regularly working on their homepage.

2.4.1.2 Places of Access

A relevant question to answer is: Where do users access the Internet?

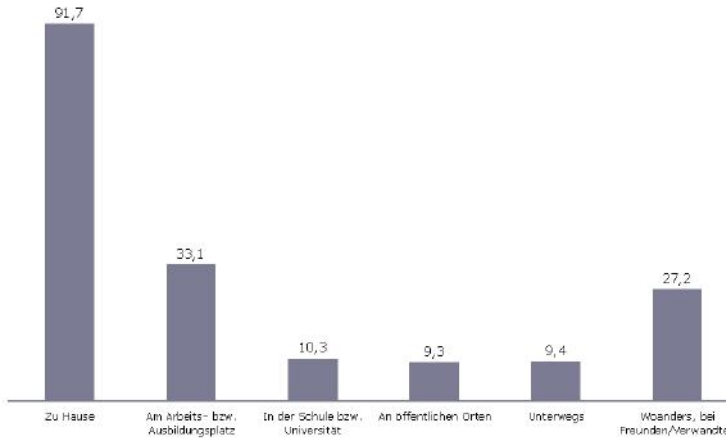


Figure 2.4: Places of Internet access
Source: Arbeitsgemeinschaft Online Forschung [45]

About 91.7 % use the Internet at home, followed by a 33.1 % usage at the place of employment or education. It is interesting to see that a lot of people use the Internet at other places or at their friends home, which is ranked at third place with 27.2 % . [45]

Which actions are executed at these different places is displayed in the following figure.

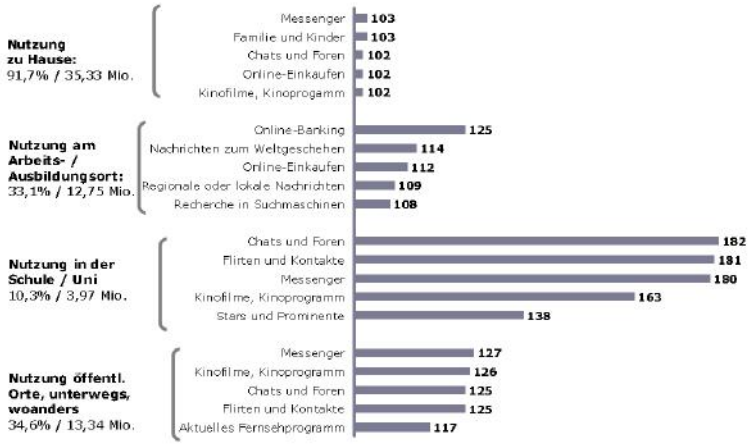


Figure 2.5: Internet usage at different access places
Source: Arbeitsgemeinschaft Online Forschung [45]

At home there is no significant difference of usage as with 91.7% most of the users are represented at this place. At places of employment a special banking software could be a discriminator. Otherwise a chat, contact or messaging functions like Facebook and access within the mobile sector seems to be the dominant variable. [45]

2.4.1.3 Media Mentalities and Sinus Milieus for Germany

As the basic population could be divided according to their social status and basic orientation, the Sinus Milieus for Germany build the basis to identify possible customer groups. The results of this social-psychological approach for Germany, can be found in figure 2.6.

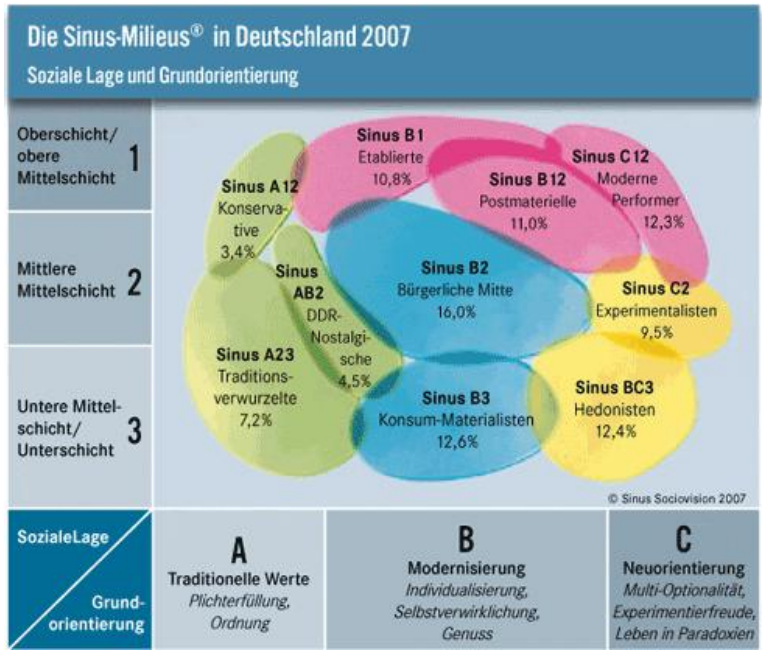


Figure 2.6: Sinus Milieus Germany
Source: Stern [63]

According to this segmentation, ten customer groups can be identified. The Representatives in every group are very heterogeneous. They differ in age, gender, political views etc., but nevertheless they represent the same interests and attitudes.

In a further, current analysis for Germany, conducted by SocioVision and Stern, six different personal media mentalities could be found. These differ in the attitude towards PC, Internet, media and ICT.

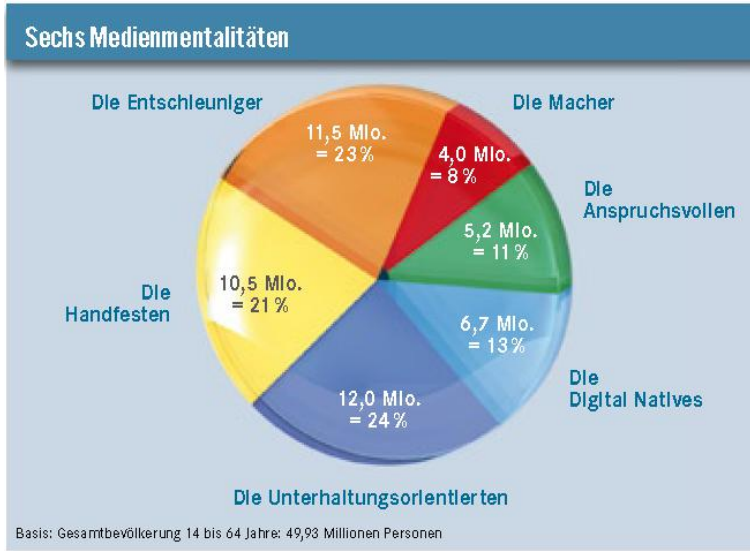


Figure 2.7: German media mentalities
Source: Stern [63]

These media mentalities are localized in the upper mentioned Sinus Milieus, which lead to the following result.

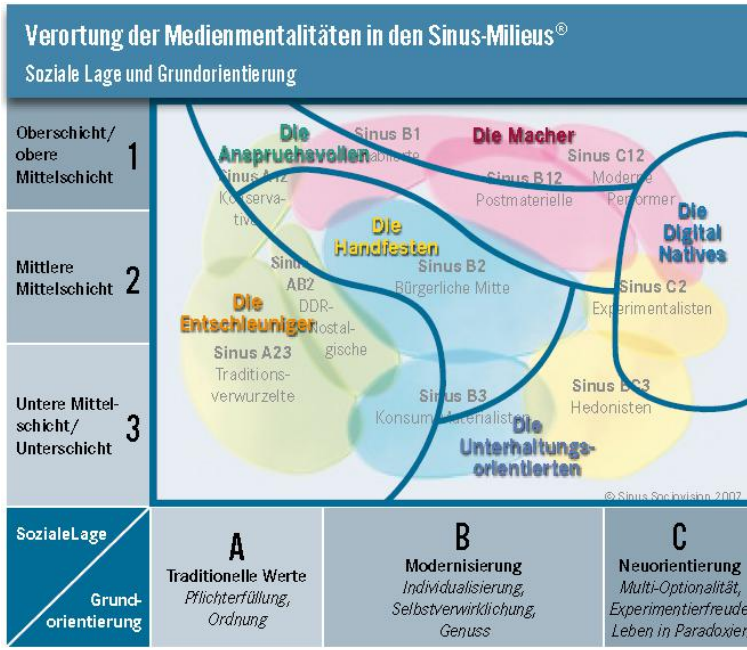


Figure 2.8: Localized media mentalities within the German Sinus Milieus
Source: Stern [63]

These six groups are defined by about ten categories of which only the relevant for the usage of the Internet and ICT will be displayed in table 2.3.

This allows a customer segmentation for the ICT market as well as a description of the needs of media affine groups in more detail.

	persons	percentage of	
types	in mio	"onliners"	Age
"Die Macher"	4	11%	20 to 50
"Digital Natives"	6.7	19%	below 40
"Die Unterhaltungsorientierten"	12	27%	2/3 <30
"Die Anspruchsvollen"	5.2	12%	40 to 60
"Die Handfesten"	10.5	17%	above 40
"Die Entschleuniger"	11.5	14%	above 50

Table 2.3: Description of the six mentalities (I)
Source: Stern [63]

types	personality description
"Die Macher"	broad interests, intensive usage of print and Internet, poor TV affinity
"Digital Natives"	intensive use of media, networking, distinct PC and Internet expertise
"Die Unterhaltungsorientierten"	distance to print, intensive and increasing usage of the Internet (games, chats)
"Die Anspruchsvollen"	intensive use of print, low TV consumption, competent but selective use of ICT
"Die Handfesten"	roots within print, low above TV consumption, restrained Internet usage
"Die Entschleuniger"	passive consumption of media, increased use of TV, distance to multimedia and Internet

Table 2.4: Description of the six mentalities (II)
Source: Stern [63]

Within these types, the *Die Macher*, the *Digital Natives* and the *Die Unterhaltungsorientierten* seem to be the most promising segments to penetrate.

These include mainly the age group up to 50 which represents 22.7 million which comprises of 57 % of online users. In a second step the *Die Anspruchsvollen* could be taken into consideration. These are the so called silver surfers, the mainly 50+ generation.

2.4.2 Customer Segments in 2012

Taking the personal descriptions, the usage and therefore different mentalities into consideration, it could be argued that the description of what users do and want went along the same categories but above different contexts. Up to the age of 50, people nearly seem to want the same. The main needs are to communicate, gather information, get entertained and try to interact with others. Context here means, the age mindset they live in and the environment to which they are exposed. Only two direct arguments could be delivered. On the one hand, people at their working place need more daily news and online banking as well as research. Second, students and scholars are deep into messaging, flirts and connected to this cinema information. Condensing this information will lead to the following statement. People are, besides communication and shopping, mainly active in planning their time for an environment in the environment at which the action is of relevance. This is what they want for 2012. They want the right information, at the right time, in the right place with the least effort.

2.5 Conclusion

In these days a development towards increasing personal and business interactions in the web can be observed. Web 2.0 states not a revolution of software but one of communication paradigm, enhancing interactive and data processing applications. User created content becomes more important, therefore a new flood of information arises, that has to be handled. User participation and intelligent software help to structure this data. Through standardization and the trend to opened up APIs, the issue of user created services will show up. The shift of fixed line Internet to mobile Internet provides its users with a high degree of mobility. Therefore the aspect of environment specific information comes into account. It states a new business opportunity: providing enablers that enrich cross IC-device communication between users through linking information about time and space with people and their lives.

References

[45] Arbeitsgemeinschaft Online Forschung e.V. Berichtsband: Teil 1 zur internet facts 2007. Technical report, 2007.

[46] D. Boeth. An Analysis of the future of B2B E-Commerce. URL http://ftc.gov/bc/b2b/comments/PPRo%20Statement.pdf. Accessed on 26.11.2007.

[47] J.G. Breslin. Creating a social network from an existing bulletin board community. *Digital Enterprise Research Institute National, University of Ireland, Galway.*

[48] Bundesnetzagentur. Jahresbericht. 2006.

[49] Bundesverband Digitale Wirtschaft. Mobile Internet vor dem Durchbruch zum Massenmarkt, November 2007. URL http://www.bvdw.org/presse/news.html?tx_ttnews%5Btt_news%5D=1827&cHash=9d15048429. last accessed on 26.11.2007.

[50] T. Coenen, D. Kenis, C. Van Damme, and E. Matthys. Knowledge sharing over social networking systems. In *On the Move to Meaningful Internet Systems 2006: OTM 2006 Workshops*, pages 189–198. Springer, Berlin, Heidelberg, 2006.

[51] Deloitte. Trends 2007. *Media Predictions TMT.*

[52] Federal Statistical Office. Statistisches Jahrbuch. 2007.

[53] Federal Statistical Office. IKT in Deutschland. 2007.

[54] Fittkau and MaaßConsulting. Internet Research and Consulting Services. URL http://www.w3b.org/trends/second_life.html. Last accessed on 26.11.2007.

[55] FOCUS Online. Die Schattenseiten der Online-Communities. URL http://www.focus.de/digital/internet/online-communitys/internet_aid_26611.html. Last accessed on 26.11.2007.

[56] S. Fox and L. Rainie. The Future of the Internet. *PEW Internet, American Life Project*, 2005.

[57] Fraunhofer. Technikakzeptanz und Nachfragemuster als Standortvorteil. *Institut für Systemtechnik und Innovationsforschung, Karlsruhe*, 2002.

[58] GOLEM. Onlinehandel boomt - Deutsche stehen auf E-Commerce. URL http://www.golem.de/showhigh2.php?file=/0710/55688.html\&wort. Last accessed on 26.11.2007.

[59] Consulting IDATE and Research. Broadband Coverage in Europe - Final Report, DG INFSO. 2006.

[60] Microsoft. Service-oriented architecture: Effective care in a new healthcare economy. URL http://www.microsoft.com/industry/healthcare/healthplans/solutions/soa.mspx. Last accessed on 26.11.2007.

[61] A. Mislove, K.P. Gummadi, and P. Druschel. Exploiting social networks for internet search. In *Proceedings of the 5th Workshop on Hot Topics in Networks (HotNets'06)*, Irvine, CA, November 2006.

[62] OECD. ICT, e-business and SMEs. 2004.

[63] Stern. MarkenProfile 12, 2007.

[64] StudiVZ. StudiVZ Statistics. URL http://studivz.irgendwo.org. Last accessed on 26.11.2007.

[65] Verein Deutscher Ingenieure. *VDI Nachrichten*, 45:11, 2007.

[66] J. Voß. Tagging, Folksonomy and Co: Renaissance of Manual Indexing? In *10th International Symposium for Information Science*, Cologne, 2007.

3 Chapter 3

Legal Issues and Regulation

Sona Petru, Martina Ruiß, Benedikt Sager

In the last few weeks the telecommunications sector became a popular matter of the media, as there were numerous propositions concerning important alterations in the legal framework of telecommunications. Especially for telephone companies (telcos) it is a time of change as the EU tries to seize power over this sector and dominate the national regulatory authorities. With progressional developments and innovations relating to telecommunications, the legal issues and regulations change comparatively fast and tend to involve further fields, concerning e.g. personal data protection and market regulation, that needs to be taken into account. The regulatory framework becomes more and more complex and nontransparent. The various authorities on national and international level defend their power but also need to cooperate in order to provide a clear legal framework and jurisdiction for customers and service providers. According to all these reasons, it is essential for telcos not to only look at the market pool, the technology and innovations but also at the legal issues and regulation to be able to predict the trend on the market and to come to the right decision concerning investments.

3.1 Introduction

According to the German Government, the information and communication technology (ICT) is becoming immensely important to the German Economy, and not only for Germany; the rapidly growing ICT-sector, is seen as one of the leading sectors with the side-effect of being a catalyst for growth in many other sectors. Its estimated proportion to overall macroeconomics growth at the moment is approximately 40 %, with a potential to increase. This effect is keenly observed in Germany. To achieve one of the prior aims of the German Government, to attain a top position in the worldwide information society, the ministry supports a competitive telecommunications policy in order to trace a strategy of liberalization and deregulation. In such a fast-paced and constantly changing sector, it is important to maintain a fast-acting legislation in order to be able to react rapidly to new developments, but also to create a legal framework, to reveal the limits of the law and at the same time to perpetuate e.g. personal data-protection. [95] Apart from legal issues and legislation, the text also addresses an extract of parties involved in the legal process to give an idea of a possible distribution of power of the decision-makers.

3.2 General Information about Institutions and Laws

On the national and European level, there are authorities, to monitor and assure abidance by the law.

3.2.1 Institutions, laws and Organizations in Germany

On the Federal Territory of Germany, the highest decision-making authority concerning the telecommunication sector is the Federal Ministry of Economics and Technology. It considers the development of the telecommunications market as a key for Germany's way to a top position in the worldwide information society. In order to achieve its aims on this market, the Federal Ministry of Economics and Technology setup a regulatory authority, the *Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway* (herein after called BNetzA or Agency), as one of its separate higher federal authorities. [105]

Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway

The Agency's main task concerning the telecommunication is to care for the compliance with the Telecommunications Act (TKG). This effort includes the coverage of liberalization and deregulation of the telecommunications market in Germany. Tasks among the responsibilities of the Agency concerning the

telecommunications market consist of securing fair and working competition as well as efficient and interference-free use of frequencies, ensuring the supply of basic telecommunications services at affordable price and protecting public safety interests.

For the purpose of implementing the aims of regulation, the Agency has effective procedures and instruments at its disposal, including rights of information and investigation as well as the right to impose graded sanctions. According to Article 117 of the TKG, the Agency is bound to instructions of the Federal Ministry of Economics and Technology. The Agency holds an expert study-group of well-known professors from German universities and gives the undertakings directly concerned the chance to participate in the Ruling Chamber proceeding. Apart of its field of activity in Germany, the BNetzA also plays a role on the international and European scene concerning telecommunication, e.g. it cooperates with the European Commission. [105]

The Association of Telecommunications and Value-Added Service Providers (VATM)

Among other local organizations dealing with the development on the telecommunications market in Germany is the *The Association of Telecommunications and Value-Added Service Providers* (VATM), which unifies about 50 of the telecommunications and multimedia companies active in the German market, all of them competing with the ex-monopolist Deutsche Telekom AG. The VATM seeks to create competitive conditions that will provide all participants in the market with a fair chance to succeed, and to operate in a stable regulatory framework and investment climate. The VATM is able to impose pressure upon the decision makers on the telecommunications market with its regular presentation of latest developments as well as comment and interpretation of decisions relevant to the market in press releases and press conferences. [106]

3.2.2 Aims and Future Perspectives for Germany until the Year 2012

According to the iD2010, a Federal Government action program which supports the EU in implementing the *i2010 - A European Information Society for Growth and Employment* strategy, the German Government intends to promote development in the ICT-sectors by modernizing the legal and technological framework. A concrete plan to implement by the German Government in the next few years concerns the frequency regulation, the question of establishing a European Regulatory Authority and the incorporation of TKG and media law.

3.2.3 Institutions, Laws and Organizations on an European Level

On the European level, the highest decision maker concerning the telecommunications market is the European Commission.

EU Directorate-General for Information Society and Media ("DG InfSo")
As head of the EU Directorate-General for Information Society and Media, the Commissioner Viviane Reding is in charge of contributing to Europe's competitiveness. Among the instruments at her disposal contributing to promote open and competitive communications market is the eCommunications Regulation. The EU legal framework for regulating telecoms services from 2002 is made up of a series of legal texts which apply throughout the 27 EU member states. The goals of the framework are to encourage competition in electronic communications markets; improve the functioning of the internal market and guarantee basic user interests, e.g. to ensure that privacy is protected and that citizens can access all essential telecoms services independently of their residence. The rules of the framework intend to support deregulation in the longer term. [82]

The European Regulators Group (ERG)
The European Regulators Group for electronic communications networks and services is an independent corporation for reflection and advice in the electronic communications regulatory field. It has been set up by the Commission to provide a suitable mechanism for encouraging and strengthening cooperation between national and international regulatory authorities. Composed of the heads of relevant national authorities, the ERG assists the Commission and provides information about the national telecommunications market. [104]

3.2.4 Aims and Future Perspectives for the EU until 2012

Since 2005 the European Commission follows the "i2010", its new strategic framework to set up policy guidelines for the information society. The three main goals of i2010 are:

- creating a Single European Information Space
- strengthening innovation and investment in ICT research
- creating an inclusive European information society [90]

Corresponding to the aims of i2010, and to ensure fair competition, the Commission also proposes to create a single trans-national telecom market including all member states and complementing the national regulators. For now the current telecoms rules specify how national regulators should proceed in order to limit the power of dominant operators and encourage new providers to enter the

market. The new rules should deepen this aim but also facilitate the regulation, by achieving greater regulatory consistence among the EU and to improve legal certainty. [103] In November 2007, Vivane Reding presented the idea of creating *The European Telecom Market Authority* in order to improve the quality and consistency of regulation in the EU, to reinforce cooperation between national regulators and the Commission and to provide expertise for regulatory issues linked to cross-Community telecoms services. The Commission's proposals will be discussed in the European Parliament and Council and if accepted and adopted, the revised regulatory framework could enter into force from the year 2010 on. [81]

3.3 Market Regulation

The regulation of the telecommunications market in the countries that belong to the European Union comes in principle under the jurisdiction of the respective responsible national authority. However, the European Commission shapes the national legislation and has an eye on the regulatory processes in the member states of the EU and it can take states to the European Court of Justice when they violate a condition of the treaty of the European Union.

3.3.1 Present Days Market Regulation

In Germany the telecommunications market is regulated primarily by the Telecommunications Act (TKG). In order to "secure fair competition" [100, § 2, paragraph 2] on the one hand and to "to encourage efficient investment in infrastructure and to promote innovation" [100, § 2, paragraph 2] on the other hand the following regulations have been enacted amongst others:

1. The regulatory authorities can take measures if companies with significant market power according to §10 act on markets without real competition according to §11.

2. New markets are no subject to part two (Market Regulation) of the Telecommunications Act according to §9a paragraph 1 except that without regulations a lasting competition would be endangered (§9a paragraph 2). An important example that is to mention is Voice over Internet Protocol (VoIP). A few years ago the first VoIP services were available and during the first years no regulation laws concerning VoIP were enacted. The responsible authorities like for example the BNetzA observed the market and left the development of VoIP to free competition. In the year 2005 the BNetzA released a paper that contains the key points on regulatory issues concerning VoIP. This year the ERG published their "Common position on VoIP". All in all the ERG and the BNetzA are of the same opinion and

want that VoIP should be treated like all the PSTN telephone services [89].

3. Public telecommunication network operators can be forced to enable competitors to use their network (§18). In this connection §19 to §23 are important. Companies with significant market power do have to treat competitors without discriminating someone and they do have to disclose the required data that are needed to use the network. Moreover, §27 to §39 deal with rates regulation so that extortionate prices for using networks of other companies are out of the question.

3.3.2 Development of Market Regulation until 2012

As the telecommunications market is changing extraordinary quickly the framework that regulates this market has to be adapted permanently in order to keep up with new challenges and to come up to new market environments.

3.3.2.1 The Need for Reform

According to the European Union the following aspects lead to a reform of the regulatory framework:

- There are still some markets where one can make out a lack of competition, as for example the important broadband market.
- Cross-border competition and pan-European services are hampered by 27 different, partly inconsistent regulatory systems.
- The radio spectrum is under-utilized in the EU [80].

3.3.2.2 Proposals for a New Regulatory Framework

Altogether three main authorities have to be taken into consideration when you talk about the future of the telecommunications market regulation.

The European Commission, which is represented in this field by Viviane Reding, commissioner for information society and media, will have the most influence on the future of regulation. On November 13 Viviane Reding published the new guidelines concerning the development of the regulatory framework in her sphere of responsibility. The European Commission wants...

- ...to create a competitive European single market with 500 million customers and to establish a more effective regulatory system.. Therefore the regulation rules in the 27 member states shall be adjusted [83].
- ... incumbents to ”separate its network infrastructure from the units offering services on top of this infrastructure” according to the British

model. "Although operationally separate business entitities are created, overall ownership will remain unchanged. Functional separation allows network access to both new entrants and the incumbent's own retail division on the same terms. Incumbents would therefore no longer be able to unfairly discriminate against new entrants. This would fuel competition and at the same time strengthen incentives for the incumbent and for new entrants to invest in networks and services. The United Kingdom has already introduced functional separation, which has in turn allowed for substantial deregulation" [84].

- ... to strengthen the independence of the national regulatory authorities. As a consequence, influences from other public bodies will be restrained [84].
- ... to reduce the number of regulated markets from 18 to 7. According to the proposal 10 markets, primarily retail markets shall be deregulated and two regulated markets shall be merged. The aim is to simplify "the regulatory environment and [to reduce] the burden on regulators and industry" [85]. Moreover, the responsible regulators could concentrate on less markets where regulation is really necessary.
- ...to accelerate the process which leads to a European single market. Therefore a new authority, the European Telecom Market Authority shall be founded until 2010. This new authority shall be accountable to the European parliament but nevertheless it shall be independent [86].
- ... that "some of the most valuable bandwidth, previously reserved for traditional TV" [87], which will be available by 2012, are then used for other services like for example wireless access to broadband communication services.

Apart from the European Commission the European Regulators Group (ERG) has an influence on future laws concerning Telecommunication. They published several reports containing the following proposals. The ERG...

- ... supports without any reservations supports the European Commission in its plans on "Functional Separation" [88].
- ... wants to work closer together with the national authorities but wants to maintain the decentralized organization of the authorities and therefore speak out against a new European authority [68].

The third authority that has to be taken into consideration is the BNetzA. The BNetzA...

- ... is against establishing a new European Regulators Authority. The official reasons are that according to their opinion the decentralized

organization worked out well in the past and that a European authority would not be able to cope with the specific characteristics of the different member states [67].

- ... is against "Functional Separation" as proposed of the European Commission. They argue that Germany cannot be compared to Great Britain. Concerning "Functional Separation" the BNetzA even gets support of the VATM [67].
- ... is against using the free frequencies for wireless broadband connections from 2012 on [69].

3.3.2.3 Conclusion and Most Likely Scenario

All together a lot of different authorities are dealing with regulatory issues. It is to expect that after having negotiated a few compromises the European Commission will get its plans through as this process happened yet once dealing with a different topic. The European Commission finally succeeded in reducing the roaming fees this year although many opponents tried to hinder the new laws. Moreover, the first compromises can be seen to emerge. Viviane Reding visited the German minister of economic affairs Glos who defended the point of view of the BNetzA concerning the foundation of a new European Regulators Authority [69]. After the discussion, Viviane Reding explained that she wanted a new authority that is some kind of a head organization of the national authorities.

3.4 Data Protection

Since criminal offenders more and more make use of modern telecommunication instruments, law enforcement agencies and safeguard authorities in numerous cases need support of telecommunication providers to complete their everyday job. This support varies from requests about names and telephone numbers of participants to the entire observation of a person's telecommunication action. Telcos are then asked to provide information and perform activities that possibly conflict with customer rights like data protection and the privacy of telecommunication. Hence explicit legal guidelines are required, which give consideration to civil rights but also to necessary constrictions when it comes to criminal prosecution.[92]

3.4.1 Legal Situation in Germany and the EU

1995 the European parliament and council enacted the Directive 95/46/EC on the protection of personal data. "It sets up a regulatory framework which seeks to strike a balance between a high level of protection for the privacy of individuals and the free movement of personal data within the European Union

(EU). To do so, the Directive sets strict limits on the collection and use of personal data and demands that each Member State set up an independent national body responsible for the protection of these data." [74] Due to the fact that modern technologies, in particular the Internet and electronic messaging services, provide a rich source for data abuse Directive 2002/58/EC states specific requirements in the field of telecommunication on European level. In 2006 this directive has been amended by Directive 2006/24/EG, regulating the retention of data generated or processed in connection with the provision of electronic communications services or of public communications networks services. [79] In Germany, once again, the TKG is implemented, which, with respect to the protection of personal data, is complemented by the TKÜV (regulation of telecommunication supervision). Above all the general BDSG (Federal Data Protection Act) is implemented. [94]

3.4.2 Privacy of Telecommunication

The privacy of telecommunication is one of the basic rights stated in the Basic Constitutional Law of Germany. [98, Article 10] In the following the text gives a definition of privacy of telecommunication, discusses in which way and on what conditions restrictions can apply, and also takes a look on the impacts this has on a telecommunication service provider like the Telekom and with which obligations they are confronted.

3.4.2.1 Definition

A legal definition can be found in § 88 TKG. According to that, the 'Fernmeldegeheimnis' guarantees the privacy of content and circumstances of telecommunication, with regard to which people are or were involved in a telecommunication process. Therefore it constitutes the prohibition for telecommunication service providers to attempt to gain more knowledge about the telecommunication events than needed to fulfil their tasks. Moreover providers have to arrange technical measures to protect the privacy of telecommunication and personal data against illegal access. [100, § 88, paragraph 1-3]

3.4.2.2 Restrictions

The state places great importance on the confidentiality of telecommunication data. The privacy of telecommunication is inviolable. In certain cases, however, it can be restricted by law, and than allows the transmission to third parties: [100, § 88, paragraph 1-3]

Artikel-10-Gesetz, § 100a ff StPO
A legal foundation is provided by § 100a ff of the 'Strafprozessordnung' (criminal procedure) and the 'Artikel-10-Gesetz' (law for the restriction of the privacy of

post and telecommunication). Observation and recording of telecommunication according to § 100a ff StPO supports the law enforcement agencies throwing light on serious criminal offences. These legal measures can be taken, when strong suspicion rises, that a person committed a crime concerning the safety of the state, its democratic legal form or its citizens. The 'Artikel-10-Gesetz' on the other hand is used to ward off imminent danger. The very suspicion that someone is planning or about to commit one of above-named offences allows the monitoring and recording of telecommunication. [101] Nevertheless this measure can not be applied to all of the suspicion's telephone and internet connections, but only when the second party involved is accused of abetting. [96, § 3, paragraph 2][99, § 100a] In order that the observation can take place without delay telecommunication providers are obliged to make arrangements and provide necessary technical equipment at there own expense at all times. For this they have to observe § 6 – 11 TKÜV. [92] Moreover it is the provider's duty to instruct the employee concerned with the observation about his discretion and the culpability of a breach. [96, § 2, paragraph 2, number 2]

Retention of data ('Vorratsdatenspeicherung')
Directive 2006/24/EG achieves national validity not until its adoption in national legislation. Hence on November 9th 2007 the law for the rearrangement of telecommunication supervision was enacted and will become effective on January 1st 2008. [73] To help clarifying criminal offences and defending the state against potential danger, telecommunication system providers than are obliged to record costumer transaction data for six month. This data include telephone numbers involved in telephone calls (and IP-addresses in internet telephony) as well as date and start and end time of the connection. When using mobile phones also information concerning short message services and location of the user has to be stored. Furthermore according to the law providers of electronic post have to record e-mail- and IP-addresses of all messages sent or received. However, contents of communication of messages are not affected by this law. [70, pp. 17f] This data pool than has to be opened up to police and prosecution with legal order. [97] The opinions on the law for retention of data differ extremely. While the Federal Criminal Police office appreciates it as a great support for police investigation, most authorities consider it unconstitutional as citizens would be put under general suspicion. [71] Service providers basically are confronted with additional effort and hence higher costs. While the effort for giving out recorded data to authorized people is compensated, the actual storage has to be made on own expense. [72, p. 34]

3.4.3 System of Costumer Data Provision

There are cases, for example after an accident or a crime commitment, when quick action is required, but the police or the prosecution only have little information about the identity of people involved. At this point, telephone

numbers often are the only indication to find out names and addresses. To enable the authorities to take immediate action providers of telecommunication systems have to keep customer databases, containing telephone number, name, address and date of birth of the number holder. [93] The providers have to ensure the BNetzA, on behalf of authorities like the police or courts, has access to these databases at all times. [100, § 112, paragraph 1-2] By taking technical and organizational measures they also have to eliminate any possibility that individual accesses of the BNetzA come to their attention. [100, § 112, paragraph 1] Moreover to guarantee smooth process the telecommunication providers are again bound to make technical provisions. [100, § 112, paragraph 4-5]

3.4.4 Development until 2012

The EU is currently testing the so called 'European Privacy Seal' (EuroPriSe) for IT-products or IT-based services. The idea is to have a certification body, which "approves the product as compliant with European regulations of [data] privacy and security". [91] A pilot project, which is supposed to examine the suitability of daily use, started in November 2007 and will end in August 2008. From this the European Commission wants to gain experiences to reduce the EuroPriSe to practice in the next couple of years. [102] In a fast-developing sector such as the telecommunication sector and bearing in mind the technological and market developments, frameworks have to be revised on a regular basis, to guarantee to serve the consumers' interest constantly. [75] The aforementioned i2010 Initiative "includes the reform of the regulatory framework as one of its key challenges, with a particular emphasis on security and the protection of privacy and personal data" on a European level. [76, p. 3] Furthermore, in November 2007 the European Commission submitted proposals to amend the Directive of privacy and electronic communication inter alia as follows: Telecommunication service providers should be obliged to notify their costumers about security breaches which result in the loss of their personal data instantly. Also internet service providers should be enabled to take legal action against spammers. The European Commission moreover propose that "the use of 'spyware' and other malicious software remains prohibited under EC law". [77, pp. 6-12] If the proposals are accepted they will be adopted at EU level and afterwards have to be integrated into national law to become effective. "The Commission expects the new framework to be in place from 2010 onwards." [78] To conclude you can say that it is generally difficult to anticipate the future developments of data protection regulations, as the legislator doesn't know with which technologies it will be confronted over the next few years. Just coming up with new rules would mean to put the cart before the horse. Instead the legislator will enact new laws as a reaction to technology innovations of the oncoming years.

3.5 Conclusion

As showed in the previous text, the legal framework and regulations concerning the telecommunication sector are fairly fast moving and need to have the ability to adapt to new developments very fast. Implementing innovations concerning ICT means not only to gain benefits but also to pay attention to diverse fields linked to ICT, like personal data and health protection. To sum up our represented results, the general trend in this sector tends to result in deregulation on the one hand, but also in aggregation of the national regulators under a European umbrella organization on the other hand. The aim of the European Union, as the highest authority, is to keep an eye on markets, where competition is still a scarce commodity but to deregulate markets that already developed a fair competition among the providers active in this market. As the EU plans to upgrade the efficiency of using radio spectra, some valuable changes can be expected on this field, as well as the further development of useful instruments to ensure the protection of personal data as this field is becoming very sensitive along with the fast growing ICT.

References

[67] Computerwoche. EU Regulierung: Kommen die Telcos ohne Netz?, . URL http://www.computerwoche.de/nachrichten/1847538/. Last access 13.11.2007.

[68] Computerwoche. EU Kommissarin entschlossen: Gemeinsamer Telekommarkt für Europa, . URL http://www.computerwoche.de/nachrichten/1847516/. Last access 13.11.2007.

[69] T. Denkler. Allein gegen die Lobby. URL http://www.sueddeutsche.de/wirtschaft/artikel/358/143041/. Last access 29.11.2007.

[70] Deutscher Bundestag. Gesetzentwurf der Bundesregierung: Entwurf eines Gesetzes zur Neuregelung der Telekommunikationsüberwachung und anderer verdeckter Ermittlungsmaßnahmen sowie zur Umsetzung der Richtlinie 2006/24/EG, . URL http://dip.bundestag.de/btd/16/058/1605846.pdf. Last access 21.11.2007.

[71] Deutscher Bundestag. Telefonüberwachung und Datenspeicherung umstritten: Öffentliche Sitzungen des Rechtsausschusses, . URL http://www.bundestag.de/aktuell/archiv/2007/telekom_kw38/index.html. Last access 21.11.2007.

[72] Deutscher Bundestag. Gesetzentwurf der Bundesregierung: Entwurf eines Gesetzes zur Neuregelung der Telekommunikationsüberwachung und anderer verdeckter Ermittlungsmaßnahmen sowie zur Umsetzung der Richtlinie 2006/24/EG, . URL http://dip.bundestag.de/btd/16/058/1605846.pdf. Last access 21.11.2007.

[73] Deutscher Bundestag. Neues Unterhaltsrecht, Vorratsdatenspeicherung und Pakistan: Debatten und Entscheidungen der vergangenen Sitzungswoche, 2007. URL http://www.bundestag.de/aktuell/archiv/2007/rueckblick_kw45/index.html. Last access 23.11.2007.

[74] European Commission. Protection of personal data, . URL http://europa.eu/legislation_summaries/information_society/l14012_en.htm. Last access 24.11.2007.

[75] European Commission. Reforming the current telecom rules, . URL http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm. Last access 28.11.2007.

[76] European Commission. Proposal for a directive of the european parliament and of the council amending directive 2002/22/ec on universal service and users' rights relating to electronic communications networks, directive 2002/58/ec concerning the processing of personal data and the protection of privacy in the electronic communications sector and regulation (ec) no 2006/2004 on consumer protection cooperation, . URL http://www.ec.europa.eu/information_society/policy/ecomm/doc/library/proposals/dir_citizens_rights_en.pdf. Last access 28.11.2007.

[77] European Commission. Proposal for a directive of the european parliament and of the council amending directive 2002/22/ec on universal service and users' rights relating to electronic communications networks, directive 2002/58/ec concerning the processing of personal data and the protection of privacy in the electronic communications sector and regulation (ec) no 2006/2004 on consumer protection cooperation, . URL http://www.ec.europa.eu/information_society/policy/ecomm/doc/library/proposals/dir_citizens_rights_en.pdf. Last access 29.11.2007.

[78] European Commission. Reforming the current telecom rules, . URL http://ec.europa.eu/information_society/policy/ecomm/tomorrow/index_en.htm. Last access 28.11.2007.

[79] European Commission. Data protection in the electronic communications sector, . URL http://europa.eu/scadplus/leg/en/lvb/l24120.htm. Last access 15.11.2007.

[80] European Commission. 2007 EU Telecoms Reform - The need for reform, . URL http://ec.europa.eu/information_society/doc/factsheets/tr1-generalstory.pdf. Last access 29.11.2007.

[81] European Commission. 2007 EU Telecoms Reform - The European Telecom Market Authority, . URL http://ec.europa.eu/information_society/doc/factsheets/tr3-eutelecommarketauthority.pdf. Last access 29.11.2007.

[82] European Commission. Consumer rights and benefits, . URL http://ec.europa.eu/information_society/policy/ecomm/current/consumer_rights/index_en.htm. Last access 29.11.2007.

[83] European Commission. 2007 EU Telecoms Reform - A more effective regulatory system, . URL http://ec.europa.eu/information_society/doc/factsheets/tr10-newarticle7.pdf. Last access 29.11.2007.

[84] European Commission. 2007 EU Telecoms Reform - More Competition for a stronger Europe, . URL http://ec.europa.eu/information_society/doc/factsheets/tr2-morecompetition.pdf. Last access 29.11.2007.

[85] European Commission. 2007 EU Telecoms Reform - From 18 to 7 regulated markets, . URL http://ec.europa.eu/information_society/doc/factsheets/tr9-listofmarkets.pdf. Last access 29.11.2007.

[86] European Commission. 2007 EU Telecoms Reform - The European Telecom Market Authority, . URL http://ec.europa.eu/information_society/doc/factsheets/tr3-eutelecommarketauthority.pdf. Last access 29.11.2007.

[87] European Commission. 2007 EU Telecoms Reform - The digital dividend: New airwaves for new wireless services, . URL http://ec.europa.eu/information_society/doc/factsheets/tr7-digitaldividendw.pdf. Last access 29.11.2007.

[88] European Regulators Group. ERG opinion on Functional Separation, . URL http://www.erg.eu.int/doc/publications/erg07_44_cp_on_functional_separation.pdf. Last access 29.11.2007.

[89] European Regulators Group. Common Position on VoIP, . URL http://www.erg.eu.int/doc/publications/consult_draft_cp_voip/erg_07_56_rev1_voip_draft_cp.pdf. Last access 29.11.2007.

[90] European Union. i2010: Information Society and the media working towards growth and jobs. URL http://europa.eu/scadplus/leg/en/cha/c11328.htm. Last access 29.11.2007.

[91] EuroPriSe. EurPriSe-Brochure. URL http://www.european-privacy-seal.eu/results/europrise-brochure/Folder-Datenschutz-X3-v2.pdf. Last access 26.11.2007.

[92] Federal Ministry of Economics and Technology. Sicherheit in der telekommunikation, . URL http://www.bmwi.de/BMWi/Navigation/Wirtschaft/Telekommunikation-und-Post/sicherheit-in-der-telekommunikation,did=189818.html. Last access 15.11.2007.

[93] Federal Ministry of Economics and Technology. Sicherheit in der Telekommunikation, . URL http://www.bmwi.de/BMWi/Navigation/Wirtschaft/Telekommunikation-und-Post/sicherheit-in-der-telekommunikation,did=189818.html. Last access 15.11.2007.

[94] Federal Ministry of Economics and Technology. Gesetze und Verordnungen, . URL http://www.bmwi.de/BMWi/Navigation/Service/gesetze.html?suchSubQuery=4. Last access 15.11.2007.

[95] Federal Ministry of Economics and Technology. id2010 - information society germany 2010, . URL http://www.bmwi.de/English/Redaktion/Pdf/id2010,property=pdf,bereich=bmwi,sprache=en,rwb=true.pdf. Last access 29.11.2007.

[96] Federal Ministry of Justice. Gesetz zur Beschränkung des Brief-, Post- und Fernmeldegeheimnisses, .

[97] Federal Ministry of Justice. Wer hat Zugriff auf die Daten?, . URL http://www.bmj.bund.de/enid/Vorratsdatenspeicherung/Wer_hat_Zugriff_auf_die_Daten___1fb.html. Last access 25.11.2007.

[98] Federal Ministry of Justice. Grundgesetz, .

[99] Federal Ministry of Justice. Strafprozeßordnung, .

[100] Federal Ministry of Justice. Telekommunikationsgesetz, .

[101] Niedersächsisches Ministerium für Inneres, Sport und Integration. Artikel 10-gesetz. URL http://www.mi.niedersachsen.de/master/C30002_N13682_L20_D0_I522.html. Last access 23.11.2007.

[102] M. Raguse. Europäisches Datenschutz-Gütesiegel am Start. URL http://www.datenschutz.de/news/detail/?nid=2331. Last access 19.11.2007.

[103] V. Reding. Politikbereiche und Tätigkeiten: Überblick. URL http://ec.europa.eu/commission_barroso/reding/ataglance/policies/index_de.htm. Last access 29.11.2007.

[104] The European Regulators Group for electronic communications networks and services. Welcome to the European Regulators Group. URL http://erg.eu.int/index_en.htm. Last access 25.11.2007.

[105] The Federal Network Agency for Electricity, Gas, Telecommunications, Post and Railway. Status of the Federal Network Agency. URL http://www.bundesnetzagentur.de/enid/6e3a1f6db6e5bc0aaf8eb7a60ae06395,0/Federal_Agency/The_Agency_xj.html. Last access 24.11.2007.

[106] Verband der Anbieter von Telekommunikations- und Mehrwertdiensten e.V. URL http://www.vatm.de/english/aims_and_mission.html. Last access 24.11.2007.

Chapter 4

4 Value Chains in the Web X.0 Ecosystem

Anup Koyadan Chathoth, Berk Kirca, Chao Zhang

The evolution of new value chains is inevitable as the two industries - Telco and Web X.0 - start merging. The existence of major stake holders like telcos, handset manufacturers and web companies competing for the driving position in the value chain will decide what course the Mobile X.0 business space will follow in future. Interfacing with the user, controlling revenue sharing and ownership of data being three key factors deciding the dominance in the value chain, there will be competition between these players to occupy these roles in the value chain. The evolution of specific value chains can be analyzed based on whether telcos will be the owner of the Mobile X.0 value chains or a co-solution provider or just an access provider.

4.1 Introduction

After the dot-com bubble in late 20th century, a new generation of Internet based companies are shaping the online ecosystem. This time the users are collaborating to improve our virtual world more than ever. They (we) are not just consumers of the web, but also prod"users". This rapid change is putting the roles of the players in the market such as; telcos, web-companies, customers in uncertainty. One should know clearly how the ecosystem works, how the revenue flows are, and where the other players will be positioned to exploit its own strengths. Understanding the scope and future orientation of current projects, such as *B21C* of British Telecom and *Android* of Google will definitely put a light on how the online space will look like for the telcos. Yet it is still not clear which player in the value chain will drive the change and will be the flagship of innovation. So, a company which wants to succeed in this ever changing market should consider multiple projections of the future value chains driven by different players in each scenario, to be ready for the challenge, and reposition themselves in the market for higher profits.

4.2 State of the Art

4.2.1 Web 2.0 - Business Models - Value Chains - Revenue Flow

In the Internet world, there are many new business models arise with the introduction of new concepts and technologies. Depends on the different revenue types, the business models for the Web 2.0 generation can be categorized as following: [112]

- affiliate
- advertising
- transaction commission
- community
- subscription

These new business models impact the traditional value chain in the web ecosystem, which was usually consist of content owners, content aggregators, content providers, portal owners and the end users. To be able to predict the evolving trend of the value chain into Web X.0 ecosystem, it is necessary to understand the current business models and related value chains. In the following section, few of the most popular models are in Web 2.0 ecosystem are selected for discussion.

4.2.1.1 Affiliate Business Model

The affiliate business model provides purchase opportunities to people beyond the traditional merchant or retail websites. Its main principal is to offer financial incentives in the form of revenue sharing with the affiliated partner sites. To build up the affiliate partnership, a web site could directly make agreement with the merchant or retail site, or more commonly through the affiliate network. An example of the affiliate network is the Affilinet. After making the affiliate relationship, the affiliate partners provide the consumers either direct purchase opportunity on their website or redirect the consumers to the merchant sites. There are several remunerations methods available for the affiliate sites, such as PPC (pay per click), PPL (pay per lead), PPS (pay per sale) or combined solutions of these three. Since the affiliate model utilizes the super networking power of the web, it becomes a quite popular business model in the Internet commerce.

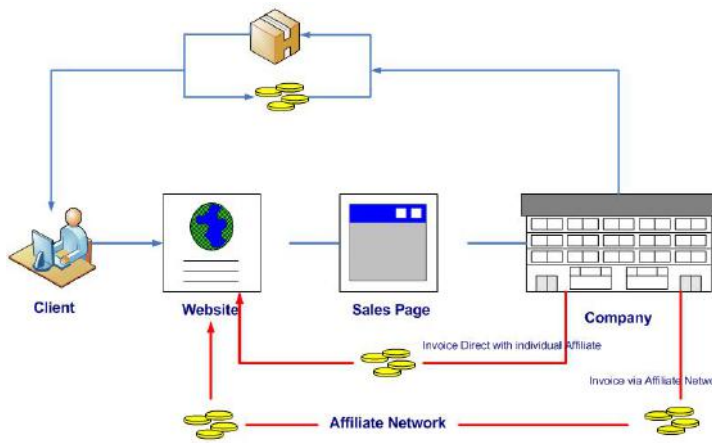


Figure 4.1: Affiliate business model
Source: Bigmouthmedia [107]

Figure 4.1 [107] gives an overview of the affiliate business model: a client visits Internet site via a computer and notices certain product or service offered by a company. He orders the product or service on company's sales page. Then the product or service will deliver to the client. Once the transaction is done, the company gives certain amount of commission directly to the Internet site, or via Affiliate network. Such interactions between different players can be described in a value chain diagram as below:

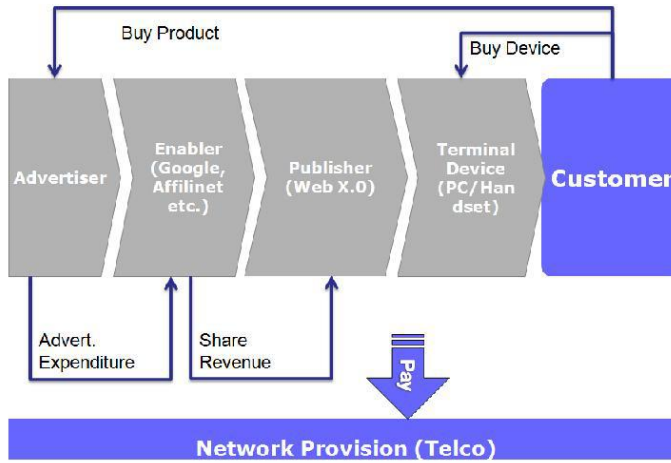


Figure 4.2: Affiliate/Advertising Model Value Chain and Revenue Flow
Source: Own Illustration

In this value chain, only the most relevant players are included. The revenue flow is indicated by the blue arrows. Telco here provides network access for the users as well as for other players and serves as a bit pipe.

4.2.1.2 Advertisement Model

Another business model similar to affiliate model is the web advertising model. In the web advertising model, the website as the broadcaster provides content and services together with various advertising information. Normally the content and service comes for free (blog, e-mail), so the main revenue for the broadcaster comes from advertisement. Most of the time, the broadcaster is distributing the content created by other people, which is the main concept of Web 2.0. The advertising model become profitable once the traffic of visits is large or highly specialized.

For this kind of business, the most popular players (enabler) are Google and Yahoo. By leveraging their huge power in searching and categorizing information, they ensure very high degree of relevance between the audience and the advertisement. The Google AdWords generate most of the revenue for Google, at the same time, Google AdSense also become the major revenue source for millions of broadcasting websites.

The most significant difference between the traditional advertising value chain and the web advertising value chain is the players in the chain. The traditional players such as marketing agencies, aggregators and the carriers are having

less and less share in the value chain and even vanishing out. These changes make the value chain of this model become quite similar to the value chain of Affiliate business model. In this case, the role of enabler is replaced by Google or other advertisement management companies instead of the affiliate network companies.

Since the value chain structure is similar to the affiliate model, the revenue flow is also similar. Telco again is sidelined as a data transporter. Revenues are mainly shared within advertiser, enabler and content providers.

4.2.1.3 Transaction Commission Model

The next popular model is the transaction commission model, which usually is in the form of online market place or auction platform. This model brings buyers and sellers together and facilitates the transactions. Those websites support business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C) markets. Once a deal is made through the platform, the platform owner charges a fee or commission base on its own formula.

Most famous player like this kind is eBay. Here the business scenario is a bit more complicated than the previous two models. Take a mobile phone auction for example, user A offers the product (mobile phone) on the platform for auction, user B won the auction and pays to user A directly via PayPal or other finance institute, user A needs to pay certain amount of commission to the virtual market place owner - eBay, a transaction is therefore completed.[109]

The figure below is a simplified version of the value chain and revenue flow, excluding finance institutes and other parties. Money is mostly flow between the platform, logistic companies and the users. Telco as a network provider could not get a big share of the revenue.

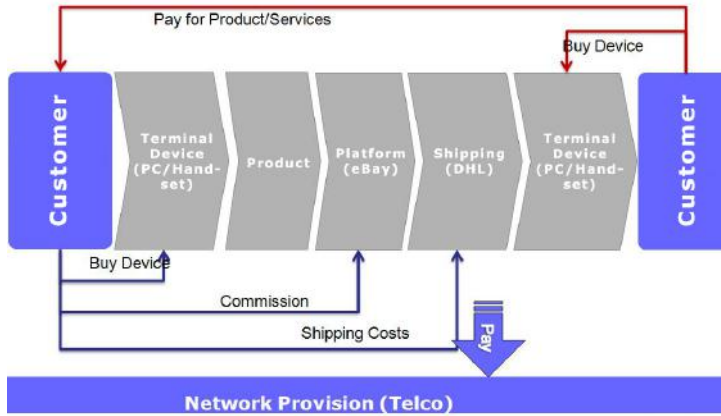


Figure 4.3: eBay Value Chain and payment flow
Source: adapted from Engel and Kraft [109]

4.2.1.4 Community Model

The quick rise of the social networking brings up millions of different community sites in the web 2.0 world. Back few years, although the social community sites have huge amount of users and traffics, there is not a way to monetize the resources in hand. But now, the revenue for a mature community site normally comes from: Banner sales, Sponsorships, Affiliate Sales, Data and Surveys, Mobile, Retail Sale and Gaming etc.

An example for this business model is *Facebook*. Facebook in one hand as a useful web application enables millions of users to keep in touch with their old friends and create their own communities, in the other hand as a platform opens its API to let users create applications and versatile its functionalities. With such an intensive user engagement, Facebook actually let the users to run business through the communities by themselves in any kinds of model. As several different kinds of business models can be found in this network community, these different value chains are mixed and interconnected forming a bigger value chain or even value system. But what is important to be noticed here is the loop phenomena which formed by user's cross-role as producer and consumer and Facebook gets share on the revenues generated within this looping value system.

4.2.2 Telco and the Web

4.2.2.1 Telco's Positioning Yesterday

Web 2.0 is already dragging the digital services industry into the unknown, shaping and restructuring the value chains, business models and strategies in the

market and as a result we started to see that also telecom players are responding to this change rather than seeing that other services from web 2.0 companies bypass their value and go over the top of their business. Up until now, telcos were used to make their Internet based revenues from their broadband business by basically serving as a bit pipe, and with charging per bit and for some basic web 1.0 services such as ring tone downloads, picture sharing and mobile IM for their mobile communications business.

4.2.2.2 Telco's Postioning Today

Today after the introduction of web 2.0, wherever you look; be it online communities, affiliates or e- merchants, visionary Internet companies are trying to build partnerships with telcos to combine their services with Telco resources, offering a much wider variety of attractive applications, devices, services and revenue possibilities. If you compare this to the previous generation of web applications, which offered services on top of the pure connectivity of the telcos, and required far more complexity in the application itself, today's solutions are offering more reliable and diverse services for less effort. This is achieved through the shift in positioning of the telcos as not just bit pipes they used to be for most of the services in the web 1.0 era, but rather as part of the value adding process by exploiting their back-office functions and using the already available data through the end-to-end control of the telcos over their network. Services which can use these enabling functions of the network operators include; software as a service, gaming, video, and other mobile applications for the end-user and developer. [1]

As the current situation implies, both mobile and fixed network operators are well prepared for the web 2.0 innovation, investing in infrastructure, laying out fiber cables to the home, paying incredible amounts of money for bandwidth, investing in being available everywhere every time, yet they still do not know exactly how they will turn their investments into revenues. They keep looking for ways to make their functions such as "location, presence, bandwidth policy, identity/authentication, QoS, rich messaging, profiling and other network services" more attractive for the developers.

Yet telcos face significant challenge from other players like Google and Yahoo with their hip services dominating the market, pushing development platforms, and they already have significant amount of customers and communities to develop applications for their platforms. As a result we see that players are beginning to cluster in the opportunistic positions in the web 2.0 value chains, shifting and in some sense converging, where there is no certainty which player will be able to hold grounds in which position. Logically everyone wants to be as close to the customer or where the most value is produced. By producing the most value, companies would have more bargaining power to for the sharing of

[1] http://web20.telecomtv.com

the revenues among the players. On the other hand; by being the closest player to the customers, the companies could make use of the fact that the customers recognize their name as the provider of the service, and all the customer info will be collected by those companies. “We have got big companies like News Corp. buying broadband infrastructure, telecom providers launching IPTV services, Google putting Wi-Fi networks in the San Francisco Bay Area and more”, according to the Telecommagazine. “One of the most interesting moves is that some telcos like Sprint, BT and Telecom Italia are getting their acts together as wholesale services providers. This involves delivering services to companies such as Disney or Virgin that add value to them and take them to the end customer.” Other wholesale services are on their way; authentication, charging, location, and security via a Web 2.0 web services approach to name a few. [113]

4.3 Future Trends in Web X.0 Value Chains

4.3.1 Evolution of Value Chains

When the two industries - the web and telecoms come together we see the breaking down of the traditional value chains from both the industries. The mobile device is ideally poised to capture user generated content ‘at the point of inspiration’ – making it the main driver behind Web X.0. The existence of multiple stake holders attempting to capture the driving position in the value chain will decide what course the Mobile X.0 business space will take in future.

The emergence of new Mobile X.0 value chains is inevitable mostly because of the user centric business models made popular by the web 2.0 experience over Internet. The critical observation regarding Mobile Web X.0. is to consider the ‘flip side of being free and open’ i.e. the users are expected not only to consume data and provide for the financial flow , they are also expected to ’give back’ to the community. This web 2.0 feature might only turn more significant in a move from 2.0 to a more semantically organized X.0. Consequently, a web X.0 service should get richer as more people use it and this will be the dominating trend in the new value chains [111].

4.3.2 Generic Value Chain

The most important characteristic of a Web X.0 value chain is that the consumer becomes producer of the content. Hence, we have a loop instead of a chain. The entry point is the same for creation and consumption. The structure of such a value ’loop’ is given in the figure. In this loop, if we go from left to right: the user creates content and publishes it. If we go from right to left, content is created for the user to consume. In both directions the same/identical device and access infrastructure will be utilized but the content and its context is

different. The diagram indicates both the revenue flow as well as the flow of content between different players in the value chain. [110]

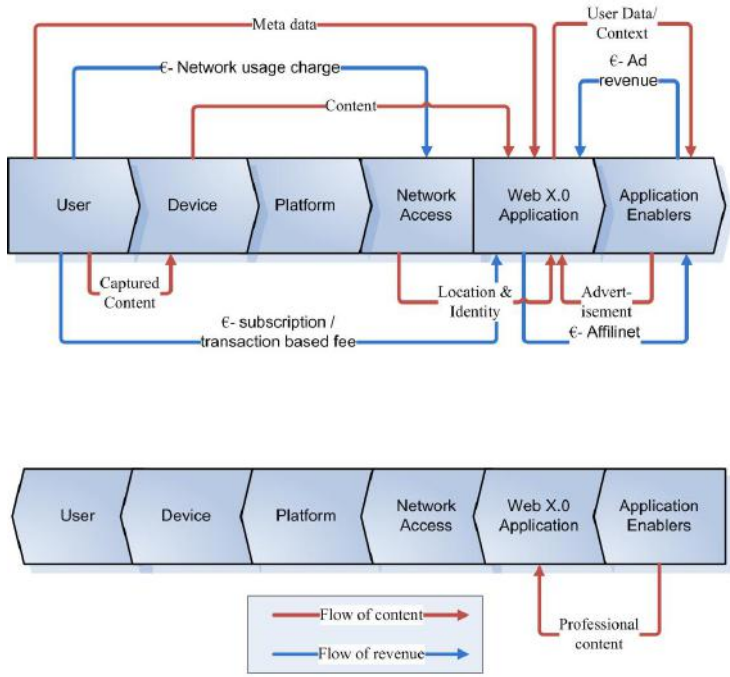


Figure 4.4: Generic value chain for mobile Web X.0
Source: Jaokar and Fish [110]

The following table explains the role played by each block given in the diagram.

Roles	Descriptions
User	ProdUser and consumer of content
Device	The hardware equipment
Platform	Integrating software for baseband processing, operating system, user interface, local applications
Network Access	Network interface and connectivity enabler
Web x.0 Application	Actual web X.0 app and database running on remote server
Application Enablers	Search engines, payment enablers, ad providers, professional content generators

Table 4.1: Description of roles in the generic value chain
Source: Own Illustration

4.3.3 Evolution of Specific Value Chains - Competition for Roles

In the generic value chain described in the previous section there are six important roles to be played. Of these the user, device and access are already occupied by the traditional players- the consumer (as in web 2.0) or a media company (as in traditional publishing business), the handset manufacturer and the network operator respectively. The remaining two players namely platform and application enablers come into focus here, since they essentially form the backbone of the value chain. In the traditional Internet-space web 2.0 model these roles have been performed by the web companies and application providers. Once they also join the race along with the network operators and handset manufacturers, the value chain of the mobile space starts evolving. The most important attraction of being the platform provider is that it will be driving both user innovation and developer innovation. Thus this role enables each player to consolidate their position in the market and be in control of the direction in which market evolves.

There have been already announcements from network operators, web companies and handset manufacturers indicating their plans to dominate the value chain by building platforms and alliances to make headway in occupying positions in value chains. In the following sections we analyze these examples and their motives.

Web Companies

The most famous example of a web based company trying to move well beyond an enabler position for Mobile Web is Google's Open Handset Alliance and the Android platform[2]. Instead of being sidelined to an enabler who will provide advertisements to the platform owner, Google has decided to own the platform. The value chains and monetizing in the Open Handset Alliance is still open to speculation. But Google has divulged its goal with OHC as "bringing more Internet and PC style creativity to mobile space"[3]. Though Google has only made minimal foray into being a web platform, all its attempts like GoogleDocs, Google Widgets etc has been based on the principles of offering free services to the user and the mobile space could see an extension of this using an advertisement based value chain.

Though Google may be the first web based company attempting to capture the entire Mobile X.0 value chain, examples like Facebook stand out as an inspiring model. Facebook made one of the most successful attempts at providing value to both users and application developers by establishing a successful value chain connecting them. Facebook gives the application developers free access to its API and allows the developer to display unlimited advertisements on their applications. Apart from advertisements, affiliate programs also have proved to be a significant source of revenue for application developers. Many of the applications thus provide a value add to the user through a mash-up of data available in Facebook itself or a mash-up of Facebook and other web 2.0 services.

Network Operators

The mobile operators have a direct relationship with customers and influence the whole value chain.They actually manage the physical network and in some cases also fulfill the aggregator role. They have started making foray into the X.0 space through two key strategies- building their own Web X.0 applications like the Pikeo Photos from France Telecom[4] and providing abstraction over the network through platforms such as British Telecom's 21 CN[5]. Another example is from TIM (Telecom Italia Mobile) where users are able to upload content to any social network[6]. TIM also adds something special in the interim stage between content capturing and uploading (in this case-context aware tags) leveraging on its unique access to this data. In general the telcos hope to position in the X.0 space leveraging their three core capabilities (enablers).

[2] http://www.openhandsetalliance.com
[3] http://www.pbs.org
[4] http://www.pikeo.com
[5] http://www.btplc.com/21CN/
[6] http://opengardensblog.futuretext.com/

Network Abstraction
Abstracting telecoms APIs and providing the facility to mash up between telecoms and non telecoms services.

- Identity: This is a key telecoms industry advantage and operators like T-mobile are doing some interesting work in this space.
- They are concerned with billing and customer support. They can be customer-facing. This enable them to get upfront payments rather than rely on a revenue-share model

Handset Manufacturers
Device makers are the first physical point of interaction with the customer. Device makers are trying to own a larger share of the value chain by becoming platform vendors and application providers. An example of such an attempt is Motorola's Tilefile, for which Motorola built the foundations for an entire new platform. The Tilefile platform wraps videos, photos and audio into a single content-neutral format called a *Tile.* around which social activity gathers. Another example of such an application is Mosh from Nokia which is a social network which spans across the desktop and the mobile device. It enables users to upload audio, videos, documents, images, games and applications to your profile. Handset manufacturers , especially Nokia, with Ovi and it's acquisitions like Navteq have critical advantage to provide a 'One stop shop' for Web X.0 users.

4.4 Future Value Chains

4.4.1 Telco as Bit Pipe Provider

The weakest positioning of the Telco is given in case of a mobile extension of existing Web 2.0 sites or in case of stand-alone mobile portals that do not explicitly involve the mobile operator. The operator in such a scenario will be reduced to the role of a mere access provider and will not be able to broaden its role to a platform owner or web X.0 service enabler.

4.4.1.1 The Value Chain

The value chain in this business model look exactly like the current value chains existing in the Internet space. In the generic value chain discussed in the previous section the roles of enablers and platforms will be handled by web based companies.The relationship and business models involving such a value chain will closely resemble the Web 2.0 ecosystem described in the first section of this report. The biggest opportunity may lie where the apps are less tied into the network (*idiot savant pipe*, rather than *dumb pipe*), but the billing and value-based pricing remain in place.

4.4.1.2 The Rrevenue Flow

The Web X.0 solutions in this case are open for any interested customer independent of the mobile operator he is subscribed to. These services are free or employ a payment solution independent of the billing facilities of the mobile operator. The Telco profits only from the increased mobile traffic due to upload and download of data for these services, but has no opportunities to add value to the solution and for further revenue creation. Only in the scenarios of a subscription based model where the user pays for each time he uses a particular services or buys a new service the operators can offer to combine this payment service with their billing service. In that case operator will be responsible for the revenue sharing. But in most of the other business models applicable to this value chain, the platform owner, application developers or the enablers will receive payments directly from user and will share it across other stake holders. The exact terms of such a revenue sharing in the mobile space will possibly resemble the models currently existing for Internet based services.

4.4.1.3 Example

One of the most interesting example of operator being sidelined as a bit-pipe operator is the m.facebook.com service offered freely on all mobile phones by Facebook. The mobile Facebook acts both as a platform for developing application as well as a community application by itself. The application developers generate revenue through advertisement, affiliate networks etc, while Facebook generates revenue through advertisement. The role of the network operator here is clearly is that of only an access provider with no say in the actual web application or its revenue generation.

4.4.2 Telco as Solution Designer and Value Chain Leader

To make the best profit in the future, Telco could design and implement some new solutions which enable it to be the leader in the value chain and covers broader range in the value chain. The new value chain will look totally different.

4.4.2.1 The Value Chain

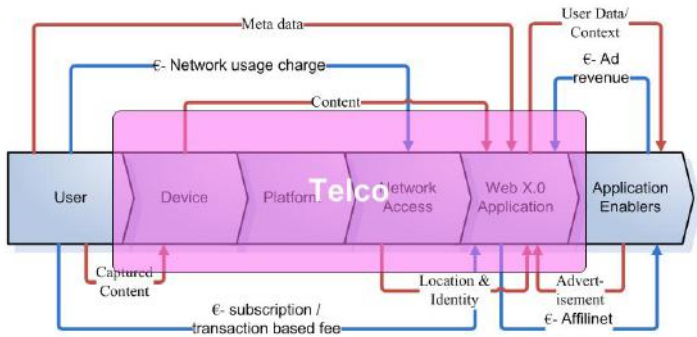


Figure 4.5: Telco as solution designer and leader in the value chain
Source: Own Illustration

The figure above shows the ideal position for Telco in the Web X.0 value chain. Currently the Telco are positioned in the Network Access part receiving only the network access fee. But once the Telco extends its coverage to the neighboring area by providing new solutions, the players in the value chain will soon be reduced to three.

4.4.2.2 The Revenue Flow

One possible business model to realize such change in the value chain could be the open community model. In this case, the value chain is more or less like the loop chain as described in the previous section. The difference to the traditional web 2.0 generation is that, the content does not go through many different players in the value chain any more. Instead of having players like user, device manufacture, network operator (Telco), aggregator, application enablers and content/product provider, there will be only three players remain in the value chain – user, solution provider (Telco) and application enablers. User generates revenue by publishing their contents via the solution provided by Telco, and the other user consumes the content via the same or other solutions from Telco. Telco has a dominate position in this shorten value chain. The revenue will be

shared with user, Telco and the application enablers. Of course, the success factor here is to be able to achieve critical mass of interested customers and content out of the own customer base. Once the community is setup, there will be a strong lock-in effect for the customers.

4.4.2.3 Examples

Currently there is not Telco having such a broad coverage in the value chain, but they are some pioneers starting entering taking different roles in the value chain. For example the Pikeo from French Telecom is intended to build a photo sharing community within its mobile users together with its location and identity function. The user who uploads photos is the content provider and the others who download the content are namely the consumers, which both come from the same user group – customer of Telco. With this solution, Telco's roles are network operator, Web X.0 solutions. Some other example like the B21CN from British is taking the role as platform solution provider for the network access. The Skype phone from the UK mobile operator 3 is a good example for Telco as a device maker in the value chain.

4.4.3 Telco as Equal Partner Co-Designing the Solution

The scenario, which is more realistic than being the initiator of the value chain for the telcos, and still allows them to add value to the services unlike being a bitpipe, thus is more revenue generating; is that Telco partners with either a content creating web X.0 company or a device manufacturer. In case of the cooperation with a web X.0 company, Telco offers exclusive access to the web site, which is offered through the Telco to its customers. Telco is also taking care of charging the customers of the web X.0 site, and provides access through its network. Furthermore telcos could support the web-site by configuring media into network and device compatible format on top of the other services mentioned in the earlier sections of this report.

Such cooperation could be a significant revenue stream for the telcos in terms of higher network traffic and shares from the revenue of the web X.0 site, which are acquired through billing of the web sites customer base for uploading and accessing content. Here Telco is luckily positioned next to the customer in the value chain, being the first player in the revenue stream. Although the customer is accessing the web-site, he also shares some user experience associated with the Telco. So the Telco is in some sense the brand that is selling the service, which improves user satisfaction, and definitely helps for customer lock-in effects. The web X.0 company is also benefiting by being able to offer higher quality of service, acquiring a broader customer base, adding more functionality and leaving billing and some other services to the Telco at the cost of sharing the revenues generated. [111]

4.4.3.1 E-sales as B2B2C-BM Example

One example of telcos collaborating with a web-site is to offer an end-to-end e-sales solution. The planning and implementation of an e-sales system requires extensive expertise and access to communications infrastructure and IT services; all services, that are core business of a Telco. The portfolio of services, which are necessary for marketing such a B2B2C business model, may cover a wide range of services. These include CRM-services (Service Numbers, Call Center Services, Managed Network ACD and IVR-solutions), cross-promotional platforms (Internet, IPTV, public telephones), Payment Solutions (Internet and mobile), Web-based marketing platforms, voice portals and IPTV Channel. The task of a Telco is to provide these sales, marketing, transaction and communication functions to be combined as a tailored e-sales solution [108].

4.4.3.2 Collaborating with the Handset Manufacturer

Currently Telekom Italia Mobile (TIM) is offering a great service to its customers by guessing the meta data for the content and suggesting it to the customer, which insures easier handling of the application, which creates and shares the content, and improves customer experience. For instance; when a prod"user" creates content, TIM's service tags it intelligently through the knowledge about the author of the content the network already has. In this model Telco is still nearest to the customer, but most of the value is created by the web X.0 application. A better model is to ally with the handset manufacturer, to directly associate meta data with the content and share it over Telco's network more cost effectively using less intermediaries. This model allows the Telco to generate most of the value, and increases volume of the traffic by simplifying the usage (e.g. send your tagged photo to all of your friends in one group in your phone directory by clicking a few dedicated buttons on your handset), and increases user experience at the cost of sharing revenues with the handset manufacturer.

4.5 Conclusion

When two traditional value chains namely telecommunications and the web evolve and start to collide, it is inevitable that the players will have to reposition themselves and adapt to the current situation, shifting, converging and leaving some of the players behind. Specifically it is very challenging for the telcos, because they are gigantic companies undertaking lots of investment and thus are not very agile. Yet they have many assets that they can exploit in the new value chain in different ways. Telcos could continue their traditional role by serving as bit-pipes, they could be the initiator of the value chain covering much of the areas of it, or they could look after partnerships, where they can add value through their Telco specific assets.

References

[107] bigmouthmedia. bigmouthmedia. URL http://www.bigmouthmedia.com/. Last accessed 30.11.2007.

[108] Detecon. eSales verändern telco 2.0. URL http://www.ecin.de/mobilebusinesscenter/telco2.0. Last accessed 30.11.2007.

[109] F. Engel and P. Kraft. Businessmodels im Web 2.0 - Erfolgreich monetarisieren. URL http://www.spormed.de/wordpress/wp-content/uploads/2007/06/\supreme_barcamp_hh_fe.pdf. Last accessed 30.11.2007.

[110] A. Jaokar and T. Fish. Mobile Web 2.0, 2006. URL http://www.futuretext.com. Last accessed 30.11.2007.

[111] R. Martignoni and K. Stanoevska-Slabeva. Mobile Web 2.0. In *20th Bled eConference- eMergence: Merging and Emerging Technologies, Processes, and Institutions*, Bleed, Slovenia, June 2007.

[112] M. Rappa. Business Models on the Web. URL http://digitalenterprise.org/models/models.html/. Last accessed 30.11.2007.

[113] K. Willets. Telecom Finally Goes Web. URL http://www.telecommagazine.com/Americas/article.asp?HH_ID=AR_2975. Last accessed 26.11.2007.

Chapter 5

5 New Competitors for Telcos

Christoph Baumeister, Daniel Filonik, Michael Gross, Faraz Najafi

This report analysis how and why new competitors from different businesses enter the telecommunications market and how their future strategy looks like. Further we describe how this affects the classical telecommunication market in general and how traditional telcos can react to these changes.

5.1 Introduction

"New competitors from other industries become key players, and completely new business models become generally accepted" [123]. This citation by David Willis, analyst at the American IT-Consulting Gartner, perfectly describes the upcoming challenges for traditional telcos and shows how important it is to analyze possible "new" competitors in the market.

5.2 Competition Among Traditional Telcos

This chapter provides an analysis of the current situation on the German telecommunication market as well as upcoming trends.

5.2.1 Status Quo on the German Market

Currently 50% of all 38 million German households have a broadband Internet connection. The ex-monopolist Deutsche Telekom AG (DTAG) still provides 45% of those lines. 19,4% are provided by DTAG resellers, 30,9% by companies which have an own DSL-infrastructure and 4,7% by cable providers. The share of VoIP telephony is currently at 30,7% [133].

In the mobile market the volume of sales has slightly decreased due to very high competition resulting in lower end user prices [133]. Nevertheless the airtime volume is growing much faster than in the fixed-line network. The number of connection minutes per day has increased by 30% in the last year. In the sector of non-voice services a growth of 2,4% in the total share of turnover in the mobile market can be assessed, which is driven by data services [133].

5.2.2 Forecast about the German Market

In the coming years DTAG will continue to get more and more under pressure as competition continues to increase. For example, United Internet has announced that they will no longer resell DTAG lines but Telefonica lines which could result in a loss of 2.5mn. lines for DTAG [168]. Another sign of growing competition is the alliance of United Internet with Vodafone, T-Mobile's biggest competitor [126]. The general trend goes towards mobile networks and especially mobile Internet. In 2010 more than 50% of mobile users "will access the Web on a mobile device at least once a week" [163].

5.3 Changes in Fields of Competition

Before analyzing different new competitors it is necessary to have a closer look at the changing competition in fields of telecommunications.

5.3.1 Service Platforms

The telecommunication infrastructure plays an important role as a service platform gives the owner a number of advantages. A network carrier has the ability to provide different enablers, for example location and presence information as well as authentication services, using the data already available in its network. Such enablers could be an additional source of revenue for telcos [185], but it is necessary to be faster on the market than private equity investors in order to be successful [185].

As network neutrality comes more and more under attack in the U.S. [154], the most significant advantage of telecommunication companies becomes obvious. They have the full control over their network being able to prioritize data traffic or even to decide which services are allowed on them. That such fears are justified shows the example of U.S. telcos and cable providers, which tried to stop the VoIP data stream of Vonage [154]. Looking at these developments it may be an interesting option for other companies like Google to enter the market in case to avoid the named problems.

Mobile devices and the corresponding operating systems are service platforms, which are until now in the hand of suppliers and telcos, like Nokia or DTAG. These companies have the full control over their platform in the means of being able to exclusively decide what services or applications are allowed to be used or even installed on their devices. They are caught between the customer, who wants flexibility and freedom, and the service/content providers, who want to restrict the consumers freedom to enhance their revenues [119]. But as modern mobile phones tend to work more like “mini” computers the importance of the operating system as a central control center grows [123], which is underlined by the statement that the one who will provide the operating system for these devices is about to control the mobile Internet [123]. So it is interesting for new competitors to start their own platform initiatives, for example Google or Apple, who are about to enter the market with their products.

5.3.2 Services

After having looked at the platforms it is important to analyze the service sector as both will strongly influence the future of the telecommunication market.

Voice and Messaging

Voice and Messaging services were the home domain of telecommunication companies in the past. But this strong position is threatened by web players offering the possibility of free telephony via VoIP [119]. On the mobile market these new competitors had problems to access platforms and to reach the customer in the past, but with the development concerning devices and operating systems the problems are about to vanish. Examples are Skype’s free mobile Internet telephony [171] or messaging systems like ’Hotxt’, which offers users to

send SMS with unlimited length via the GPRS network for a very low price [119].

Entertainment

The wide field of entertainment services ranges from social networks to music platforms and IPTV. In all these areas different players have entered with an own approach of wining the market. Especially Web 2.0 companies like Facebook, MySpace or EBay/Skype have drawn attention as possible competitors but also partners for mobile operators with their large number of users [123]. So Vodafone UK and MySpace have launched a service, that enables Vodafone customers to stay in contact with their friends while they are on the move [186].

Another growing sector is IPTV with a predicted number of 7 million customers in 2015 [419]. With only three competitors on the market, DTAG, Hansenet and Arcor, it could become interesting for competitors from other branches to start their own IPTV service. But applications like Joost, an IPTV platform, have the potential to become serious challengers as they are offered free of charge.

A third point is mobile entertainment, which is taking a more important role especially with increasing popularity of devices like the iPod/iTouch series. It is estimated that the value of the market will increase "from $17.3 billion in 2006 to nearly $77 billion by 2011" [143] driven by factors like mobile television.

Presence and Location

"Location is everything." [201]. This sentences shows the importance of Location-Based Services (LBS). A service which will be strongly influenced by the developments already discussed. The fact that the LBS applications market is "likely to grow quickly" [201], which makes it interesting for competitors to enter the infrastructure segment in order to be able to provide such services on their own.

The other field, presence services, is more about connectivity and availability [181]. Telcos have the possibility to collect presence information through their network and therefore have different sources confirming the customer's status. Possible competitors could be instant messengers which already provide such services with the disadvantage of being limited mainly to the computer.

Authentication and Billing

The need of a secure authentication is getting more vital as the web market grows and companies want a reliable source to confirm the user's identity [192]. With services like Windows Live ID there already exists a strong market presence. But despite this problem telcos can make use of their big customer base, network data and good reputation to provide an own authentication service.

Concerning billing there are already many smaller providers offering these kind of services. In this field, telecommunication companies have the advantage that they can provide billing in the already existing telephone bill.

5.4 New Competitors

This chapter deals with status-quo analysis and strategy forecasts of four different new competitors for telcos: Google, Apple, Nokia and Nintendo.

5.4.1 Google

Google was founded as an Internet search engine start-up in 1998. Today it is the most valuable brand in the world [189] and has more page visits than any other website [188]. The following part gives a sum-up about how an Internet company like Google happened to become a potential competitor for telcos. After this, the second part provides an evaluation of Google's further strategy concerning the telecommunications market.

5.4.1.1 Status Quo Analysis

Today Google is by far not a classical search engine anymore but has expanded its business to many new areas. Ralf Kaumann, consultant at Accenture, describes Google as a "meta-media group"[247]. This meta-level is supposed to be a proprietary layer above the Internet which gives access to any kind of information and offers a wide range of services. Google's general philosophy concerning new products or services has always been quite different to those from competitors: According to the technology research firm Gartner, Google "is extremely willing to introduce new services into the marketplace at the beta stage and worry about how to make them profitable and polished after they've proved themselves"[116]. In addition to that comes the openness of their products. Software programmers are even being encouraged to develop add-ons to Google products which is totally in contrast to Apple's strategy that has so far exclusively focused on an own closed miniature IT world [247].

Google primarily relies on a single source of income: 99% of Google's revenue is derived from advertisement [116]. In 2000, Google began to place advertisements associated with search keywords in text-based form on the result pages of search queries. This feature is called 'AdWords'. Additionally Google offers 'AdSense', a service that pays the website owner for placing advertisements on his website. AdWords and AdSense are also available for mobile since 2006 and 2007 respectively [153, 147]. All newly introduced service are offered for free and are solely refinanced with context-related ads.

Launched in 2004, a free email web service called *Gmail* has been Google's first step towards communication. Gmail is also accessible from mobile phones [145]. Privacy advocates have raised concerns about the fact that Google scans e-mails in order to add context-related advertisements [136]. The launch of *Google Talk* has been another important step towards becoming a player in the next-generation telecommunications market as it enables Google to offer voice calls and to receive 'presence' information from their users. Google Talk operates

very similar to *Skype* as it combines free *Voice over IP* (VoIP) functionality with an IM. Furthermore Google plans to support the widely used SIP standard in the future [148] and has already launched an application that enables making VoIP-calls on Blackberries [124]. *Google Maps* is a web service that provides street maps, satellite pictures, diverse information about businesses and route planing functionality. Google Maps can also be used on mobile devices and even supports GPS [146]. *Google Video* and *YouTube*, which has been acquired by Google in 2006 are both video platforms where users can share videos. Google Video can also search competing platforms for videos. Google acts as pure content aggregator - still both services can be seen as Google's first step into the entertainment business. *Google Checkout*, an online payment tool, *Google orkut*, a social networking platform and *Google Blogger*, a blog publishing system are also worth being mentioned as they could also be part of an integrated next-generation telecommunications strategy.

In order to ensure an even bigger coverage of its services, Google puts lots of emphasis in partnering with other firms as Google's boss for the German market Philipp Schindler confirms in an interview with Computer Reseller News [131]. Google has partnerships with diverse telecommunications companies such as Deutsche Telekom, Vodafone or China Mobile [191, 196, 161]. These collaborations range from integrating Google Search in Internet or mobile portals to offering Google applications for mobile phones.

5.4.1.2 Strategy Concerning the Telecommunications Market

Google's general strategy for the upcoming five years will be based on the same pillars as before: Open and free services, partnering and a business model that is mainly based on advertisements. Designing web services that are part of an open ecosystem, open for add-INS and free to access has proved to be the right way and is therewith unlikely to be changed [247, 167]. Partnering is and will be important for Google out of two reasons: First, Google does hardly create any content by themselves and second Google has realized that partnering - sometimes connected with the necessity to share revenues - is key in order to access a large customer base and to enter new markets [131]. At least in the U.S., lobbying is likely to become a part of Google's future strategy as well. Google showed that they are capable of lobbying when they recently enforced some changes to the Federal Communications Commission's terms (FCC) concerning the upcoming auction for the U.S. mobile network spectrum [247].

By announcing Android and declaring to plan to make a bid for the U.S. mobile spectrum, Google clearly underlined its interest in entering the mobile market. In the following we would like to analyze Google's strategy in detail.

Google's Android is supposed to become an "open and comprehensive platform for mobile devices" [179]. The Android platform is a free, open-source software bundle that includes all things necessary to run a cell phone[165, 179]. Third-

party developers are encouraged to develop their own applications by the help of a freely available software development kit. The newly founded *Open Handset Alliance* plans to develop mobile phones and services based on Android. Among the 34 members of the alliance are semiconductor companies, OEMs, software partners, wireless operators and commercialization partners [135].

Google's aim is to reduce "the complexity of the mobile world" [253] by setting a standardized platform that is able to consolidate the currently heavily fragmented mobile market and is able to run on millions of different mobile phones. If Google's plans succeed this could mean an end to the fact that the separation between hard- and software has not yet been carried out on the mobile device market. But Google's intention is not to just create a better world but to expand its advertisement business to the mobile world. This is supposed to be done by integrating Google services such as search, instant messaging or Google Maps into the devices. According to Gartner there are about 2.5 bn. mobile phone users world wide. That is twice as much as the number of people who surf the web from a PC [123]. The market research company Opus Research forecasts that the amount of money spend for mobile advertising in the U.S. and Europe is going to rise from US$ 106 million to US$ 5 billion until 2012. These numbers should give an immediate understanding for Google's plans.

Some specialists grant the Open Handset Alliance good chances but note that the project will take a lot of time as the handset base only changes incrementally [203]. Others do not believe in Android and suspect an even greater fragmentation of the market [139]. Android's success will be determined whether the platform reaches a critical mass or not. This implicates that Google needs as many partners as possible [157, 135].

Besides Google shows more and more interest in network infrastructure. In July 2007 Google and Sprint, a U.S. network carrier announced a deal about paring Sprint's yet-to-come 4G WiMAX mobile network and its location and presence detection with Google applications [162]. This shall be done by the help of a portal that also allows searching and social networking [162].

In addition to this Google has announced that it plans to bid US$ 4.6 billion for a 700 MHz wireless spectrum that will be auctioned by the FCC in January 2008 [258]. Google has already achieved some small victory as they succeeded with their claim that the winner of the auction has to set up one third of the network in a way that it can be accessed by any device or service [198]. These plans are due to the fact that Google fears that some carriers might discontinue the so called 'neutrality of networks'. Meaning that some carriers might prioritize data streams from and to their own services and simultaneously discriminate those to competitors' services in case they do not pay a fee for fast delivery [247, 258].

Google has announced that if they win the auction, they will build a completely open network that allows using any web service and moving "handsets between

carriers without onerous restrictions" [258, 198]. Whether Google will operate the network alone or with partners has not been decided so far. An ABI research analyst says that some kind of partnership seems likely as Google has no experience in running a network and the costs of building a network will be US$ 3 billion and more [258]. Besides specialists raise technical concerns: The 700 MHz spectrum does have advantages concerning its reach, nation wide coverage and low attenuation but also faces severe difficulties as there are currently no compatible devices, no radio infrastructure nor any definition for radio transmission [198].

To sum it up Google's plan to build up a mobile network bears financial risks as well as it might increase competition with mobile carriers. On the other hand this could offset the risk that carriers might discontinue the neutrality of networks. Google's non-diversified revenue stream and increasing concerns regarding privacy, security and regulation will be further threats to Google [116].

On the other hand introducing subscription services and the immense financial backing are an opportunity and a strength for Google. Google's attempt to push the mobile market with Android and introducing rich, easy-to-use mobile services are totally in favor of expanding the ad business to the mobile market [116].

5.4.2 Apple

Apple Inc. is an influential and successful device/OS manufacturing company, currently pushing into the merging telecommunication and entertainment market by the introduction of new devices and services.

5.4.2.1 Status Quo Analysis

Apple has a strong position in the mobile entertainment market: The portable media player *iPod*, introduced in 2001, has a current market share of about 75% of the portable music player market [137, 132].

The sixth generation iPod, once a simple music player, has transformed to a platform with media content capabilities and can handle movies, audiobooks and games which are bought through iTunes. It can also be used to manage photos, podcasts and contacts. Every 9 to 12 months, Apple introduces a new iPod generation in order to stay competitive in the quickly changing mobile device market [158].

Most interesting for the telecommunication market is the launch of the 'iPhone', a phone device with a widescreen display, which offers innovative touch-sensitive navigation. On the mobile media side, the iPhone has all the iPod capabilities. All services and functions are offered by *widgets*, pre-installed applications which can be started by tipping. The iPhone offers WiFi and EDGE Internet connectivity, a browser and a YouTube widget for online video

streaming. With iPhone's Internet capability, Apple is pushing into the growing mobile Internet market [134]. Apple supports the development of iPhone compatible Web applications by offering resources in its iPhone Dev Center [117]. In contrast to native applications, 'Web Apps' can only be accessed using an Internet connection and are not integrated into the iPhone device. The Web App capabilities have shown great feedback and resonance [169] and many Web 2.0 companies have already adopted their services to the iPhone [118]. Although being launched in the U.S. in June 2007, the iPhone will have conquered a quarter of the U.S. mobile smart phone market by the end of 2007 [122], according to NPD Research Group. The start in Europe in November 2007 has also shown to be successful [127].

The 'iPod Touch', new member of the iPod family, is basically an iPhone with lacking mobile phone and e-mail functions. Targeting the mobile Internet market as well, the lower-priced iPod touch is part of Apple's *iPhone Nano* strategy, similar to offering a lower-priced iPod Nano with lacking features compared to the iPod. In order to avoid sales cannibalization, the higher-priced iPhone was strategically introduced before the iPod Touch [195].

The main reason for Apple's success in the mobile device/OS market is the focus on a unique, modern design as well as an easy-to-use interface, rather than on high-end hardware specifications [141], similar to Nintendo's Wii strategy.

With its media content service *iTunes*, Apple possesses 70% of the digital music market [149]. Apple enters the mobile media content market by integrating the iTunes software into the iPhone/iPod Touch, which allows the user to buy media content directly on the device using its Internet connection. This move is similar to Apple's iPod-iTunes lock, which has boosted the iTunes sales significantly [142]. Nevertheless, it is unlikely that Apple will continue its closed-system approach [130] in the way it is today, especially in a market heading for modularization and standardization.

This weakness affected Apple's new move towards the home entertainment market, *Apple TV*, a set-top-box which can wireless sync high-definition media content of the iTunes library with Macs and PCs and play them on TV. AppleTV has an Internet connection which is limited to searching and streaming videos from YouTube online and to the iTunes Store. Apple TV is easy-to-use, but does not allow any modifications to the device. It has had a far less successful start than the other Apple device launches [202].

Apple's marketing strategy relies on press events like the annual *Apple Keynote* [125]. The presentation of new devices comprises the highlighting of the unique design/interface and the presence of the Apple logo. As a result, most of Apple's marketing is done indirectly by the press. This strategy has established the Apple branding as one of the best-known brands, being connected with a young and innovative character by the public [128]. The indirect marketing for the iPhone is estimated to be equal to a 400 million Euro campaign [172].

Looking at the recent product launches and Apple's service-device integration,

the status quo and short-term approach of Apple is mainly the branding-driven introduction of new devices, focusing on entertainment features.

5.4.2.2 Strategy Concerning the Telecommunications Market

Apple's new devices which have hit the market from mid-2006 reveal Apple's strategy: The long-term approach will be to establish the introduced devices as content service platforms [211].

In order to hold up the iPhone hype, Apple will release annual updates to its mobile devices adding lacking features like UMTS and video recording [173]. Besides, Apple will have to give up the provider-lock of the iPhone due to legal reasons in Europe [184, 170]. Since the smart phone market currently comprises only about 6% of the total mobile phone market [120], many analysts believe that Apple will introduce a low-end smaller *iPhone Nano* in order to address the rest of the market [175]. Concerning the mobile entertainment market, the iPod Touch is considered to play the same role.

In 2008 Apple will start offering restricted support for native third-party software [121] in order to expand the features of the devices by these services. But full support and integration will probably be limited to a very small number of applications and companies which do not directly compete with Apple and iTunes, like some Google services. Furthermore the more open support for iPhone compatible Web 2.0 applications, i.e. through the Dev Center, will form an active private and business developer community around the device, similar to the podcast community around the iPod. As a result, Apple will increasingly focus on stressing its own media services with its brand, which will be the only pre-installed media content services. In contrast to the current strategy focus, the innovation on the service side will be valued higher than the device [125].

Despite partially opening the platform for third-party Web applications, the closed-system approach will continue to be one of the key components in Apple's strategy, especially when it comes to preloaded service control and the iTunes store. Due to the restrictive iTunes licensing policy, Universal and NBC have stopped offering their content through iTunes store [114, 115], focusing on own media content services. As the relationship between the other content providers like Sony are as fierce as the former Universal-Apple relationship, these companies might follow. Such a development would be extremely destructive to the iTunes market share, as one of the major aspects of iTunes' success, besides its integration, has been the completeness of the media content offering. Furthermore, it is most unlikely for Apple to hold a nearly 70% market share in the competitive and diversifying digital music market.

There are many indications that Apple will head for the business mobile services market: Most areas of the entertainment market are saturated and iTunes is, as pointed out previously, facing serious problems. Moreover, the capabilities of the iPhone like Mail, Contacts and Google Maps can easily be

integrated into a business service model. Although the need for Internet access and on-demand mobile content is still in an early adoption phase [129, 163], the need for device-based services will arrive at the famous peak of expectations in the next 2 to 5 years [173, 129] due to the transition from fixed to full mobile environments, at the peak by 2010 [151, 134], and the spread of smart phones, especially in the business area. Interesting candidates for new integrated Apple services could be the '.Mac Services', which have recently been expanded to offer file and media sharing, group/community services, mailing and messaging and an online storage service. Another indication of Apple's future service orientation is the present iPhone campaign [155], which increasingly presents services available on the iPhone.

While the influence of the iPhone as a future standard in many parts seems out of question, Apple TV is a different matter. Apple TV is a product with a "closed system" OS among many other similar products in the home entertainment market [151]. Due to the lack of extensibility, Apple TV offers no special value to the user compared to other products, which is also indicated by the currently low sales [202, 114]. At the current state, this device will gain no considerable market share [202]. As Apple has never relaunched a product which has not met the company's expectations [156], it is most unlikely that there will be an *Apple TV 2* device. In order to access the growing home entertainment market [138], Apple will have to launch a new product with a new design and branding which is not directly affiliated with Apple TV, offering lacking features like video recording, full web access and IPTV. The launch of such an 'Apple TV Pro' device within the next 2 years could be a considerable move, especially because of the low development costs and the already available production resources for Apple TV. This device could become a successful platform for on-demand iTunes media content and similar integrated Apple services.

5.4.3 Nokia

As the world's largest manufacturer of mobile telephones [178], Nokia has influenced the telecommunication market for some time. Considering Nokia's recent endeavors into the domain of services, they have to be regarded as new competitors for traditional telecommunication providers.

5.4.3.1 Status Quo Analysis

Until recently Nokia has profited from the expanding mobile device market. They are offering a variety of different devices, ranging from mobile phones and PDAs to handheld consoles. However, the main strength of Nokia lies in the segment of mobile phones, since products like the *Nokia Internet Tablet* or the *N-Gage* had little success on the market [194]. Traditionally Nokia has been working closely with network operators in order to distribute its products, offering them at a cheap price bundled together with a contract

for the respective telecommunication provider. In addition to their hardware expertise, Nokia is also involved in the software that runs on their devices. They are the biggest share holder in Symbian Limited, the developer of the operating system 'SymbianOS' that is used in many Nokia devices [190]. This allows Nokia to influence the applications and services that are available on their mobile phones.

Despite their strong position on the mobile device market, there have been some threatening developments for Nokia lately. They are struggling with numerous old competitors like Samsung or Sony Ericsson as well as new ones like Apple and potentially Google. This fight for market share is intensified by the fact that the global market has been slightly declining lately [160]. Another big problem for Nokia could be the end of subsidization of their devices by network operators, in which case Nokia would loose their primary contact to the customers [119].

5.4.3.2 Strategy Concerning the Telecommunications Market

Starting 2008, Nokia will be reorganized into three primary divisions, one of which will be called services and software [236]. This can be seen as an attempt by Nokia to intensify customer relationships and open new sources of revenue by pushing into the service domain. Nokia's dedication to this strategy is evident when looking at the various different services that have recently been launched or are planned to be offered soon.

With their own mobile ad service Nokia is hoping to get their share of the $11 billion that are estimated to be invested into mobile marketing by 2011 [183]. Nokia is also planning a number of services using the location information available on GPS capable phones like the 'Nokia N95', including location targeted ads. Further location based services like maps for navigation are also planned and Nokia's commitment can be seen in the acquisition of Navteq, a leading supplier of digital maps [177].

Furthermore, Nokia is working on bringing social networks to mobile devices. On the one hand Nokia has been building up their own community portal called 'MOSH', which is currently in beta phase. On the other hand 'Twango', a social networking site specialized in easy sharing of files in different multimedia formats, has recently been purchased by Nokia [200].

At the heart of Nokia's service strategy lies *Ovi*. The plan is to offer all of Nokia's mobile services using a unified service platform. Besides Nokia's map service, Ovi features the N-Gage, Nokia's music store and a service for storing and sharing photos. Going up against Apple's iTunes will be tough for Nokia, but the music store shows that Nokia is not willing to give the entertainment sector up without a fight. Their updated model of the Nokia N95 features 8GB of memory, providing enough space for downloadable content. In their effort to build up Ovi, Nokia is betting on partnering with network operators and

has recently succeeded in getting Telefónica and Vodafone on board [180]. It is likely that Nokia will continue looking for big partners as they are necessary for them to prevail against Apple or Google when it comes to mobile services.

Another indicator for Nokia's strategy is their decision to stop in-house development of semiconductors for most of its mobile phones and outsource the business to third parties [159]. This decision underlines the strategic shift from hardware manufacturer to service provider.

5.4.4 Nintendo

Big console manufacturers like Nintendo have the potential to become strong competitors in the service segment. Online connectivity is standard feature in the current generation of consoles and a variety of online services are either planned or already available.

5.4.4.1 Status Quo Analysis

Nintendo has been very successful with their latest console named 'Wii'. Despite being released roughly a year after Microsoft's *XBox 360*, the Wii is currently leading in the console market with over 13 million units sold [176]. This huge user base is one of Nintendo's biggest strengths, meaning that their platform for delivering online services is already deployed in millions of households worldwide. Nintendo controls the distribution of development kits and the release of software for the Wii. Another strength lies within the system itself: it is designed to be connected to the Internet 24/7 via a service called *WiiConnect24*. Its interface is controlled using the intuitive pointing abilities of the *Wiimote* controller and was designed to support a variable number of *WiiChannels*. Some of these channels are already providing online services, e.g. the news, weather or shopping channel. The Wii also allows for browsing the web and sending text messages to other users. Another strong pillar of Nintendo's success is the handheld *Nintendo DS* system. It has online capabilities as well, but their use is mostly limited to online multiplayer games.

Although Nintendo's position is strong, it has some weaknesses as well. The Wii's critics often question the longevity of its success [152]. One reason for such skepticism is the relatively weak hardware compared to the XBox 360 or the Playstation 3. The hardware limitations are going to bar Nintendo from offering some services. For example, the Wii is not capable to output video at HD resolution. Further, the Wii lacks a hard drive, which means that only a small amount of data can be stored on the console. Another problem for Nintendo is their image, as they are best known for their child friendly games. Even though Nintendo has been working on changing this image, it could make it difficult for them to sell certain services.

The current trend of casual gaming should be seen as an opportunity for Nintendo, as it could bring new audiences to their console, including adults who

are interested in online services and able to pay for them [140].

5.4.4.2 Strategy Concerning the Telecommunications Market

An important part of Nintendo's strategy for the next couple of years will be providing software for their current hardware. This also includes offering new online services in the form of new WiiChannels. Several names that have been registered by Nintendo hint at the nature of the new channels, e.g. *!!M* is believed to be the name of an upcoming channel for instant messaging [166]. Another possibility could be a social networking channel on the Wii. The classical console cycle is roughly 5 to 6 years, meaning that a next generation Nintendo console could be expected around 2012. However, Nintendo's CEO Satoru Iwata has been quoted saying that Nintendo is looking for more flexibility in bringing new products to the market. It is possible that Nintendo will release an upgraded Wii considerably earlier than 2012 to catch up with the technology of its competitors [197, 144]. The next mobile system by Nintendo could arrive even earlier, because the Nintendo DS has already been available since 2004. In combination with the growing availability of mobile Internet the next handheld could become a strong platform for mobile communication and online services. As Nintendo has not attempted to monetize services so far, they could be open for a partner in order to establish a profitable business model based on services.

5.5 Strategic Implications for Telcos

Besides the above discussed companies which are the respective key players from different fields, there are also other companies that are worth being considered. For example, Microsoft resembles Google in many areas - except the focus on openness. Furthermore IBM is currently vertically integrating communication services into their portfolio and has a lot of experience in integrating applications, platforms and hardware into full solutions [150, 164].

Looking at the market, one can determine three main trends: First, the market heads to a "convergence between communications, information and applications" [116], resulting in growing importance of content and services. Second, competition will definitely increase as most of the services offered by new competitors "start to destroy value for the telecom operators" [119]. Third, service enablers become more and more standardized (e.g. Google's 'Open Social') and can be put together like modules when designing a new service. In order to ensure that the new competitors' services are widely used they push more and more towards owning service platforms as well [135], competing directly with the telcos.

In case the carriers do not participate in this new development, they are in danger of being relegated to pure bit-pipe providers [116, 119]. Carriers should provide innovative services by themselves that ideally are open to users from

other networks [116], or partner with web players and content owners in order to offer services that go beyond their capabilities [119]. Another interesting partner could be video console manufacturers as they have already made the critical step into the living-rooms. Focusing on large business customers might also be a chance as this field is "still largely unclaimed" [116]. Another chance for integrated telecommunication players is convergence, meaning the "seamless integration of services across different access methods" [119]. Furthermore telcos should think about forming an international strategic alliance among telecommunication providers in order to be better positioned against new competitors. A unified global customer base that is not regionally limited and a joint effort in developing innovative network neutral services could boost the telcos' chances in this new competition.

References

[114] S. Abdi. Forbes bezeichnet Apple TV als Flop, 2007. URL http://www.computerbase.de/news/consumer_electronics/2007/september/forbes_apple_tv_flop/. Last accessed 24.11.2007.

[115] S. Abdi. Preisstreit: Keine NBC-Inhalte mehr bei iTunes, 2007. URL http://www.computerbase.de/news/internet/webdienste/2007/september/preisstreit_keine_nbc-inhalte_itunes/. Last accessed 24.11.2007.

[116] K.M. Adams, J.-C. Delcroix, T. Chamberlin, and L. Leong. Google's Strength Pose Threat to Carriers, Others. *Gartner*, page 6, 2006.

[117] Apple, Inc. iPhone Dev Center, 2007. URL http://developer.apple.com/iphone/devcenter/. Last accessed 25.11.2007.

[118] Apple Inc. iPhone Webapps, 2007. URL http://www.apple.com/webapps/. Last accessed 27.11.2007.

[119] Arthur D. Little. *Web reloaded? Driving convergence in the "real world"*, chapter 4, pages 26–39. 2006.

[120] E. Auchard and S. Carew. Google enters mobile phone market, 2007. URL http://news.yahoo.com/s/nm/20071106/wr_nm/google_wireless_dc. Last accessed 29.11.2007.

[121] S. Aughton. iphone third-party apps support finally on agenda, 2007. URL http://www.itpro.co.uk/news/127322/iphone-thirdparty-apps-support-finally-on-agenda.html. Last accessed 25.11.2007.

[122] S. Aughton. iPhone seizes a quarter of US smartphone market, 2007. URL http://www.macuser.co.uk/macuser/news/140901/iphone-seizes-a-quarter-of-us-smartphone-market.html. Last accessed 27.11.2007.

[123] J. Berke and M. Kroker. Alle gegen Microsoft. *Wirtschaftswoche*, (47), 2007.

[124] Blackberry. Google Talk. URL http://www.blackberry.com/devicesoftware/entry.do?code=gtalk. Last accessed 27.11.2007.

[125] R. Block. Live from Macworld 2007: Steve Jobs keynote, 2007. URL http://www.engadget.com/2007/01/09/live-from-macworld-2007-steve-jobs-keynote/. Last accessed 29.11.2007.

[126] capital.de. United Internet schließt mit Vodafone ein Bündnis. URL www.capital.de/div/100006060.html. Last accessed 24.11.2007.

[127] Capital.de, dpa. T-Mobile verkauft am ersten Tag ueber 10.000 iPhones, 2007. URL http://www.capital.de/unternehmen/meldungen/795137.html?nv=smart. Last accessed 29.11.2007.

[128] B. Chaffin. iPod Helps Apple Edge Out Google ForGlobal Brand, 2005. URL http://www.macobserver.com/article/2005/01/31.1.shtml. Last accessed 27.11.2007.

[129] J. Chapman, A. Chetham, N. Ingelbrecht, E. Jopling, T.J. Hart, N. Gupta, E. San Miguel, A. Sabia, A. Zimmermann, A. Liang, C. Milanesi, A. Daum, P.A. Reali, S. Shen, T.H. Nguyen, A. Frank, M. Basso, and S. Pittet. Hype Cycle for Global Consumer Communications Services. *Gartner*, 2007.

[130] T. Claburn. Is A Closed iPhone Doomed To Fail?, 2007. URL http://www.informationweek.com/industries/showArticle.jhtml?articleID=196802882. Last accessed 25.11.2007.

[131] Computer Reseller News. Ohne Partnerschaften läuft bei Google gar nichts. URL http://www.crn.de/news/showArticle.jhtml?articleID=202601509. Last accessed 25.11.2007.

[132] P. Cruz. U.S. Top Selling Computer Hardware for January 2007, 2007. URL http://www.bloomberg.com/apps/news?pid=conewsstory&refer=conews&tkr=AAPL:US&sid=ap0bqJw2VpwI. Last accessed 25.11.2007.

[133] Dialog Consult / VATM. Der deutsche Telekommunikationsmarkt - Zehn Jahre Liberalisierung im Festnetzmarkt. URL http://www.vatm.de/content/studien/inhalt/16-10-2007.pdf. Last accessed 21.11.2007.

[134] K. Dulaney and B. Hafner. Predicts 2007: Mobile Devices and Applications Reflect Key Changes at Work and Home. *Gartner*, 2007.

[135] K. Dulaney, R. Cozza, and F. Troni. Google-Sponsored Mobile Platform Likely to Be a Market Force. *Gartner*, 2007.

[136] Electronic Privacy Information Center. Gmail Privacy Page. URL http://www.epic.org/privacy/gmail/faq.html. Last accessed 27.11.2007.

[137] D. Eran. Market Share Myth 2007: iPod vs Zune and Mac vs PC, 2007. URL http://www.roughlydrafted.com/RD/RDM.Tech.Q1.07/FFE4A8E2-9816-4344-9FB0-61BED246674C.html. Last accessed 25.11.2007.

[138] J. Erensen. Apple Focuses on Video and the Digital Living Room. *Gartner*, 2006.

[139] Financial Times. Will Android be Google's transformer? URL http://www.ft.com/cms/s/0/019484b0-8c93-11dc-b887-0000779fd2ac.html. Last accessed 24.11.2007.

[140] I. Fried. Casual games get serious. URL http://www.news.com/Casual-games-get-serious/2100-1043_3-6071465.html. Last accessed 30.11.2007.

[141] K. German and D. Bell. Apple iPhone Review, 2007. URL http://reviews.cnet.co.uk/mobiles/0,39030107,49286836,00.htm. Last accessed 27.11.2007.

[142] J. Gibs. iPod sales boost iTunes popularity, 2006. URL http://www.999today.com/technology/news/story/2611.html. Last accessed 29.11.2007.

[143] B. Gibson. Juniper Research, . URL http://www.juniperresearch.com/shop/viewpressrelease.php?id=81&pr=45. Last accessed 26.11.2007.

[144] E. Gibson. "Wii 2" could be here within the next few years, says Pachter, . URL http://www.gamesindustry.biz/content_page.php?aid=25843. Last accessed 30.11.2007.

[145] Google. Lesen und beantworten Sie E-Mails von unterwegs, . URL http://www.google.com/intl/de_de/mobile/mail/. Last accessed 29.11.2007.

[146] Google. Enhance your Google Maps experience with GPS, . URL http://www.google.com/gmm/gps.html. Last accessed 23.11.2007.

[147] Google. Google AdSense for Mobile unlocks the potential of the mobile advertising market, . URL http://www.google.com/intl/en/press/annc/20070917_mobileads.html. Last accessed 24.11.2007.

[148] Google. Google Talk and Open Communications, . URL http://code.google.com/apis/talk/open_communications.html. Last accessed 25.11.2007.

[149] J. Graham. EMusic's pitch: Download song - and own it, 2006. URL http://www.usatoday.com/tech/products/services/2006-07-30-emusic_x.htm. Last accessed 25.11.2007.

[150] W.L. Hahn, R. Cowles, and M. Harris. IBM will profit from tomorrow's telecom environment. *Gartner*, 2006.

[151] D. Haskin. Analysis: Will Apple TV be bigger than iPhone?, 2007. URL http://www.macworld.com/news/2007/03/19/appletv/index.php. Last accessed 24.11.2007.

[152] B. Hastings. 10 Reasons Why PS3 Will Win This Console Generation. URL http://www.n4g.com/ps3/News-32115.aspx. Last accessed 30.11.2007.

[153] Heise. Google testet Mobile Ads in Deutschland. URL http://www.heise.de/newsticker/meldung/77867. Last accessed 23.11.2007.

[154] heise.de. Der Kampf um die Netzneutralität. URL http://www.heise.de/ct/hintergrund/meldung/92819. Last accessed 28.11.2007.

[155] V. Heiskanen. Apple's IPhone Generates Buzz That May Top Mustang, 2007. URL http://www.bloomberg.com/apps/news?pid=20601109&sid=ao8.A9Aiie9E&refer=home. Last accessed 29.11.2007.

[156] A. Hesseldahl. Remember the Apple Flops?, 2007. URL http://www.businessweek.com/technology/ByteOfTheApple/blog/archives/2007/03/remember_the_ap.html. Last accessed 29.11.2007.

[157] T. Hoppe and J. Koenen. Google plant Handy-Betriebssystem. *Handelsblatt*, (214), 2007.

[158] T. Hormby and D. Knight. A History of the iPod: 2000 to 2004, 2005/2007. URL http://lowendmac.com/orchard/05/1014.html#1. Last accessed 25.11.2007.

[159] D. Ibison. Nokia to outsource mobile phone chips. URL http://search.ft.com/ftArticle?id=070808011768. Last accessed 30.11.2007.

[160] IDC. Handheld device market down but not dead. URL http://ce.tekrati.com/research/9674/. Last accessed 30.11.2007.

[161] internetnews.com. Google und China Mobile Starten Suche-Service. URL http://de.internet.com/index.php?id=2046945. Last accessed 27.11.2007.

[162] Internetnews.com. Sprint, Google Partner on WiMAX For Mobile Web. URL http://www.internetnews.com/wireless/article.php/3691061. Last accessed 27.11.2007.

[163] Nick Jones. Mobile Web Trends 2007 to 2011. *Gartner*. (25.11.2007).

[164] E. Jopling. New Entrants Will Shake Up The Telecom Industry. *Gartner*, 2006.

[165] O. Kharif. Google's New Cell-Phone Universe. *Business Week Online*, 2007.

[166] P. Klepek. New Wii Trademarks Discovered. URL http://www.1up.com/do/newsStory?cId=3151576. Last accessed 30.11.2007.

[167] T. Knüwer. Was würde Google tun? *Handelsblatt*, (214), 2007.

[168] R. Kowalewsky. Telekom-Vertriebspartner United Internet droht mit Wechsel. URL http://www.capital.de/div/100006817.html. Last accessed 22.11.2007.

[169] T. Krazit. Apple puts up iPhone Web app directory, 2007. URL http://www.news.com/8301-13579_3-9796109-37.html. Last accessed 25.11.2007.

[170] Mactechnews. iPhone ohne SIM-Lock fuer 999 Euro, 2007. URL http://www.mactechnews.de/index.php?id=18440. Last accessed 29.11.2007.

[171] A. Maier. Skype und 3 bauen mobile Internettelefonie aus. URL http://www.ftd.de/technik/it_telekommunikation/:Skype%20Internettelefonie/272055.html. Last accessed 21.11.2007.

[172] F. Matthey. iPhone-Berichterstattung ist fuer Apple 400 Millionen wert, 2007. URL http://www.macwelt.de/news/ipod/344303/index.html. Last accessed 28.11.2007.

[173] M. McGuire, V.L. Baker, and H.G. De La Vergne. iPhone to Reset Road Map for Mobile Content. *Gartner*, 2007.

[236] C. Milanesi and L.-O. Wallin. Nokia Reorganization Reflects Consumerization of IT. *Gartner*, 2007.

[175] P. Müller. iPhone Nano soll noch heuer kommen, 2007. URL http://www.macwelt.de/news/iphone/347225/. Last accessed 28.11.2007.

[176] Nintendo. Consolidated Financial Statements. URL http://www.nintendo.co.jp/ir/pdf/2007/071025e.pdf. Last accessed 30.11.2007.

[177] Nokia. Nokia to acquire NAVTEQ, . URL http://www.nokia.com/A4136001?newsid=1157198. Last accessed 30.11.2007.

[178] Nokia. Quarterly and Annual Information - Q3 2007, . URL http://en.wikipedia.org/wiki/Nokia. Last accessed 30.11.2007.

[179] Open Handset Alliance. Industry Leaders Announce Open Platform for Mobile Devices. URL http://www.openhandsetalliance.com/press_110507.html. Last accessed 26.11.2007.

[180] M. Palmer. Nokia sees opportunity in Ovi-Vodafone deal. URL http://www.ft.com/cms/s/0/6e83aa58-8d63-11dc-a398-0000779fd2ac.html. Last accessed 30.11.2007.

[181] J. Porus and M. Ellis. Location-Based Services and Presence Technology: The Future of Telecommunications is Closer Than You Think. URL http://www.harrisinteractive.com/news/newsletters/HarrisReport/HI_TheHarrisReport_2007_v02_i01.pdf. Last accessed 25.11.2007.

[247] A. Postinett. Konkurrenten reagieren ratlos auf dern Erfolg des Internetunternehmens - Das Prinzip Google. *Handelsblatt*, (23), October 2007.

[183] M. Reardon. Nokia introduces mobile ad services. URL http://www.news.com/2100-1039_3-6164800.html. Last accessed 30.11.2007.

[184] S. Rechsteiner. Orange verkauft das iPhone ab November ohne SIM-Lock, 2007. URL http://www.macprime.ch/news/article/orange-verkauft-ab-november-iphone-ohne-sim-lock/. Last accessed 29.11.2007.

[185] M. Ross, S. Aldrin, M.D. Pedersen, and C.S. Kälin. Telecom Industry Value Opportunities for Private Equity - Episode 2: The Telecom Enabler. T-Labs White Papers.

[186] M. Ruhfass. MySpace launches exclusive mobile partnership with Vodafone. URL http://www.mobileburn.com/pressrelease.jsp?Id=3110. Last accessed 27.11.2007.

[253] H. Schmundt. Erlösung durchs Jesus-Phone. *Spiegel*, (46), 2007.

[188] Spiegel Online. Google Beliebter Als Microsoft, . URL http://www.spiegel.de/netzwelt/web/0,1518,479583,00.html. Last accessed 20.11.2007.

[189] Spiegel Online. Google ist wertvollste Marke der Welt, . URL http://www.spiegel.de/wirtschaft/0,1518,478914,00.html. Last accessed 21.11.2007.

[190] Symbian Limited. Symbian Fast Facts - Q3 2007, 2007. URL http://www.symbian.com/about/fastfacts/fastfacts.html. Last accessed 30.11.2007.

[191] T-Mobile. T-Mobile and Google agree on partnership. URL http://www.t-mobile-international.com/CDA/pr_tmo_-_partnership_google,20,,newsid-3996,en.html?w=1057&h=811. Last accessed 20.11.2007.

[192] Telco 2.0. Telcos as digital identity enablers, March 2007. URL http://www.telco2.net/blog/2007/03/telcos_as_digital_identity_ena.html. Last accessed 25.11.2007.

[258] The Wallstreet Journal Online. Google has even bigger plans for mobile phones. URL http://online.wsj.com/article/SB119517445580795065.html. Last accessed 26.11.2007.

[194] I. Thomson. Nokia holds fire on mobile gaming. URL http://www.vnunet.com/vnunet/news/2146487/nokia-holds-fire-mobile-gaming. Last accessed 30.11.2007.

[195] TidBits-Staff. Apple Introduces iPod Touch, Wi-Fi iTunes Store, and New iPods, 2007. URL http://db.tidbits.com/article/9152. Last accessed 27.11.2007.

[196] Vodafone. Vodafone Live! to offer Google Maps for mobile alongside Google search, 2007. URL http://www.vodafone.com/start/media_relations/news/group_press_releases/2007/vodafone_live___to.html. Last accessed 19.11.2007.

[197] S. Watts. The Console Cycle Is Outdated. URL http://www.1up.com/do/newsStory?cId=3164150. Last accessed 30.11.2007.

[198] H. Weiss. Google plant eigenes Mobilfunknetz. *VDI Technik und Wirtschaft*, (31), 2007.

[419] B.W. Wirtz, H. Burda, and W. Raizner. Deutschland Online - Zukunft des Breitband Internets. URL http://www.studie-deutschland-online.de/do4/DO4-Berichtsband_d.pdf. Last accessed 20.11.2007.

[200] S. Withers. Nokia buys twango social media site. URL http://www.itwire.com/content/view/13682/598/. Last accessed 30.11.2007.

[201] S. Wolfe. VCs Back Location-based Services. URL http://www.redherring.com/Home/21422. Last accessed 26.11.2007.

[202] S. Woolley. The iFlop, 2007. URL http://www.forbes.com/business/forbes/2007/1001/046.html. Last accessed 24.11.2007.

[203] ZDNET. Google: Wird Android die Handy-Branche aufmischen?, . URL http://www.zdnet.de/itmanager/kommentare/0,39023450,39158860,00.htm. Last accessed 24.11.2007.

Part II

Scenarios and Business Ideas

Chapter 6

6 Enabler Platform

Christoph Baumeister, Andreas Hackel, Anup Koyadan Chathoth, Steffen Wenz

As the result of a detailed scenario analysis about the telecommunications market in 2012, we choose to create an Enabler platform for a scenario which is marked by intense competition. The suitable Enabler Platform should be launched by the help of a three stage strategy: First the platform is closed but selected flagship applications are available. In the second stage the platform is partly opened up, but every application or service needs certification by the Telco. In the third and final stage, the platform is totally open. The platform offers standardized access to all the Telcos' enablers via one API and is accompanied by an EnableDev. The EnableDev contains a software development kit and a developer community which become relevant for stages two and three. In order to be able to serve a large customer base, strategic partnerships or an alliance are necessary. For being able to address subscribers from different carriers and to ensure high quality Enablers, partnerships with other telcos and third party Enabler providers are needed. Furthermore partnering with device manufacturers and well-known Web 2.0 players makes it easier to establish the platform on mobile phones and to guarantee the availability of popular applications that make use of the Enabler platform. The Telco charges the application providers per use of the enablers or negotiates revenue sharing deals.

6.1 Introduction

The recent developments in the telecommunications domain point to a trend towards becoming an all IP network. These Next Generation Networks (NGN) will offer a more powerful infrastructure to serve the users and are discussed in more detail in this report. However, the telcos are afraid that, there are certain trends towards reducing them to bit pipes. In order to circumvent such a situation, telcos have been attempting to build on their core strengths and a crucial part of such a strategy has been the Enablers. The Enablers are expected to equip the telcos to tide over the coming of IP networks by placing them in a position to serve the Web X.0 applications and the users better. This is expected to be a new source of potential revenues and this report is an attempt to explore how the telcos can achieve this. The report discusses the Enabler platform product as the solution to making the Enablers marketable.

The report has been structured in the following way. Section 6.2 contains the analysis of various drivers that are expected to influence how the telecom domain will shape up in the coming years. Using these drivers a scenario analysis has been performed to arrive at the possible scenarios, telcos might face in 2012. The details of the procedure of scenario analysis, as well as the possible scenarios and a chosen scenario for telcos to work on are presented in section 6.3. Section 6.4 discusses the details of the enabler platform that is proposed to be developed for coping with this scenario and increasing telcos standing under such a scenario. This section contains the description of the platform and the developer community to be implemented along with it. This section also discusses the strategies for marketing such a product and potential revenue sources. A generic road map for the telcos to follow in developing the product is also detailed. Finally, in section 6.5, the concluding remarks are presented.

6.2 Driver Analysis

In order to come up with realistic and relevant scenarios, the most influential drivers for the future development of a certain industry have to be identified and analyzed. In the following section we describe the relevant drivers for the situation of the telecommunication industry in 2012. For this purpose we will analyze drivers and their possible projections concerning technology, regulation, value chains, market and competition (see figure 6.1).

6.2.1 Technology

The first chapter describes how mobile networks and mobile operating systems could look like in 2012.

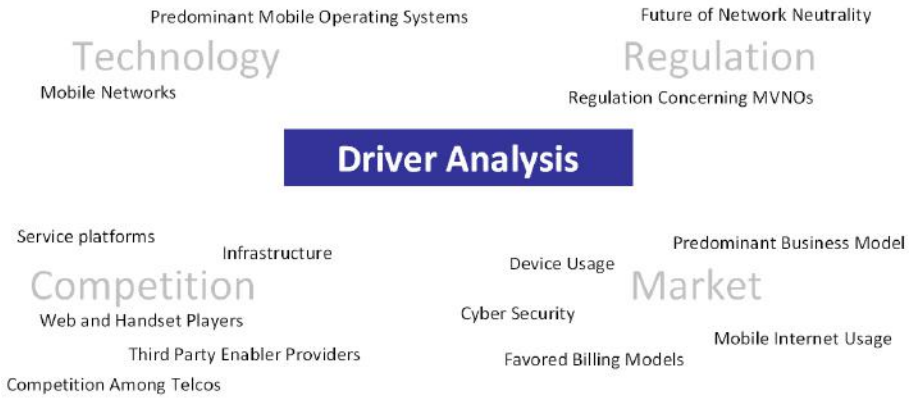


Figure 6.1: Categories and drivers used for the driver analysis
Source: Own Illustration

6.2.1.1 Mobile Networks

One possible development of mobile networks could be that all major carriers will have implemented next generation networks (NGN) and that fourth-generation (4G) technologies will be on the rise. The key difference of a network that has NGN attributes in contrast to the currently common ones is that it is a packet based network which is independent of access technology. NGN is often also referred to as "all-IP" networks which is due to the fact that normally the Internet protocol (IP) framework is used to "form" the transmitted packets. One key aspect of NGN is the IP Multimedia Subsystem (IMS) which defines "applications and services [that] are delivered to customers, regardless of which network they run on" [254]. A 4G network standard has not finally been defined yet but will probably allow peak data rates of 100 Mbit/s [233]. The deployment of 4G networks and all-IP networks are not dependent on each other but stand for a positive development from a technological point of view.

Another possible projection is that the development of mobile networks stagnates and that they do not undergo a radical change until 2012. NGNs might not be deployed until then, because despite the expectation to be able to save operating costs, the high initial investment costs and the yet-to-define interoperability between operators might be hindering aspects [245]. Besides the mobile network operators might try to "extend the life of 3G infrastructure" [233] by applying HSDPA and HSUPA technologies in order to get sufficient returns on the costly 3G investments before they start to invest again.

6.2.1.2 Predominant Mobile Operating Systems

How the mobile operating system landscape will look like in 2012 is key for determining how easy or hard it will be to address a critical mass by mobile services.

One possible projection is that Google's attempt to set a standard for mobile operating systems with the Open Handset Alliance will succeed. This might become a role model for others which will then lead to a market that is dominated by two to three players that provide totally open and standardized operating systems. In this case "open" does not necessarily mean open source. It means that applications from third parties can be installed without any problems, provided that software development kits exist which enable programmers to create applications that run on all, e.g. Android phones without any necessary modifications. The separation between hardware and software would lead the mobile world to a rapid rise as exactly such a development brought the PC market in the 80's to where it is today [253].

A second possible outcome could be that there is still a large variety of proprietary operating systems that exist next to open ones [231]. Coming back to the Google example, this would mean that Android has not yet or maybe will never become the major platform for mobile handsets but that all operating system producers have realized that openness is key for a positive development of mobile phones. Surprisingly one can name Apple as an example for such a development. As from 2008, native third-party software for the iPhone will receive (restricted) support from Apple [205].

Considering that opening up does not necessarily lead to the expected success, mobile operating systems makers such as Symbian, Microsoft, Research In Motion OS or Apple could also just turn around their strategies. This would mean that we face a mostly closed and heavily fragmented mobile operating system market in 2012 - just as it is today [253].

6.2.2 Regulation

Next we will have a look at how the influential regulation might affect the future development of the telecommunication industry.

6.2.2.1 Future of Network Neutrality

Network neutrality means that all data streams are sent and received without any discrimination within a network such as the Internet. This means that carriers simply transfer each data package without any distinction [258, 247]. Currently neutral networks are standard. Thus one projection is that all websites, platforms and contents are handled equally until 2012.

The other possible projection means that network operators discontinue the neutrality of networks in order to earn money with it. Two ways of monetary

valuation are thinkable: Demanding money from service providers for the pure possibility to deliver a service to the operator's subscribers or charging service providers for different levels of quality, e.g. VoIP transmission quality or priority of video streams. The former is quite unrealistic to happen as the European Commission is closely watching this development. Currently they simply trust on market mechanisms to solve this problem but if this does not work they will interfere [239]. But the latter could have become reality until 2012. On the one hand this would be a new source of revenue for telcos, on the other hand it is unclear how such a change will influence the Telcos' relationships to service providers.

6.2.2.2 Regulation Concerning MVNOs

Mobile Virtual Network Operators (MVNOs) do not own any wireless spectrum nor do they own all required infrastructure in order to act as mobile network operators (MNOs). They simply pay MNOs for being allowed to use their network and offer mobile telephony services to their own customers under some distinct brand [238].

At the moment, regulation in Germany does not require open access for MVNOs. That means that telcos are not legally required to open their spectrum. This is only due to the fact that competition in the mobile telecommunications industry in Germany works very good. In other countries like Ireland and France, mobile operators were forced by the European Commission to open their networks to MVNOs [227]. Further, in the U.S. Google managed to achieve that one third of the yet-to-be-auctioned 700 MHz spectrum has to be kept open for services from third parties [223].

This leads to two possible projections: Either telcos are able to control and negotiate whom to open their networks or they will be legally required to open their spectrum to anyone who wants to operate a MVNO.

6.2.3 Market

The forth main category we analyzed in order to come up with drivers for our scenario analysis is the development of the market for telecommunications solutions. The drivers are partly on a quite general level while others are also very specific for some selected topics.

6.2.3.1 Device Usage

The way how people will use their cell phone(s) in 2012 determines possible sub-markets and their respective size.

According to a 2007 TNS Infratest data ascertainment the majority of users do not use any services other than calling, SMS or taking photos [218]. Only 16% listen to the radio via their cell phone on a regular basis, 13% use their

cell phones to surf in the Internet and 14% visit mobile news pages [218]. TNS Infratest compared these results with other European countries and Germany is only positioned in the midfield or even last - depending on the category used for the comparison.

With the status quo in mind, it is obvious that the current situation could either continue or improve. For example in the TNS Infratest analysis, 22% of the respondents could very well imagine to frequently use their phone for listening to radio via a built-in function. The same applies for 17% of all respondents who could very well imagine to use their cell phone for surfing the mobile web on a regular basis [218]. A further example on device side is Apple's iPhone. According to a telecommunications consultant at Booz Allen Hamilton the iPhone has helped to exceed a line of demarcation by providing a user-friendly access to the mobile Internet that is finally fun for the users [248, p.21].

In case this trend becomes reality the majority of users might use their mobile phones as their second personal computer. This might include games, navigation, infotainment and office applications.

6.2.3.2 Mobile Internet Usage

In comparison to the "device usage" driver, the driver "mobile Internet usage" is all about how intensely mobile Internet will be used and which kind of applications will be dominant in the mobile web in 2012. For this driver it is not necessary that the mobile Internet is accessed via a cell phone. It could also be some other device such as a multimedia companion, a mobile gaming console or an integrated in-car device.

One possible projection is that subscribers use the mobile Internet but only with medium intensity. This would probably imply that it is mainly used for sending and receiving e-mails as well as surfing the "normal" web with specialized browsers for mobile devices.

The second possible projection is the more optimistic case. It contains a high mobile data usage and goes along with demand for specially designed mobile services in addition to just web access. Referring to Gartner's "Hype Cycle for Consumer Mobile Applications" one can estimate that applications like mobile community, mobile instant messaging, mobile TV streaming or location based services are among the mentioned specially designed mobile services [256]. All these applications might be adopted by mainstream within five years and are currently either in the phase of "peak of inflated expectations" or "trough of disillusionment" [256].

6.2.3.3 Development of Current Web 2.0 Applications

Besides the usage behavior of consumers, the prospective development of current web 2.0 services will influence our scenarios.

On the one hand the current web 2.0 trend could continue and even increase during the next years. Participation could become even more common than it is today and for example support the growing importance of social networks as they turn more and more into distributing centers for communication. Furthermore Gartner identified several trends for the time after web 2.0. Among them are location-based services which "leverage community concepts and mobile technology" as well as a "renaissance of the concept of the "virtual enterprises""[237]. The latter might lead to online marketplaces for business services which enable companies to outsource anything except their core competencies or companies that integrate community features of web 2.0 such as collaborative development or new kinds of interaction with costumers [237].

On the other hand it is also thinkable that the current web 2.0 development stagnates. One exemplary reason is that social communities currently struggle with making profit out of their platforms. These sites try to implement user profile targeted advertisements but it is neither proved whether users really click more often on such banners nor is the resistance of users totally overcome [224]. Another imaginable reason is that the percentage of users who actively participate in generating content saturates.

6.2.3.4 Predominant Business Models

We came up with two basic distinctions concerning the possible development of predominant business models in the Web X.0.

One possibility is that web services are free of charge but contain some kind of advertisements. These ads will become more and more personalized as they are combined with user profiling. For example social networking sites might pass on inscribed information about hobbies to their advertising partners so that they can directly target theirs ads to the matching user group. That's why in this scenario extended profiling becomes the key aspect when it comes to earning money in the web. The fact that targeted ads really have a significant better effect compared to untargeted ads has not been proved yet [224]. In this case telcos will have to try to make a revenue sharing deal which is supposed to be "very difficult" [210].

The other possibility requires that the majority of web users become disinclined of being spied on all the time. This would necessarily lead to business models in which users pay for consumed services. Paying might be handled either transaction based or by subscription.

In order to keep this driver simple we have limited the number of projections to those two basic ones. It puts its focus on whether users are willing to pay for web services or not. Additionally, there are also other business models around. For example charging no fees but monetizing services by device sales [210].

6.2.3.5 Cyber Security

Cyber security is currently threatened by different kinds of cybercrime such as spamming, malicious code, denial-of-service attacks, unauthorized access or online banking frauds.

It is possible that cybercrime stays at about the current level and can be fought by existing solutions such as firewalls, virus scanners or anti-spyware software. The other possible projection is that cybercrime increases and that new ways of defense are necessary. For example the German Federal Office for Information Security (BSI) expects a significant increase of cybercrime during the next years [265].

6.2.3.6 Favored Billing Models

The driver "favored payment model" distinguishes two simple projections: Either the attitude towards paying via the mobile phone bill is positive or negative in 2012. This will probably depend on how mobile payments are introduced to the respective market for the first time.

Considering mobile payments there are two main applications imaginable: Paying via phone bill in online-shops instead of using PayPal or a bank transfer or paying with one's cell phone via Near Field Communication (NFC) technology in a real shop [266]. In both cases the mobile phone bill could easily be charged. Gartner specialists expect a diversification of payments solution around the globe [266]. According to them there won't be the one solution that is accepted by every culture in the world.

6.2.4 Competition

The last sub-section deals with how competition might develop until 2012. By then the classical, closed telecommunications market as it existed a few years ago won't be existent anymore. Currently a lot of new players with different backgrounds are pushing into that market. Among them are web players, handset manufacturers and service providers. That is the reason why we do not only analyze the competition among telcos but also possible new infrastructure owners, the relationship between telcos and those new entrants, how service platforms might develop and what third party enabler providers might do.

6.2.4.1 Competition among Telcos

First we want to have a look at how the competition among traditional telcos might develop in the future.

On the one hand a consolidation among companies that offer telecommunications services might take place all over Europe. As a result this would lead to some few key European players that own a lot of market power. This

development applies to both the fixed-net market and the mobile market. When having a look at the German broadband Internet access market one recognizes a huge number of service providers which more and more also start offering mobile telephony in addition to their existent offer. But the incentives to merge or perform acquisitions are equal: One can profit from scale and synergy effects the larger the company gets. This might be a way to compensate declines of revenues that are due to the declining prices for telecommunications services. Besides it might be easier to respond to new entrants such as web players and handset manufacturers if a telco serves a larger customer base. A result of this projection might be a reduction of competition among telcos [216].

In contrast to that, the intense competition among telcos might stay as it is today. The most likely reason for this projection is that the regulation bodies of the European Union might not approve major mergers or acquisitions among European telcos [216].

6.2.4.2 Infrastructure

We came up with two potential projections for the competition about the infrastructure market: Either the conventional carriers remain the only mobile infrastructure providers or some of the new entrants into the telecommunications market decide to build up and run networks by themselves as well.

The idea that new players might enter the European infrastructure market until 2012 has been inspired by Google's latest announcements to be planing to bid for a 700 MHz wireless spectrum in the United States of America [258]. The reason for these plans are that Google fears that some network providers might discontinue the neutrality of networks (see chapter 6.2.2.1, page 115) and either charge web services for passing through or quality of service [247, 258]. As the neutrality of networks might really be discontinued by some time, it might also become an interesting option for other companies to act like Google. On the other hand setting up an own infrastructure goes along with very high investment costs and the fact that operating a network is not a core competency of those companies.

6.2.4.3 Web and Handset Players

How will popular web and handset players behave in 2012? Will they be keen on partnering with telcos or will they try to circumvent telcos whenever they can and try to render telcos to pure bit-pipes?

In general, partnering with telcos does make sense for web service companies for two reasons: First, being linked to on some operator's starting page or having one's services integrated into mobile phones will increase the number of page visits. Second, when having a partnership with a telco it is unlikely that this carrier discriminates the particular service.

Handset manufacturers can benefit from a partnership with a telco because the operators act as distributors for their devices and offer the handsets at cheap prices as a lot of cell phones are subsidized if they are bought in combination with a long-term contract.

In contrast to that, web and handset players might also try to circumvent telcos. After having successfully established an own mobile service platform, there is no more need for looking for respective partnerships. At the moment Nokia and Apple try to establish ovi and iTunes respectively as proprietary platforms [211, 236]. In this case the providers' platforms become superfluous and the carriers might have no chance except for acting as bit-pipes.

Another example is offering voice over IP or instant messaging solutions. Therewith third parties can bypass telcos because users do not need anything except a mobile data flat-rate for being able to make calls, send messages and browse the web.

6.2.4.4 Service Platforms

We defined service platforms, as web platforms which are used as "starting point" by many users and which offer a large variety of different services, for example music downloads, news, communication, navigation or search functionality. This example list can be endlessly extended.

At the moment there are many well-known service platforms available and their number is still heavily increasing. Popular examples are Facebook, MySpace, Google, iTunes, Nokia's ovi platform, MSN or Yahoo. Maybe even Amazon or eBay have to be regarded as such players. The following two projections for the possible development of service platforms are as follows. Either we see a large number of different service platforms, all serving a diverse customer segment or we see a few superior platforms emerge until 2012. It is very likely that at least one of those predominant platforms will be a social network site [260].

6.2.4.5 Third Party Enabler Providers

The last factor that will also drive the scenarios are non-telco enabler providers which use information that is handset, web or application layer based. Such third party enabler providers are just as well able to provide other businesses with information which are equal to those that can be derived from Telco enablers. This is not the case for authentication, authorization and accounting (AAA) or quality of service (QoS) but very well for location, presence, billing or even voice (for a detailed discussion of the most relevant enablers, please refer to chapter 6.4.3 beginning on page 128).

Location data can not just be derived by the help of mobile networks but also by GPS transceivers - maybe even in combination with WiFi hot-spot tracking for in-house applications [261]. Handset manufacturers such as Nokia,

Sony-Ericsson or Samsung might come up with potentially competing solutions by themselves. Presence can also be derived via third parties. Instant messaging applications such as Skype, ICQ or Windows Live Messenger or social networking sites such as Facebook can also collect presence information about their users. Skype's VoIP functionality can also serve as a substitute for the traditional PSTN, ISDN or mobile voice services offered by telecommunications carriers. The same applies to billing. Instead of having the Telco charging the phone bill, customers might also use PayPal in combination with their checking account for billing purposes.

An interesting question is how those third party enabler providers will compete with telcos in 2012. On the one hand they may remain niche solutions in terms of being regarded as inferior in comparison to telcos' offerings. This might be due to the fact that they are not combining their offers in order to generate additional value. On the other hand exactly this might happen. Those non-telco enabler providers might also start partnering and might be integrated in some third parties' services. Such a development could even lead to a third party enabler platform.

6.3 Scenario Analysis

In this chapter, we conduct a scenario analysis based on the previously established drivers and projections. Since the problem of creating an Enabler Platform is complex and has many uncertainties and long-term effects, a structured approach is necessary.

6.3.1 Procedure

Our scenario analysis is done according to a technique described by Ute von Rebnitz. Scenarios in this case are "descriptions of the future corporate environment" [263, p. 3]. They consist of combinations of the projections mentioned in the previous chapter. Our scenarios cover a broad range of predictions, so that we can include recommendations for very different future situations. The purpose of these scenarios is to "design strategies to seize future opportunities and turn eventual threats to your favor" [263, p. 3]. We do this by developing a concrete product idea and properly visualizing our concepts. After all, scenario analyzes are usually conducted by small teams within a company, who need to convince and involve top management in order to have any effect. [263, p. 15]

Von Reibnitz outlines eight steps of conducting a scenario analysis, which are roughly followed in this report. The first three steps include identifying drivers and coming up with possible projections. Step four is a so-called consistency analysis, in which all possible scenarios are sorted by their consistency. We use a software tool for this purpose, as even our limited set of drivers produces several thousand possible scenarios. In this tool, we mark down how each projection

correlates to projections from all other drivers in a numerical matrix. Two projections that have a negative correlation (symbolized by a negative number between -3 and -1) are more or less mutually exclusive, whereas positive numbers mean those projections are likely to occur at the same time. Consequently, projections that have no correlation at all are marked down with a zero. Steps five through eight consist of describing the scenarios in an imaginative way, identifying threats and opportunities as well as coming up with a suitable strategy. [263, p. 5 - 6]

Von Reibnitz recommends that the chosen scenarios be very contrasting, however there are no detailed instructions of how to filter the generated scenarios. We accomplish this by locking driver projections from certain influence areas, e. g. competition or market pull, and choosing the scenario with these projections that has the highest consistency. It should be noted that cross-consistency is no measure for the probability of a scenario, i. e. two scenarios with the same consistency are not necessarily equally probable.

In the following subsections, according to steps five and six in von Reibnitz's technique, we describe four scenarios we find to be interesting. Also, we determine some of the basic implications the circumstances have on our platform. One of the four scenarios is the scenario we choose for designing a concrete platform in the next chapter.

6.3.2 Standardization Scenario

This scenario assumes an IP-based Next Generation Network and a 4G mobile network constitute the dominant forms of Internet access. There are a few standardized, open mobile operating systems in the likes of Google Android that superseded the formerly dominant proprietary operating systems.

Legal regulation of the telecommunications market is somewhat lax: As it is common today, telecommunications companies which own a license for a frequency spectrum control who has access to it and are in no way forced to open it to competitors. Also, there is no legislation to mandate network neutrality. As such, it is common practice to slow down or even block services offered by competitors. Telecoms may demand a fee from content providers to guarantee neutral handling of their traffic.

Web X.0 services are largely offered free of charge and generate revenue through advertisements. In addition to that, data that is entered by the user or automatically gathered from usage statistics is used to serve more targeted advertisements. Users accept this automatic processing of their data since they are not willing to pay directly for services.

Generally speaking, there is a high demand for new, specialized mobile services. Users now want to use their cell phones for mobile entertainment and office work. There is a market pull for mobile services that go beyond mere Internet access. Also, the boom of Web 2.0 business models continues. Customers are

content in using their phone bill for billing of various services. Cyber criminals have become organized and are a threat to companies and consumers, who are now looking for new solutions.

Competitors from other trades are trying to enter the infrastructure market. However, some consolidation among European telecommunications companies has taken place. The remaining key players have thus become hard to attack by new competitors. Some web and handset players are willing to partner with telecoms to gain access to their user base. There are some established service platforms. Third-party Enabler providers are cooperating with telecommunications providers and may be included in their service platforms.

This scenario assumes that radical changes will take place in various aspects of the communications market by 2012. Interestingly, it is the scenario with the highest cross-consistency (120). Also, the market pull drivers unanimously point towards high demand for new mobile services. We feel that this mostly optimistic scenario might not prepare a Telco for all possible outcomes. Therefore, we describe a few scenarios that pose more of a challenge in the following subsections (with emphasis on the differences to this scenario, which forms a basis for all of them).

6.3.3 Restrictive Regulation Scenario

This scenario is in many ways similar to the first, but shows the effects of a more restrictive legislation. Telecommunications companies are forced to resell parts of their spectra to virtual mobile network operators. Also, there are network neutrality laws that disallow discrimination of data streams.

Under these circumstances, the most consistent scenario looks as follows: The telecommunications market in the EU has remained fragmented with lots of competitors. Also, there is a diversity of service platforms and no winners have emerged so far. This is logical since the aforementioned regulation outlaws two important tools to push smaller competitors out of the market. This scenario has a consistency of 99.

6.3.4 Status Quo Scenario

The Status Quo Scenario assumes that none of the predicted changes in the telecommunications market will have taken place by 2012 and is therefore very different from our first scenario.

A Next Generation Network has not been fully established yet, so the dominant forms of Internet access remain DSL and 3G or "3.5G" (UMTS + HSDPA) mobile networks. There are diverse mobile operating systems, all of which are closed to third-party applications. Users have turned out to be indifferent towards the possibilities of new mobile services. The majority uses cell phones for calls, messaging and web access. The development of Web 2.0 businesses has

stagnated. No new competitors have tried to enter the infrastructure market, however there still is a great deal of competition among European players. There are diverse service platforms, but third-party Enablers have remained niche solutions.

The circumstances of this scenario do not call for a service platform as there simply is no demand for it. It is not ruled out that the development of the communications market as described in the first scenario will pick up eventually. This scenario has the lowest cross-consistency of all chosen ones (72), however it is still in the top five percent of all generated combinations.

6.3.5 Chosen Scenario: Intense Competition

In this scenario, only four driver projections differ from the first scenario; however, these have considerable implications on the design of our platform.

The scenario mainly revolves around the fact that there is intense competition in all areas of the telecommunications market. Firstly, there is a variety of competing mobile operating systems. These are partly open, meaning that outside developers can publish applications to run on the respective mobile devices. Even though competitive practices such as quality of service discrimination and closing networks to outside companies are legal, no consolidation has happened so far and there still is competition between European players. As a consequence, there are multiple competing service platforms. Also, web and handset players mostly have no interest in partnering with telecoms and try to render them to pure bit-pipes.

This scenario has a relatively high consistency of 99, which places it in the top 0.3% of all scenarios produce by our software tool. There are several reasons why we choose this variation of the first scenario as the basis for the design of our platform. First of all, there is demand for innovative mobile applications as well as mobile Internet access (to Web 2.0 businesses). This means that there is a market for diverse services that would benefit from our Enabler Platform. Also, new competitors are entering the already fragmented telecommunications infrastructure market. Revenues from a telecom's traditional business as an access provider are thus most likely declining, which could even force them to establish an Enabler Platform to compensate for the losses. However, many of our competitors have realized this and launched their own platforms. They are employing aggressive quality of service discrimination techniques to fight for their position in this market.

This scenario poses a great challenge for a Telco because an Enabler Platform requires unique features and services to distinguish itself from the various competitors. In the following chapter, we develop a strategy for a Telco to prevail even in this difficult situation. This strategy will of course also prepare a Telco for more optimistic scenarios.

6.4 Enabler Platform

The Enabler platform as a product consists of two main distinct services. First the platform with the EnableCo, the NetCo and the ServCo system as well as the implemented Enablers. Second the EnableDev as an additional developer community including the provision of a Software Development Kit (SDK). (see figure 6.2)

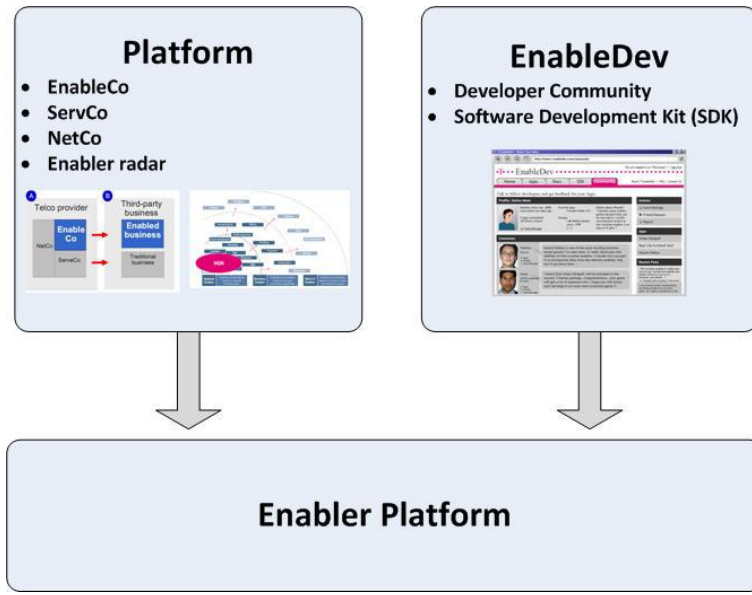


Figure 6.2: The Enabler Platform as a Product
Source: Own Illustration

6.4.1 Stages of Platform Implementation

One of the first and most momentous strategic decisions to be made is whether access to our platform will be open or closed. We define open access as follows: Businesses and independent developers alike can obtain an SDK and the documentation of our API free of charge. On a closed platform, access to the SDK is restricted and only chosen partners may develop applications for our platform.

The most obvious advantage of an open platform would be network effects. Our platform becomes more valuable as more applications are developed for it, unlike other economic goods which are most valuable when they are rare [255, p. 40]. However, opening access to our platform immediately upon launch has some drawbacks. In our scenario, there already is a multitude of service platforms,

some of them possibly open to all developers. In this case, another open platform would not be unique. Also, an open platform without applications to showcase its features will not attract the businesses needed to create popular applications. British Telecom (BT) faced this problem upon release of their Web21C SDK, which exposes basic network functionalities to developers. Developers abused BT's pricing models and extensively placed international calls and even used the Voice Enabler for criminal schemes. BT reacted by blocking the call feature for certain countries and phone number ranges [207]. An incident like this creates negative publicity and might severely hurt the trust our customers put in a Telco.

We therefore came up with three stages of the implementation of our platform. The first stage is the pre-launch stage and constitutes of building up our Enabler Platform. The goal for this stage is to have a selection of applications ready upon launch of the platform. We want our platform to be known by the business models it enables. For this purpose, we need to find partners to create showcase applications (or create corporate spin-offs if none are interested). We then use our core customer base to distribute these applications.

In the second stage, we partly open our platform to other businesses. The goal is simply to build up a diversity of applications. By now, an SDK and a developer community have been finalized.; businesses can apply for access to both. Created applications are then certified by us and may be distributed with our help. Also, in this stage we start selling Enabler access to B2C business customers to gain additional revenue.

In the third and final stage, we make our SDK and developer community available to anyone, with the intent of retaining our customers by continuing to add value to our platform. By this time, there are many established applications using our Enablers. We now start to support independent developers to look for interesting applications that might further advance the use of our platform.

6.4.2 EnableCo Definition

Besides the traditional Telco businesses, originated in the highly integrated net infrastructure (NetCo) and the therefore offered services (ServCo), additional revenues should be created by the so called Enabler concept (EnableCo). This EnableCo is an addition to and not a replacement of the traditional Telco. In combination with the NetCo and ServCo, the EnableCo will therefore enlarge the whole spectrum (see figure 6.3). This idea copes with upcoming challenges through the Web 2.0 and the thereby emerging new competitors like Google or Skype. The EnableCo is a combination of different Enablers that will be offered to third parties in order to open enabling capabilities and further develop the Telcos offering. This will increase the chances to address a majority of important trends and innovates the wholesale business model. Additional revenue streams of USD 500 billion are predicted.[251].

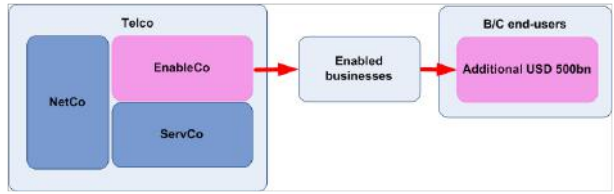


Figure 6.3: Telco enlargement by EnableCo
Source: Adapted from Ross [250]

6.4.3 Included Enablers

There are different aspects along a single Enabler can be evaluated. It has to be mentioned that the value of a single Enabler increases if combined with others. Various data sources or functions can be included. It is further important that not only the technology is a important factor. Especially the possibility of commercialization counts. The user must be able to control personal information release to other parties. The Enabler should be ultimate for the operator in delivering value to third parties. In the Enabler radar (figure 6.4) a classification of the Enablers is made by the capabilities based upon which the enabled functions are delivered. The resulting Enablers so went from a more hardware up to a more software based classification.

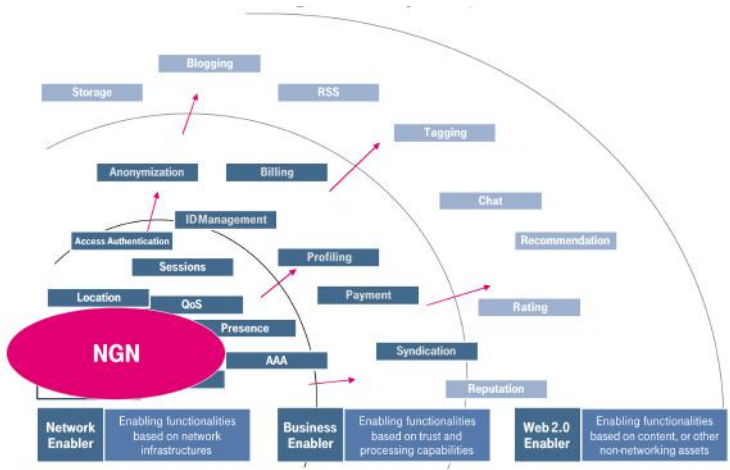


Figure 6.4: Enabler radar
Source: DTAG

The Enablers further described in the next section are the most important according to our opinion. The list therefore is not complemented and has to be

seen as being exemplary for building up use cases, giving partnering proposals and a basic understanding.

6.4.3.1 Location

Location provides information about where the user of a mobile device is located and goes hand in hand with tracking. This can be done based up on about different technologies. Taking the accuracy of the results into consideration, the Global Positioning System (GPS), Radio Frequency Identification (RFID), Wireless LAN (WLAN), Bluetooth, Uplink Time Difference of Arrival (U-TDOA, GSM) and Angle of Arrival (AOA) are the most promising ones. For the next years, the Galileo Satellite System should be taken into account. In total the GPS system seems to be the first priority for providing this information. This service works best outside houses but is problematic when applied in buildings[204, p. 97]. Here on the other hand tracking via GSM seems to be the technology with an acceptable accuracy [204, p. 106]. As it is a rational assumption that most of the time the users are inside a building this is a function that could be mainly provided by the Telcos. The limitation here is that the data therefore will be available to a higher extent, but will not be as exact as the GPS tracking. The GPS system delivers results with a distance failure up to 15 meters and will not be sufficient for home or small shop usage. Therefore hybrid system as a combination of different technologies would provide the best results by the highest possible coverage and accuracy of location information. The data therefore has to be handled and transferred via the Mobile Location Protocol (MLP) [241, p.10]. As a good example of one of these applications, the successful spin-off of T-Labs, namely 'Qiro' can be stated. It combines mobile communities, location based search and context based advertisement. "Myqiro.de" could locate friends as well as cash machines and provides you with information, e.g. the newest movies or other location related information. For being able to provide the highest quality and coverage for users, partnering with mobile handset manufacturers that include GPS in cell phones and allow using this information for the Telcos will be necessary and useful.

6.4.3.2 Presence

Presence as a function allows a user to display his current status in a certain area [257, p. 121]. This is rather known as an feature in Instant Messaging [215]. But this function in nowadays is not yet combined with other applications [259]. The Presence Enabler is defined as a "service that manages the collection and controlled dissemination of presence information over mobile networks" [244, p. 7]. Presence provides an aggregated view of real time end-user presence and availability information across a set of devices, products, services and networks. It reflects the ability and willingness of a user to communicate with the help of different presence states, e.g. 'away', 'busy', 'online' or 'do

not disturb'. The user thereby is enriched in his control capabilities which may trigger further communications or interactions following status changes. In a use case, as Presence being limited to single application, a Telco could provide a combination of different services like location based activity as well as usage preferences and manual configuration. For others being able to use Presence information it would make sense implement this function to e.g. the cellular mobile address book. The Telcos could provide the IT-Infrastructure to bundle all the different information and so serve as a control instance for the user. The so created extended presence with the potential to develop to a syndicated presence could create a high value potential for customer. Therefore partnering with mobile handset providers or mobile OS system providers, fixed line telephone manufacturers and perhaps application providers like Skype will be necessary and useful.

6.4.3.3 Storage

Storage describes the function with which to deploy and archive as well as to access data in real time. That is currently mainly still provided by a hard disk, USB Stick, CD or DVD. With the ability to share huge amounts of data it will be possible to shift this to the communication network. The Storage Ecosystem could be seen as a system of content, applications, devices and access. Streaming data, prerecorded content as well as user generated content can be handled and transferred within the upper mentioned system. Content used or delivered by home and mobile applications could be accessed independent from the device (home, mobile) and the place. Therefore the user will no longer be bound to his PC or Laptop. The data will be centrally saved, by local access for the user. Social interaction could be provided by sharing stored content like photos, with others. Another application can support collaboration by web hosting of business data. This will create cost effective solutions with a nearly endless storage capacity. It will make sense for the Telcos to partner with, e.g. YouTube or My Video, as well as iTunes or other application providers like Zoho.com or Adobe. Device manufacturers like Sony or Apple are reasonable, too. This will be possible, if the availability of access and bandwidth increases. MP3 Players as well as other devices could for example store and load their data in and from the network, if wireless access could be granted. Memory cards therefore can be used as a kind of cache without an additional storage. This would provide a nearly unlimited recording capacity.

6.4.3.4 Identity

Identity can be defined based upon different approaches. The user-centric view is defined by the agglomeration of person related data and is known as "Identity 2.0" As anybody shapes his own identity in reality, the existence of a virtual identity in cyberspace has traditionally been ignored [221]. Now the digital

identity as the online representation of identity could be defined as a set of claims (in their digital form) being made about a user or another digital subject [229, p.111].Whereas claim could be defined as "an assertion of the truth of something, typically one which is disputed or in doubt" [209]. Here the user is the owner of the data and therefore will often have to refer to organizations for verification. In the latter step the user-centric information (claim) is approved and can be used for various applications. The management of this becomes more and more important. In a first step the creation of a digital identity can be made by using service providers listed at OpenID. But this could be further developed. The Telcos therefore can offer a service at which they combine their about a person known data with a Virtual ID. Orange, a subsidiary of France Telekom, e.g. partners with OpenID to provide such a service to the customers. This ID could be used for purchasing in the Internet, verification or eased access to services. Talking in terms of a corporate-centric definition, the knowledge an organization has about a person is significant. Besides the government, also the Telcos need this information. These instances use it for serving their customers and to sustain respective regulation. Managing and transferring this data within a federation is one main issue in identity management (IDM). It is further to mention that the profile data that is acquired by actions of the user is an important issue in identity definition. At least the, by the to the persons related network, gathered data about this person, is part of the whole identity, too. This includes birthdays, phone numbers and so on. For a first approach the Telcos should partner with a provider like OpenID. Also Identity Management System providers could provide useful services.

6.4.3.5 Billing

Billing as defined by the Open Mobile Alliance [240, p. 4] includes the ability to generate and provide charging detail records (CDR) for transactions. These can be done either based on data from the proxy or the content server for events related to push as well for content pull services. The charging therefore can be event or session based and in the case of using the proxy for charging, the content server could be used for forwarding pricing details to the proxy. This information then can also be included in the charging recording. In concrete, the Telcos can, e.g. in combination with "Near Field Communication", offer a new payment service. Here the regular telephone or mobile cellular bill, prepaid or contract, can be used for charging and accounting. For this Enabler it would make sense to partner with mobile handset manufacturers, micro payment providers and credit card systems. This will increase the value for the customer and the revenues for the Telcos.

6.4.3.6 Authentication, Authorization, and Accounting

The AAA system, which stands for authentication, authorization and accounting, is a term in the field of computer security. It is a design for configuring the type of authentication and authorization on a per-line (per-user) or per-service (e.g. IP, IPX, or VPDN) basis [213, p. 16]. Authentication means identifying a user to authorize him in terms of granting or denying access to network resources and to track him for accounting purposes [214]. Examples of types of service include, but are not limited to IP address filtering, route assignment, QoS/differential services, traffic management and encryption. Whereas accounting data is used for trend analysis, capacity planning, billing and cost allocation. These functionalities are more or less dependent on each other and were currently served by using different protocols and should be standardized to one in the future [232]. This will enable wireless roaming in NGN [219]. As AAA has long been an inevitable function, it will be a crucial competence in the future. The Telcos should partner with such institutions for being able to provide standardized access to needed core net interfaces and their platform infrastructure.

6.4.3.7 Quality of Service

The Quality of Service (QoS) concept is defined in the ITU-T Recommendation E.800 as: "the collective effect of service performance which determines the degree of satisfaction of a user of the service''[225, p. 3]. The QoS concept consists of a set of parameters that belong to the traffic performance of the network, but in addition to this, the QoS also includes a lot of other concepts. According to the "Teletraffic Engineering" Handbook [226, p. 55] these can be summarized to "service support performance", "service operability performance", "severability performance" and "service security performance". QoS is also one of the most important key features of Next Generation Networks (NGN) [264, p. 1]. These challenges have to be handled by the Telcos and and can be operated by offering solutions based upon standardized SIP protocols [249] and NGN [217]. Within the NGN, high data volumes, session and non-session based data and information has to be handled and organized. This requires collaboration within the different core networks [235] as well as the creation of "virtual data pipes" [264, p. 11], which lies in the competency of the Telcos.

6.4.3.8 Voice

Voice services are the primary way that people communicate today. But there is the emergence of new types of communication services like instant messaging, social networks, blogging, wikis and location tracking [234]. So channels by which voice is offered are changing. Voice develops to an Enabler. As 'The Economist' argues, VoIP will soon overtake voice over PSTN in usage. According to 'The Future of Voice' [230, p. 4] the transformation of the Telco industry

will include the emergence of alternative communication platforms (e.g., mobile, VoIP), the migration to an all-IP environment with the influence of the Internet, especially in VoIP and peering as well as the emergence of Peer-to-Peer (P2P) technologies (e.g., Skype).VoIP is resulting in vertical separation of networks and services and greater competition. Intelligence is moving to the network's edges, with decentralized control. With shifting Voice from PSTN to IP there emerge the possibilities of voice Web applications. Voice will be 'embedded' in many applications and services [230, p.13]. As an example, voice enabled E-commerce could be an application as well as vertical applications like real estate. This leads to a convergence of communication, information and entertainment [230, p. 13]. Voice is still the killer application weather the threat is that voice will be for free. This could just be served by the Telcos by offering a higher standard in quality [220]. For partnering the Telcos could think about some established application providers.

6.4.3.9 Push Technology

Push service is defined as "communication of content toward a client without an explicit request" [242, p. 4]. Therefore the behaviors of client and server for the fulfillment of push services are crucial. This service is currently mainly used for "Email Notification" [243], as implemented in the Blackberry handsets. Another case in the future can be "Push to Talk over Cellular" [242, p. 11]. This is a direct form of communication where multiple users can have conferences using their mobile phone in the way of a walkie-talkie. There might be other not yet mentioned applications where the users are confronted with not directly requested content on a non opt-in basis. This can be interesting in terms of mobile advertising at special events but also leads to speculations about security issues. The Telcos therefore should deliver the opportunity to use this service, but also have to secure that this service is not exploited for illegal uses and uncontrolled information transfer. Partnering in this area seems to be useful with mobile handset manufacturers or larger retailers. The latter can be interested in standardized push marketing solutions. These as a location based service could be delivered by the Telco on a high quality base.

6.4.3.10 Trust and Security

Trust and Security have to been seen as an Enabler in terms of delivering value to the customer by cutting fears. As confidence in the network and the services offered are the basic requirements, also the Telcos themselves have a need for security to ensure their operations and business interests [311, p. 8]. According to M. Satti [252] known possible difficulties are theft of user identity and securing the user privacy. This can be expanded up to denial of services (DOS) issues as well as unauthorized capturing and distribution of contents. Also an improper security design of NGN service platforms and the publication

of non-secure applications have to been seen crucial. The Telcos therefore have to define their security along different dimensions. As mentioned in an ITU report, “access control”, “authentication”, “non-repudiation”, “ensuring of information”, “data confidentiality”, “communication security”, “data integrity” and “availability of access” besides “privacy” are the most important [311, p. 6]. Within doing so, security as a driver, can enable the overall success of a technology [334, p. 25]. As the Telcos are known for their trustworthiness, they will have to keep up in doing so. Thus generating additional value for the customers in terms of network allocation. The Telcos therefore in total should only partner with reliable application and service providers. These can be marketed as trusted partners. The Telcos so can keep their up to this point known trusted corporate identity.

6.4.4 Platform Description

In this section, we explain the technical details of the platform to be implemented to market the Enablers to end-users and applications. The various components of the platform ecosystem and the architecture of the platform are discussed in detail. This section also contains mock-ups for the use case scenarios for controlling the user-settings for Enabler usage as well as application activation.

6.4.4.1 Components of the Platform Ecosystem

The deployment of the platform and its interconnections within the network infrastructure are illustrated in Figure 6.5 .

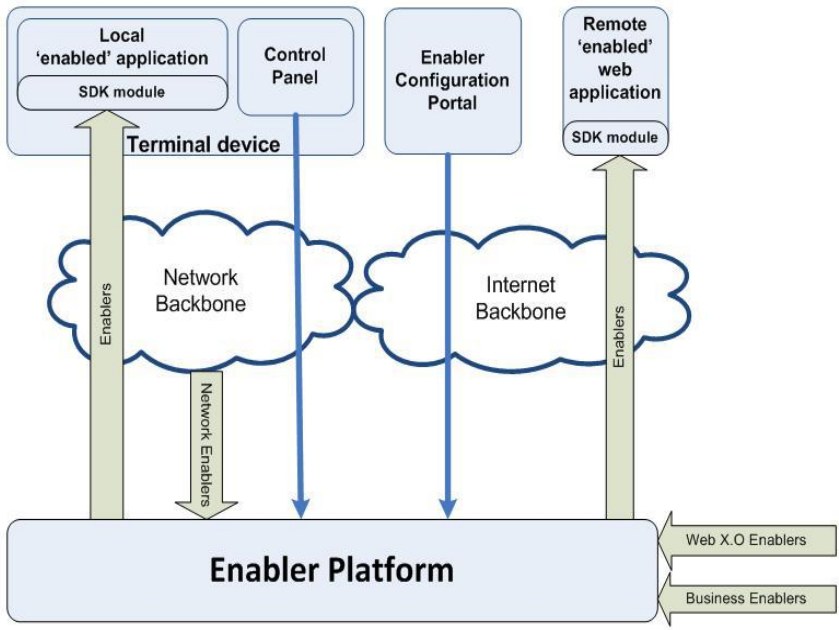


Figure 6.5: Components of the Platform Ecosystem
Source: Own Illustration

The Enabler platform, which forms an integral part of the network infrastructure, runs as an intermediary connecting the user terminal and the applications, making available the Enablers to both. At the network back-end, the Enabler platform makes use of three different kind of Enablers - network Enablers, business Enablers and service Enablers, as discussed earlier in the Enabler radar.

The most important role of the platform is to provide an abstraction over these Enablers and make them available to the applications. The applications again can be of two different types - local applications running on the terminal device and applications running on remote web servers accessed through browsers. The terminal device at the user end has a control panel to help the user in activating and controlling the usage of Enablers. The users of the application can also perform this configuration using an Enabler Configuration Portal available over Internet. They can decide what Enablers are to be made available to different applications and also what the terms of usage could be wherever applicable.

Enablers

The various Enablers to be included in the platform have already been discussed in the previous section. They key distinction between these Enablers depending on from where these Enablers are provided to the platform has also been discussed in that section.

SDK Module

For remote as well as local applications to work with the platform, they needed to be provided a module as part of our Software Development Kit (to be discussed in detail in a later section). The role of this module is to ensure that the applications developed for the platform can communicate and integrate with the platform. This module will take care of the interfacing with the platform APIs for different Enablers as well as obtaining permissions for activating the for the application. The module could either be made available directly for different environments and programming languages or the developers can be provided with a 'driver development' kit for programming the modules by themselves.

Control Panel

As mentioned earlier, the objective of the platform is to form a bridge between the user and Web X.0 application for a smoother and enriched information/service sharing. But this could involve sharing very sensitive user information with third parties and it is imperative that the Telco requires user authorization for this. Hence the user has to be given control over what Enablers he/she would like to use and with which applications. The objective of the control panel is to make available a user friendly environment for activating the Enablers. In addition, the various terms of services and tariffs can also be made available to the user through such a single window.

Enabler Configuration Portal

This portal made available through the Internet has the same functionalities as the Control Panel which runs on the terminal device. This could be integrated with the telco's currently available online services.

6.4.4.2 The Architecture of the Platform

Though the role and objectives of the platform as well as its interfacing with other components in the system have been discussed in the previous subsection, we need to look into the details of how it makes its features available to the users. The Figure 6.6 illustrates the different layers proposed in the platform.

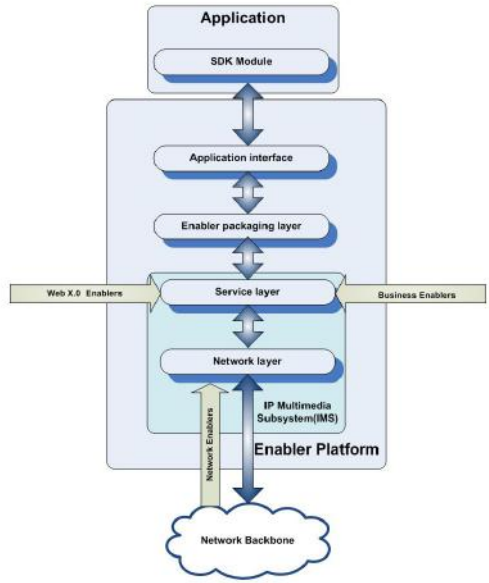


Figure 6.6: Layers of the Platform
Source: Own Illustration

Network Layer

The network layer interfaces with the network backbone and makes the network Enablers available to the platform. It also serves as an abstraction layer which makes the platform agnostic to whether the backbone is a fixed network or a mobile network. The Network layer has already been proposed to be part of the IP Multimedia Subsystem (as part of the transport interface) - for e.g. by IBM [212]. Since IPMS already has many of the functionalities such as the network interface conceived as part of it, it is reasonable to assume that the Enabler platform can derive from this.

Service Layer

Service layer integrates the currently available traditional service that Telco offers with the platform. It also acts as the intermediate layer which makes all the network as well as business and Web X.0 Enablers to the upper layers of the platform.The service layer also has the key role of integrating the charging module to the platform. Based on the Enabler usage settings provided by the user in the Control Panel, the charging module integrates the user payments interacting with the local and remote applications as well as the Enabler provider.

Enabler Packaging Layer

The role of Enabler packaging layer is to provide bundling of different Enablers as suitable to different kind of applications like - social community networks, location based services etc. It will also be advisable to consider Enabler hierarchy as well as making only selected Enablers available or only selected features of enables available to the applications. This layer has the greatest potential to offer service differentiation by making available various service packages to the end users and application developers.

Application Interface

The application interface is the layer which will enable the platform to communicate with the SDK module present in each application. The abstract interfaces provided by this layer will simplify the creation of new services for the platform.

6.4.4.3 Use Case Scenarios

In this section, the use case scenarios for the applications enabled by the platform are described.

Control Panel Settings

The role of the control panel is to enable the user with complete control over which local applications have to be installed on the terminal device, which Enablers are to be made available to each application and the service agreements on Enabler usage. Figure 6.7 shows how Control Panel displays the pool of the applications available to the user from which she can and pick and use which ones to activate. It also as displays as in Figure 6.8, which remote and local applications have already been installed on the device.

Figure 6.7: Browse for Applications
Source: Own Illustration

Figure 6.8: Activated Applications
Source: Own Illustration

Local Applications Settings

In the case of a local applications, the user will have to typically install these applications , decide what Enablers he/she wants to use through them and arrive at necessary service level agreements. This configuration can be performed through the Control Panel. Figure 6.9 illustrates a local application (MyTrail- an application that records the geographical trail of the user for the day) and the Enabler settings applicable to it.

Figure 6.9: Activated Enablers for Application
Source: Own Illustration

Web Based Applications

The web based applications run on remote web servers and access the platform through the Internet services back bone. Whenever the user decides to make an Enabler available to the remote application, the Control Panel window pops ups and prompts the user to configure the necessary settings. This is illustrated in Figure 6.10.

Figure 6.10: Activation of Enablers for a Web Application
Source: Own Illustration

6.4.5 EnableDev

In this section we explain how we plan to make our platform attractive for developers. Software companies and single developers are of course our primary customers since they pay for our services. The two complementary products that developers will use to access our platform are the SDK and the developer community. These intrinsically different products need to be designed to meet the developers' needs.

6.4.5.1 Targeted Developer Groups

Beginning in stage one of our platform implementation, software businesses will develop applications that make use of our Enablers. These applications are made to generate revenue for the developer, either directly or as a complementary service to its core business. The purpose of our SDK and community is merely to allow cost- and time-efficient development of applications, since the quality of the applications is mostly decided by the reached customer group and quality of the Enablers.

In the third stage, we will open access to the SDK and community to the public. In this phase, independent open source developers will join our community. They share some of the needs of our business customers (in that they value ease of use, for example), but may have different motivations to develop applications.

Developers that create "freeware" programs do this as a hobby or to gain reputation among peers. They will look for interesting features of our platform to create innovative applications. Also, our community plays a more important role with this customer group since independent developers will want to share their ideas with others, try out and review other applications etc.

6.4.5.2 Features of the SDK

A software development kit (SDK) is generally a set of tools to enable the development of software for a certain framework. In our case, the SDK provides access to the Enablers. Since Enablers are software that run on servers with a direct connection to certain infrastructure, this access needs to be done over the Internet. The main part of our SDK is a module that is included into applications. This module translates requests for Enabler access to Internet traffic that is sent to a server and then presents the response to the developer in a meaningful way. By publishing the details of this Internet communication, developers could circumvent our SDK and directly access our Enablers, even from unsupported programming languages (obviously only after proper authorization and encryption). The Web21C SDK by British Telecom currently allows this, for example. It is a possibility to introduce this in the third stage to allow for even more widespread use of our platform.

Our SDK also includes debugging tools; documentation of the supported calls is available online since it is prone to frequent changes. The requests that can be made to the SDK (and language-specific technicalities, for example returned data types) are specified in an application programming interface (API). As mentioned before, one of the first goals of our SDK is to allow easy and fast development of applications. To achieve this, API calls should be kept as simple as possible. For example, the placement of an SMS may be a complex transaction. However, all of this complexity needs to be hidden within the Enablers or the SDK so that the developer may literally send an SMS with just one line of code. One example of a simple API call (in Java syntax) would be `public bool sendSMS(String recipient, String message)`.

Almost all of our Enablers can be included in the SDK. Generally, it makes sense to include Enablers that are frequently accessed from within applications. This holds true for Location, Presence, Storage, Identity, AAA, Billing, Voice as well as encrypted connections created by our Security Enabler. Quality of Service only needs to be included in an SDK if individual privileged connections need to be established. For example, a video on demand portal could offer faster streams only to subscribed members. Generally, there should be one single SDK for all Enablers so that data can be easily shared between them. It could have a modular design to include certain Enablers on demand.

To enable even faster development, we plan to distribute pre-fabricated application modules during the third stage; for example an online shop template

that makes use of our Storage, AAA and Billing Enablers.

In our scenario, there is a variety of partly open mobile operating systems. This means that applications can be installed on these, but the SDK probably needs to be adapted for each development environment. In the first stage of our platform implementation, the supported programming languages should be limited to those needed by our partners (which are corporate customers and might use other development tools than single developers). Creating and maintaining various versions of the SDK consumes time and resources and might slow down the launch of our platform. However, in the second stage, the focus shifts to creating a diversity of applications for our platform. In this phase, the SDK should be provided for all common development environments.

6.4.5.3 Developer Community

Over the three stages of platform implementation, the features of the developer community will change along with the customer needs. During the first stage, no community is needed at all: Support is given directly to customers and the SDK is still in development and constantly adapted to our partners' requirements.

In the second stage, the community is rolled out and selected businesses are given access. The community will have most of its basic features by now: Individual developers can maintain a profile, upload their applications (and source code) to a project space, comment on other applications and participate in discussions. Figure 6.11 shows a mock-up of a developer's profile; applications and posts in message boards are listed, as well as comments left by fellow developers.

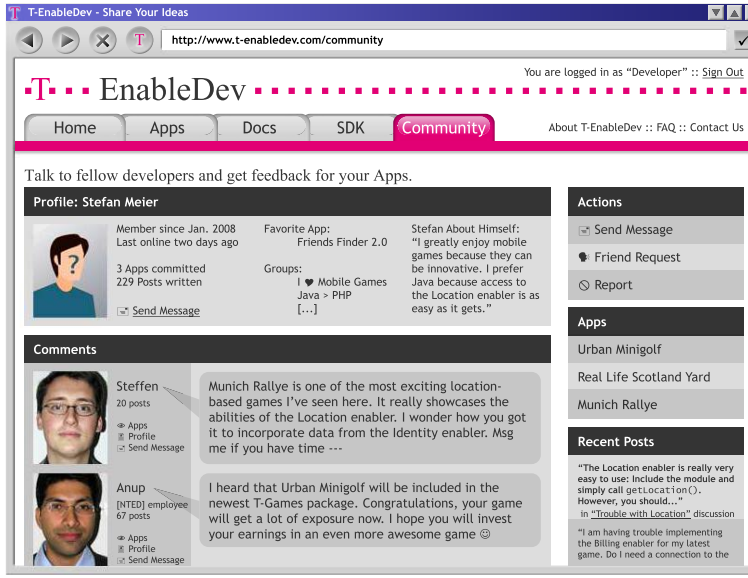


Figure 6.11: Mock-up of a developer's profile
Source: Own Illustration

If large businesses are to join our platform, they are given a private space for internal discussions which is clearly separated (technically and visually) from shared features. Moderators are present to scout for applications that are worthy of being distributed by us, for example by being promoted to cell phone customers. (Similarly, British Telecom showcases applications that make use of their Web21C SDK. [206]) Also, the documentation of all features is online, with the possibility to leave moderated comments for each entry.

In the third stage, we shift our focus to opening up to small-time developers. The goal here is to create lots of applications that make use of our Enablers, and specifically look for "killer" applications that originate on our platform. For this purpose, additional features are added: To promote high-quality, innovative applications, contests are introduced. For example, we could call for original mobile games or mobile office applications. Winners are then promoted by us. Also, applications with the most downloads or highest ratings will be more visible, for example by being marked as "Most Popular App of the Week". Vodafone Betavine, also a developer community for mobile applications, also showcases featured and most popular applications. [262]

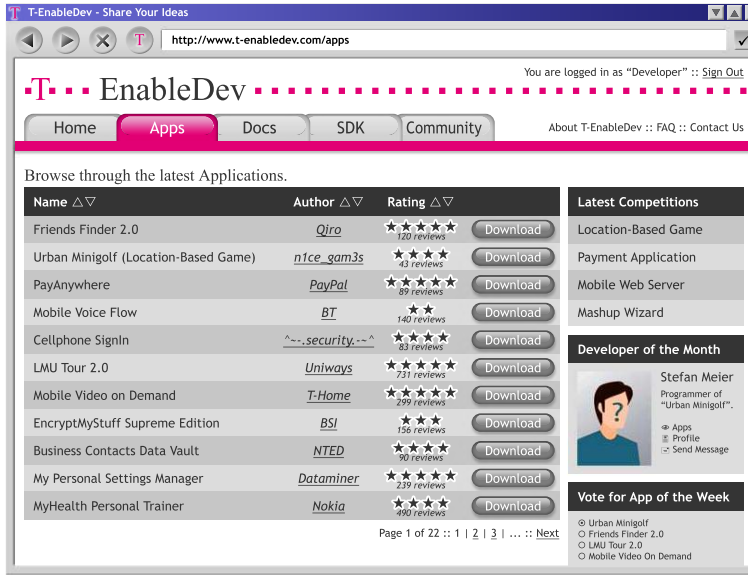


Figure 6.12: Mock-up of application browsing interface
Source: Own Illustration

Figure 6.12 shows a view of a possible application browsing interface in our community. Of course, the newest applications are listed and can be sorted by some criteria. Tools for promoting outstanding applications are shown to the right.

6.4.6 Business Model

The biggest challenge that the Telco faces in developing an enabler platform may not be in the actual technical implementation and deployment of it, but rather in the monetizing of it. In this section, therefore, we examine- who can be the possible partners in developing and popularizing the platform, how the market for the Enabler platform looks like, how telcos can efficiently market their platform and how new revenue streams can be generated with this.

6.4.6.1 Strategic Partnering

The most important issues to be considered while deploying an enabler platform are its interoperability with various terminal devices available in the market as well as providing the users as many choices as available. The popularity of the platform will have a critical dependency on how many developers are ready to develop enabler-enriched Web X.O applications for it. If the Telco decides to limit the deployment of the platform within a single country or network, there

will be less incentive for the developers to come out with new services, which will cater to only a small customer segment. Hence the options of arriving at partnerships with competing telcos to jointly develop a platform across various networks (for e.g. in collaboration with a competing telco like Vodafone) are to be explored. This could be achieved through either standardization, where different platforms can have agreement on interoperability or through broad alliances on sharing enablers and application interfaces with key partners.

Enablers

The partnerships required for realizing each enabler included in the platform has already been discussed in detail, in a previous section. Third party niche players who develop successful enablers have to brought into the fold of our product strategy to ensure that, the users have alternative options. Though many of the technology enablers are to be derived from the network infrastructure of the Telco, the third party providers could enrich the platform with many service enablers. For dealing with the other key issue of interoperability, the Telco will have to develop partnerships with other telcos, to ensure the seamless operation of the Telco enablers over multiple networks. While the Telco can make use of the international presence, (for e.g. DTAG has already existing presence in many other countries over Europe as well as United States), it can also use the already existing partnerships with other operators for enabling roaming access. This could be successfully leveraged to ensure that the users have access to the enablers, even when they operate outside their country and outside their home network. The role of standardization or broad alliance of Telco partners, mentioned earlier, is going to be crucial in achieving this.

Terminal

As already discussed in the previous subsection, the terminal devices are expected to be preloaded with flagship products for showcasing the richness of the platform. The devices are also expected to give users access to controlling the enablers they use, through a Control Panel. For realizing this, the Telco will require an understanding with the device manufacturers as well as Mobile Operating System Vendors. It has to be ensured that, right from the first stage of development of the platform, there have to be key partnerships with handset manufacturers and operations systems to enable the smooth running and access of the platform through as many different terminal devices as possible. Some of these partners could also be part of the flagship product developers in the first stage of the platform. As our scenario suggests, there is intense competition going on in the market, with multiple platforms made available by different players and the initial popularity of the platform could be driven by, say making available an enabler- enriched Internet Explorer on devices running on Windows Mobile. Such a partnership with Microsoft will ensure a default number of early adopters for our platform. Similar is the case with device manufacturers, where say, every Nokia phone made available through the Telco can have special hardware, keys

and interfaces customized for the usage of enablers and applications built using them.

Applications

The popularity of the platform among the end users will be decided by what applications are available on it, and how enriching the users find these applications. Therefore availability such a rich and diverse pool of applications has to be realized through partnerships with already popular Web X.0 applications as well as newly emerging innovative ones. The Web X.0 users who will migrate their usage to a mobile terminal devices should be attracted and retained by providing most of the key applications available to them through the conventional Internet, albeit, made richer by the enablers provided by the platform. In each of the Web X.O application segments like social networks, video portals, news / information websites, service platforms (e.g. Ovi from Nokia), possible mobile service solution for business customers, on-line shops, search engines key partners are to be sought to either port their already available applications to our platform, or develop altogether new applications.

6.4.6.2 Market and Competition

For conducting an industry analysis and deriving a business strategy, the five forces matrix of Porter supplies a framework for a qualitative evaluation of a firms strategic position. This analysis is conducted for the first implementation stage as a closed platform and will develop over time. The results therefore have to be interpreted on this background. As the not yet fixed environment offers space for different outcomes, it results in multiple nominations above the four influence factors.

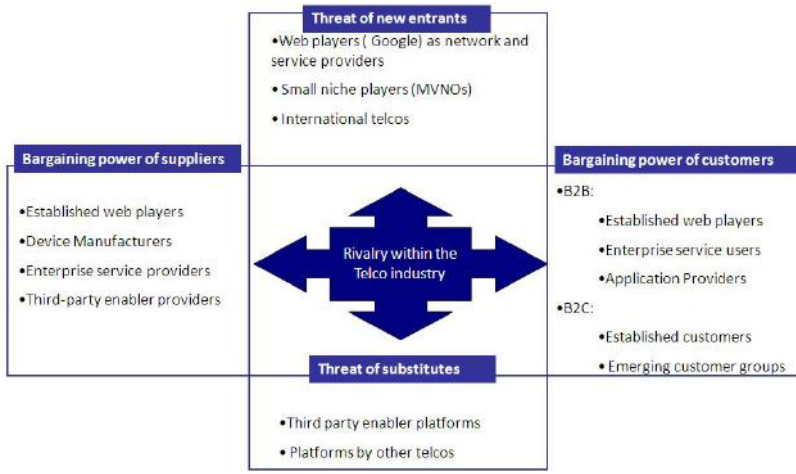


Figure 6.13: Telcos industry analysis based on Porter's Five Forces
Source: Own Illustration

Suppliers for the platform concept are mainly to be seen in trusted partners. This in the hardware and especially the software market makes it difficult if competition is limited. Therefore the trade off has to be seen in trusting only less partners vs. building up competition to strengthen the Telcos position. Nevertheless, partnering is crucial even with the threat of low competition and dependency. Due to already established web players, the Telcos need these as partners. "Whatever it costs" should be the first strategy in the first stage. Developing own web services or providing just Enablers is not an option. The situation here for Telcos is critical.

New entrants like Google might serve as a wholesaler for services and so endangers the whole platform concept. In addition Google could try to buy network providers in order to expand his advertisement based business model to the mobile sector. International acting network providers might implement a Internet platform on which any worldwide user could get access to enabled services through roaming (e.g. location based services). A fast "hello world" of

the platform is necessary strategy. The situation here for Telcos is critical.

The customers are split up in business (B2B) and private (B2C) units. At B2B a distinction could be made for Enabler-using as application providing and just consuming business customers. B2C are the numerous private public consumers with different segmentation potential. The Telcos could build up an huge B2C and B2B just consuming customer base. Here the B2B application provider as the Enabler-using segment is not well defined and insecure. The strategy for the first stage here has to be quality before quantity. The situation here for the Telcos is good.

Substitutes, as mentioned above are not only to be seen in national network providers but also in international operating Telcos. Standardization is the driver that makes this a possible scenario. The question is whether international standardization will lower national competition by rising worldwide interaction. At the most feared bit-pipe scenario, competition will remain on a national basis. Thinking globally, substitutes emerge by providing additional services. This is e.g. the expansion of the BT 21CN as well as the spread of other international MNOs and Telcos. The situation here for Telcos is critical.

The Telco as an service platform provider in the first stage therefore should act fast. It should only rely on trusted partners and have to create USPs like trust and security that other providers, e.g. web players could not stem. The Telcos chance is providing higher quality with useful applications provided by established partners. The right partners are the most crucial aspect in this scenario. Without them, a delayed launch or a not well communicated quality of service, these strategies will failure. As this happens, the stage three scenarios will have to come first. Here the probability of losing the Telcos core competencies and their corporate identity is not to underestimate. In the end this weakened strategic position may lead to shrinking the Telco to just a bit-pipe provider with no capability to provide a valuable service platform.

6.4.6.3 Marketing

Marketing this platform concept and the three implementation stages will secure the acceptance of the platform by the potential application developers as well as the consuming customers. An adequate understanding of the customer base and its own competitive position in the industry allows to develop a marketing strategy that is designed to maximize the revenues and profits of the firm. Here only a rough overview of key issues for the first stage can be described.

Providing high quality and not quantity is the core strategy in the first stage. Therefore building up a high reputation at the application service providers and the acceptance of the services by the customers are the main issues that should be addressed by marketing the concept. It has to be communicated to potential application providers for the second and third stage, that the platform will be open after a certain time period. They will not be offended and will see the

concept as a desirable solution for their ideas and needs. This will help to build up and acceptance and desire to co-operate. It will keep them from thinking about using other platforms or from developing competitive platforms on a e.g. Open Source basis. They have to be approached directly by giving them information about the current development status and further APIs. Within doing so, developers will know how they could make use of the platform later on. Competitions and awards for best application solutions can support this aim.

An on the gained partners based and to the this focused customer segmentation will supply the use and acceptance of the new services. Consuming customers have to be addressed by different channels and various marketing instruments. The customers in the beginning will have to be enlightened in detail about the advantages and how they can make use of it. They have to perceive the services as delivered and supplied by the Telcos. For generating value, this is obvious but crucial. This is important in terms of customer retention and for building up long term relationships. Flexible and targeted solutions can support these goals.

As the potential partners are the key success factor, they need to understand why they should partner with the Telco. Building up on a huge customer base and on an until now not to application providers available distribution channels could generate addition value. The Telcos retailing shops might by such a discriminator. Just being service providers, the web players currently do not have a brick-and-mortar distribution channels. These value could have been underestimated in the past and has to be re-assessed. This backward conversion, from web to reality, is one the USPs the Telcos could offer. A possible use case could be e.g. a stationary photo printer form printing out StudiVZ friends collages photos or to collect post packets in the Telco shops. Until now there is now shop to buy the product communication. In comparison to ordinary supermarkets that sell consumption goods, the Telco shops might develop to the interface of web and reality. In the end, the Telcos in addition can try to develop communication products out of the from the application partners derived services. This is just one possible implementation of how to attract and secure application service providers.

In this days the perception of the Telcos and the Internet still seem to be separated. It will be difficult to keep up on this, for the Telcos valuable, distinction, but can support building up a strategic desirable position. With the merged NGN and the thereby “out of one source” , realized by Internet applications and services, it will be more hard to communicate the value and the function of a Telco. The corporate identity of a Telco in the minds of the customers is not allowed to shift. Services like e.g. presence and location have to be perceived as Telcos services and not as one of the web players.

Taking all this steps and not yet mentioned ideas into consideration, it will be possible for the Telco to market them as a up in the future inevitable member

in the communication value chain.

6.4.6.4 Revenue Sources

It has been proposed that, the way to move forward for telcos in a seemingly stagnating traditional market is to generate new revenue sources by offering Enablers to the users and application developers. This section in detail examines, where these revenue sources could come from.

New Revenue Streams

The identification of new revenue streams can be explored mainly in two ways - expanding the customer base using the Enablers as an attractive bait and monetizing new applications based on Enablers and Enablers themselves[251]. The different possible options for achieving this are illustrated in the following diagram (figure 6.14) and discussed in more detail in the following part.

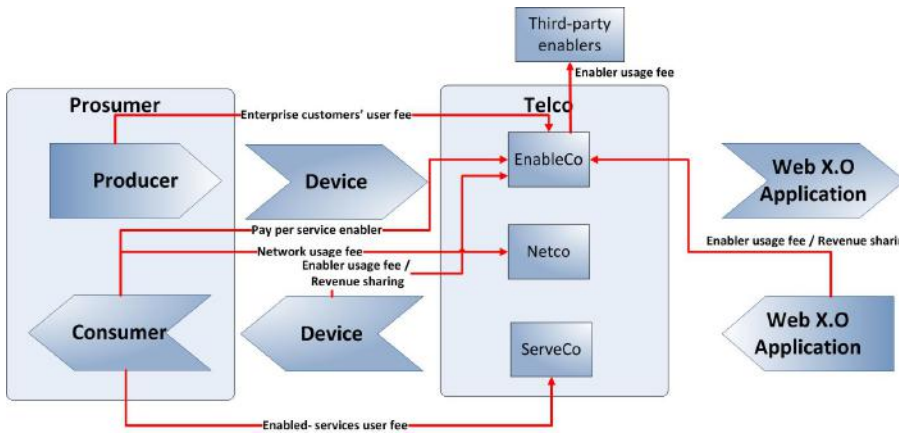


Figure 6.14: The revenue streams for the Enabler platform
Source: Own Illustration

- Enriched traditional services: The traditional services offered by Telco namely call and messaging have not undergone tremendous changes in the past. Introduction of Enablers, for example call integrated applications, message pushing etc could lead to a resurgence in the usage of these services causing a surge in the revenue from these.

- Encourage users to spend more on traffic usage and content consumption: The users could be encouraged to consume more traffic and content and could be charged for this by offering package deals with the current call-message offers with Enabler enriched applications.

- Enterprise customers: Enterprise customers are potential users of highly sophisticated Enabler-applications who could be expected to pay for Enabler-usage as well as services like integration of Enabler capabilities to enterprise operations like logistics management, customer support management and secured network services.

- Own services: The telco's internal divisions and spin offs could leverage from their better understanding of the platform, the access to the internals of it and the trust customers have on them to develop Enabler-based applications on their own. Revenue could be earned through this services by either direct payment from users or advertisements.

- Pay per use of Enablers: The most important source of revenues for telcos can be marketing the Enablers directly. The Enablers like, billing, could be made available to the users directly and charged per usage. Also, the application developers, who make use of the Enablers in their products and services can be expected to pay for their usage as well.

- Revenue sharing with applications using Enablers: Apart from charging for the Enablers, the application developers can also be expected to enter revenue sharing deals with the Telco. Expert knowledge on the platform and the Enablers could be leveraged to offer the application developers support in development and this could finally be converted into a revenue sharing deal. Another possible opportunity will be offering the developers certification of their applications and making them easily available to the users through telco's Control Panel or portal after charging a fee. The revenue sharing model similarly works for local applications developed using the enablers as well. For example, a multimedia service integrated into the device by the terminal manufacturer or a location based application pre-installed on the device also are suitable candidates for telcos to jointly share revenues.

Payment Models

The biggest challenges in establishing successful payment models for Enablers and application based on them, is combining the traditional billing options provided by the Telco with the multiple charging options required [210] for web X.O applications. There are multiple charging options available in this case like charge per usage, session or volume [212]. A real time charging module integrated into the service layer of the platform can take settings of the user's service agreement from the Control Panel and can handle this by closely monitoring the consumption of Enablers by the user. Another key distinction in the payment model is offline and on-line charging [222]. In this way users can be provided the option to make payments periodically, say every month

(offline charging) or pay upfront using a credit based charging system (on-line charging).

Revenue Sources in the Three Stages

In the first subsection of this chapter, it has already been discussed that the Enabler platform will have three stages of development. Since the business model for each of this stages are different, it is inevitable that different revenue sources for each stage have to be identified separately. In the following subsection, the details of changes in revenue sources in each stage are discussed.

- Stage 1

  In stage 1 the key partners in platform development are strategic partners who have been identified to develop flagship applications. At this critical stage, partner identification will involve not only identifying third parties who can develop value-add applications but also arriving at strategic deals with them negotiating revenue sharing. In some of the cases, a revenue sharing might not be possible at all, when we attempt to court established Web X.0 companies to port their products onto our platform. But revenue sharing model could work very effectively in the case of new applications developed with valuable input from the telco's knowledge of the Enablers as well as the platform. The possible revenue sharing models may include - pay per use of Enablers used by the application and share of user payments for the applications.

  Instead of completely relying on third parties to develop Enabler-rich Web X.0 applications, Telco can consider setting up spin offs as well internal development. In this case the applications can be marketed directly to the users and revenue can be earned. An interesting example for such a case would be enterprise applications.

  Yet another revenue source could be selling Enablers directly to the users. Those Enablers which do not require any killer applications to demonstrate their prowess could be marketed to the user directly, by highlighting added value they bring to the user. For example, user may be given the opportunity to integrate his various bill payments and use our Billing Enabler. In this case a service charge could be levied and this could turn out to be a very potential source of income.

- Stage 2

  By this stage a developer community will be developed . This new service can be monetized apart from the revenue sources applicable to the previous stage.The application developers will be allowed access to the community and provided with SDKs based on a monthly fee. The network thus established can also be extended by offering certification to the new applications developed and charging a fee for that. The application

developers who will be keen to deploy their solutions on our platform are also expected to be open to share a part of their revenues with Telco. The telco's key positioning as the intermediary between the developers and the users can be lucratively leveraged in this fashion. Another potential way in which application developers could be charged will be for each of the Enablers they make use of. Though this may discourage them from using more and more Enablers available in our platform, the added richness the Enablers bring to their solution should still be attractive enough for them.

B2C business customers who would like to make use of our Enablers and develop their own enterprise application are another source of revenue. They are expected to pay for the usage of each Enabler as well as the SDKs provided to them for developing their own applications.

- Stage 3

  This is the stage in which we open up our community to all users (including the existing users who were paying a monthly fee) without any access fees. Thus a stream of revenue available in stage 2 will be cut off. But, still the Telco certification of application as well as service discrimination could be used a potential means to encourage application to share part of their revenues. But the major source of revenue is expected to come from the pay per use of Enabler.

  But as the community is open now, there will be lot of individual developers who cannot afford to pay, until they establish themselves and start making profits. To encourage those kind of users Telco can sponsor certain popular applications and provide discounts based on their number of users. But, caution has to be taken to ensure that this is used only to encourage very innovative applications arising from , say student initiatives. Another choice in this scenario could be to ask the users to pay for the Enablers. If none of this work, it is obvious that such an application do not add any value to our service and can thus be discontinued.

6.4.7 Roadmap for DTAG

After generally outlining the stages of the implementation of our platform, we conclude this chapter by providing a time line of concrete actions to take until 2012. Figure 6.15 shows these steps arranged in a Gantt chart. While work on the Enablers is being completed, strategic partnerships with other MNOs as well as partnerships to implement certain Enabler functions are arranged. Then, work on packaging the Enablers into a platform and providing an SDK starts and concludes with the release of the platform after two years. Meanwhile, partnerships with application providers have been established. Finally, the developer community is released with the start of stage two.

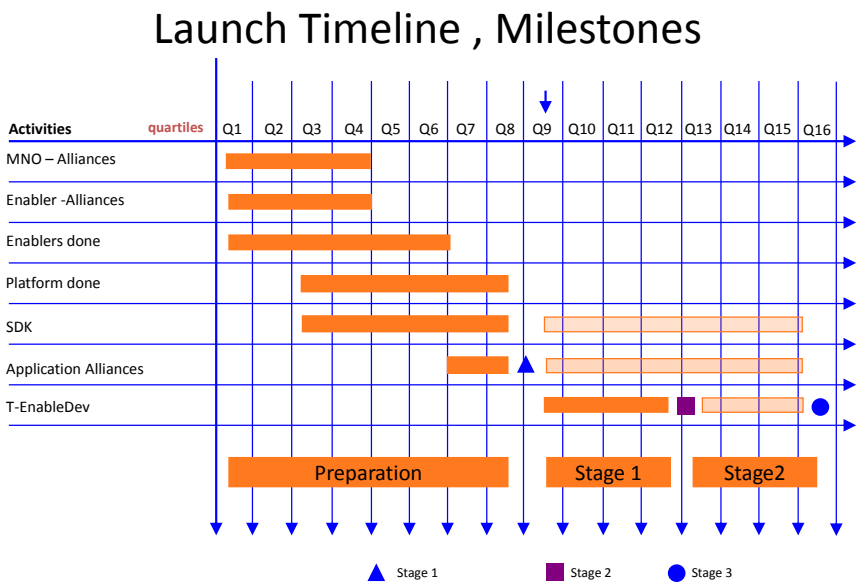


Figure 6.15: Time line for platform implementation
Source: Own Illustration

The platform design laid out in this chapter was created to fit the Intense Competition scenario. It needs to be adapted if another scenario occurs. For example, in the Restrictive Regulation scenario, content discrimination is outlawed. This rules out the aggressive traffic shaping practices that are common in our chosen scenario. As a consequence, the Quality of Service Enabler might not be of importance here. On the other hand, in the Standardization Scenario, the circumstances for building up an Enabler Platform are close to ideal. Only some key players have remained in the European telecommunications market. Web companies and device manufacturers have proven to be willing to partner with telecoms. The strategy described in this chapter would also work in this scenario.

The Status Quo scenario differs significantly from our chosen one and even the defensive three stage approach seems ill-suited for this. Most importantly, there simply is no demand for innovative or high-bandwidth mobile services. Even in this scenario, it is possible to sell some Enablers directly to B2C business customers. These might use Enablers for internal processes rather than building mobile applications with them. This also holds true for the Quality of Service Enabler, which can be used for traffic over landline networks as well. It should

be noted that the Status Quo scenario assumes that demand for new mobile services has not increased by 2012; it does not make assumptions beyond that. A Telco could use its customer base to push mobile Internet usage, should the demand not pick up by itself within the next years. For example, inexpensive mobile Internet flatrates could be marketed aggressively.

6.5 Outlook and Conclusion

The strategic position of the Telcos seem to be weak considering the upcoming changes due to web X.0.. This makes it necessary to build up the recommendations on probable scenarios. As competition being on of the key aspects in the chosen scenario the implications and recommendations are crafted to face this. Providing a three step approach for implementing the platform and the developer community, we think can deliver a valuable strategy. Taking the core competencies of a Telco into consideration, the derived recommendations and the business model can cope with the emerging challenges. Nevertheless, it is a critical issue to find the right partners for the implementation, because without them the strategy might failure in total. Within satisfying the established customer base as well as attracting new customers and developers, the basis for further growth and the success of the platform can be assured. The Telco therefore will, besides the bit-pipe, be a provider of quality enriched applications and services whom the customers and developers can trust.

References

[204] S.-A. Ahmadi, C. Giese, W. Malej, and A. Schmid-Egger. *Trendreport - Mobile Applications for the Soccer World Cup 2006*, chapter Technologies for Tracking and Localization, pages 94–107. Center for Digital Technology and Management, 2003.

[205] S. Aughton. iphone third-party apps support finally on agenda, 2007. URL http://www.itpro.co.uk/news/127322/iphone-thirdparty-apps-support-finally-on-agenda.html. Last accessed 13.01.2008.

[206] British Telecom. Web21C SDK Marketplace, . URL http://web21c.bt.com/marketplace_applications. Last accessed 20.01.2008.

[207] British Telecom. Web21C SDK News, . URL http://web21c.bt.com/news_items;all. Last accessed 20.01.2008.

[334] C. Brookson and D. Zumerle. Security for ICT. 2006.

[209] K. Cameron. The laws of identity, 2006. URL http://www.identityblog.com. Last accessed 11.01.2008.

[210] R. Chamarthy and M. Lucas. Charging for Telco and Web Services. URL http://www.billingworld.com/articles/feature/Charging-for-Telco-and-Web-2-0-Services.html.

[211] J. Chapman and A. Chetham. Hype Cycle for Global Consumer Communications Services. *Gartner*, 2007.

[212] R. Chen, E. Su, V. Shen, and Y.-H. Wang. Introduction to IP Multimedia Subsystem (IMS), Part 1: SOA Parlay X Web. URL http://www.ibm.com/developerworks/webservices/library/ws-soa-ipmultisub1/. Last accessed 18.01.2008.

[213] Cisco. Cisco IOS Security Configuration Guide, 2006. URL http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122\cgcr/fsecur_c/fsaaa/scfaaa.htm. Last accessed 11.01.2008.

[214] Jupitermedia Corporation. AAA - ISP Glossary, 2007. URL http://isp.webopedia.com/TERM/A/AAA.html. Last accessed 11.01.2008.

[215] M. Day, J. Rosenberg, and H. Sugano. A Model for Presence and Instant Messaging, 2000. URL http://tools.ietf.org/html/rfc2778. Last accessed 11.01.2008.

[216] J.-C. Delcroix. Global Consolidation of Carriers Brings Stability, but at a Price. *Gartner*, 2005.

[217] European Telecommunications Standards Institute. ETSI Standard -NGN Functional Architecture Release 1 - ETSI ES 282 001 V1.1.1. 2005.

[218] M. Fiutak. Kaum Bedarf an Mobile Content. URL http://www.zdnet.de/news/tkomm/0,39023151,39152522,00.htm. Last accessed 17.01.2008.

[219] Fraunhofer Institute. Mobility and Quality of Service in future IP Networks. 2004.

[220] K. Geunhyung. The role of VoIP in Telecommunications, 2007. URL www.itu.int/osg/csd/ni/voice/presentations/S4-3-KIM.ppt. Last accessed 11.01.2008.

[221] Eileen Green. *Virtual Gender: Leisure, pleasure and consumption*, chapter Technology, leisure and everyday practices, pages 173–188. Taylor and Francis, New York, London, 2001.

[222] GSMServer. IP Multimedia Subsystem. URL http://gsmserver.com/articles/ip_multimedia_subsystem.php. Last accessed 18.01.2008.

[223] heise online. Google beteiligt sich an Versteigerung von US-Mobilfunkfrequenzen. URL http://www.heise.de/newsticker/meldung/99845. Last accessed 13.01.2008.

[224] I. Hülsen and K.-P. Kerbusk. Schonungslose Messbarkeit. *Spiegel*, 03, 2008.

[225] International Telecommunication Union. ITU-T E.800 - Quality of Service, Network Management and Traffic Engineering. 1995.

[226] International Telecommunication Union. ITU-D Handbook - Teletraffic Engineering. 2006.

[227] International Telecommunication Union. The regulatory environment for future mobile multimedia services. 2006.

[311] ITU. Security in Telecommunications and Information Technology. 2006.

[229] ITU. digital.life - ITU Internet Report 2006. 2006.

[230] ITU. The future of voice. 2007.

[231] N. Jones. Mobile Web Trends 2007 to 2011. *Gartner*, 2007.

[232] S: Levijoki. Authentication, Authorization and Accounting in Ad Hoc networks, 2000. URL http://www.tml.tkk.fi/Opinnot/Tik-110.551/2000/papers/authentication/aaa.htm. Last accessed 11.01.2008.

[233] V.L. Liu, D.A. Willis, and B. Tratz-Ryan. Hype Cycle for the Telecommunications Industry. *Gartner*.

[234] Z. Lozinski. The Convergence of Voice and Web 2.0, 2007. URL http://www.itu.int/osg/spu/ni/voice/presentations/S3-2-IBM-LOZINSKI.ppt. Last accessed 11.01.2008.

[235] M. Mani and N. Crespi. New QoS Control Mechanism Based on Extension to SIP for Access to UMTS Core Network over Hybrid Access Networks. In *IEEE Wireless and Mobile Computing, Networking and Communications, WiMob 2005*, volume 2, pages 150–157. Montréal, Canada, 2005.

[236] C. Milanesi and L.-O. Wallin. Nokia Reorganization Reflects Consumerization of IT. *Gartner*, 2007.

[237] D. Mitchell Smith, B. Gammage, and C. Abrams. What's Next With Web 2.0 and Consumerization? *Gartner*, 2006.

[238] Office of Communications. Glossary. URL http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/wmvct/annexf/. Last accessed 17.01.2008.

[239] Heise Online. Netzneutralität: USA debattieren, EU wartet ab. URL http://www.heise.de/newsticker/meldung/75524. Last accessed 13.01.2008.

[240] Open Mobile Alliance. Enabler Release Definition for Billing - Version 1.0. 2002. Last accessed 21.01.2008.

[241] Open Mobile Alliance. Enabler Release Definition for Mobile Location Service (MLS) - Candidate Version 1.0, 2005. URL http://www.openmobilealliance.org/technical/release_program/mls_v1_0.aspx. Last accessed 21.01.2008.

[242] Open Mobile Alliance. Enabler Release Definition for Push - Candidate Version 2.1, 2005. URL http://www.openmobilealliance.net/Technical/release_program/docs/Push/V2_1-20051122-C/OMA-ERELD-Push-V2_1-20051122-C.pdf. Last accessed 22.01.2008.

[243] Open Mobile Alliance. Email Notification - Version 1.0. 2006.

[244] Open Mobile Alliance. Enabler Release Definition for OMA Presence SIMPLE - Approved Version 1.0.1. 2006.

[245] U. Ostler. Vordenker entwerfen das Next Generation Network. URL http://www.searchnetworking.de/themenkanaele/netzwerkdesign/architektur/articles/48171/. Last accessed 12.01.2008.

[361] M.E. Porter. *How competitive forces shape strategy.* Harvard Business Review, 1979.

[247] A. Postinett. Konkurrenten reagieren ratlos auf dern Erfolg des Internetunternehmens - Das Prinzip Google. *Handelsblatt*, (23), October 2007.

[248] T. Riedl. Warten auf das iPhone 2.0. *Süddeutsche Zeitung*, 28.12.2007.

[249] J. Rosenberg, H. Schulzrinne, G. Camarillo, A. Johnston, J. Peterson, R. Sparks, M. Handley, and Schooler E. SIP: Session Initiation Protocol - RFC 3261. 2002.

[250] M. Ross. The global telecoms industry. The Global Telecommunications Industry 2006 ICCA, Rhodes, Greece 30 th October 2006.

[251] M. Ross, S. Aldrin, M. D. Petersen, and C. Kälin. Telecom Industry Value Opportunities for Private Equity - EPISODE 2: The Telecom Enabler. 2006.

[252] M. Satti. The Next Generation Networks (NGN) Security Implementation ChallengesSecurity ChallengesforforService Providers (ISPs & Telecom). 2006.

[253] H. Schmundt. Erlösung durchs Jesus-Phone. *Spiegel*, (46), 2007.

[254] N.J. Scholz, J.-C. Delcroix, B.W. Sky, J. Forsman, M. Kurth, K. Bhatia, C. Patrick, P.A. Reali, and B. Tratz-Ryan. Hype Cycle for Carrier Operations. *Gartner*, 2007.

[255] M. Schumann and T. Hess. *Grundfragen der Medienwirtschaft*. Springer, 2006.

[256] S. Shen, S. Pittet, and N. Ingelbrecht. Hype Cycle for Consumer Mobile Applications. *Gartner*, 2007.

[257] S. Tarkoma, R. Balu, J. Kangasharju, M. Komu, M. Kousa, T. Lindholm, M. Mäkelä, M. Saaresto, K. Slavov, and K. Raatikainen. State of the Art in enablers for Applications in Future Mobile Wireless Internet. 2004.

[258] The Wallstreet Journal Online. Google has even bigger plans for mobile phones. URL http://online.wsj.com/article/SB119517445580795065.html. Last accessed 13.01.2008.

[259] G. Vacca. iphone: the phone reinvented. or not? URL http://the-presence-of-presence.blogspot.com/search/label/Presence. Last accessed 11.01.2008.

[260] R. Valdes. Facebook and the Emerging Social Platform Wars. *Gartner*, 2007.

[261] W. Veith. Sicher unterm Schirm. URL http://www.networkcomputing.de/nwc/mobile-und-wireless/artikel/archive/180/article/sicher-unterm-schirm/. Last accessed 21.01.2008.

[262] Vodafone. Betavine. URL http://www.vodafonebetavine.net/web/guest/home. Last accessed 20.01.2008.

[263] U. von Reibnitz. Scenarios + Vision. In *IT Challenges in the Next Millennium*, 1999.

[264] F. Weber, W. Fuhrmann, U. Trick, U. Bleimann, and B. Ghita. QoS in SIP-based NGN - state of the art and new requirements. 2007.

[265] B. Widmann. BSI: Internetkriminalität steigt deutlich an, . URL http://www.zdnet.de/security/news/0,39029460,39155279,00.htm. Last accessed 18.01.2008.

[266] B. Widmann. Mobile Bezahlsysteme auf dem Vormarsch, . URL http://www.zdnet.de/news/tkomm/0,39023151,39157550,00.htm. Last accessed 18.01.2008.

Chapter 7

7 Personal History 4D

Soňa Petrů, Claudius Jablonka, Daniel Filonik, Yang Guo

In this report we want to follow the process of analyzing trends leading to a certain scenario in the year 2012 which could be the foundation for a new product offered by a telecommunications company. To be able to present a likely scenario, we have identified the driving forces of a development and the trends that help us to analyze the progress on the telecommunications market for the year 2012. Imposed by the selected trends, we were able to emerge three possible scenarios. Out of these cognitions, the Trendsetting Scenario was considered as the basis for the development of our new product. The identified scenario consists of fixed components such as advanced battery or multimedia ability of mobile devices and uncertain components such as of open standards, the preference for all-in-one device among the users and a fully functional semantic web. Based on these cognitions, we have developed an idea for a product. Our product, the Personal History 4D, is a web service that collects a huge amount of data over a longer period of time and also helps the user to interact with his saved data. The appellation 4D involves the forth dimension, time, which allows the service to imply a diary-function. Together with the integrated location service, the user has the opportunity to review his activities over the day aligned with location information. To make the offered service easy accessible for the user, the collected data would be presented to him as a view a map that can be upgraded with tagged user created content. Shared with the online community, the user is a step closer towards merge of his online and real world.

With this idea that is capable of covering a wide range of services and possibilities, we see a chance to contribute to make the users' every day life

more manageable and better structured than it is today.

7.1 Introduction

Innovations in the information and communication technology converge and tend to break new ground together. The demand for combined services will grow tremendously over the next few years but the question occurs what kind of services among the upcoming abundance of needs will be successful on the market. What service will users prefer to satisfy their requirements?

A couple of years ago, when someone mentioned the term personal history, everyone thought about a written diary. Today, blogger are keen on having their opinions accessible and presented to public. Blogs create a platform for users to express themselves and give other participants the chance to have an insight into their reality. But what will come next? What is the next step towards sharing expressions from your everyday life?

This report deals with future services that could be offered by telecommunications companies and form a link to web services. Such a service would be "Personal History 4D".

Considering four different groups of trends, Enablers, Mobile Devices, Market and Legal Issues, we were able to create three distinct scenarios to describe the situation in the year 2012. Our trend analysis brought to light two different groups of components that are to be taken into account when constructing scenarios. The fixed components are are the same for every scenario, the varying components can change from scenario to scenario. The composition of these factors frames a scenario. Our three scenarios are described in chapter four.

Chapter five draws a picture of our product, the "Personal History 4D", and shows its market potential. We were trying to carry together different usabilities of our services to show the wide range of possibilities it offers. It reaches from simple data gathering over location service, organizing contacts, synchronizing appointments over to endue content with music, video or pictures. The other part of chapter five consists of market analysis and business models.

The last chapter gives an overall overview of our outcomes and a sum-up of the most important cognitions.

7.2 Trend Analysis

A few technological, sociological and economical trends that are apparent today may have major influence on how a future product will look like.

7.2.1 Enablers

With telecommunication companies starting their endeavors for a so-called Next Generation-Network (NGN) in the recent years, we expect an all-IP platform across fixed and mobile communication to be standard by 2012. Ubiquitous Internet access becomes natural. In five years, mobile applications will rely on permanent Internet connection like desktop software does today.

7.2.1.1 Functionality

Coupled with the all IP network introduced by NGN, consumers will get used to newer services. A few common denominators of enablers these services rely upon should be considered state-of-the-art in the near future:

- **web browsing capability** makes access to online content available for mobile handsets.
- **location information** GPS or GSM triangulation enables localized content and location-based services.
- **AAA**[1] is supposed to provide the user with one unified user profile and facilitate flexible charging billing.
- **multimedia features** includes streaming online video and music as well as online purchases.
- **social networking** is a feature that we can observe to spread across numerous community platforms.
- **online storage** allows for device- and location-independent access of content and facilitates its sharing.

7.2.1.2 Standards and Compatibility

However, those enablers may lack a commonly used standard, making wide deployment difficult. This problem does not only occur on web services where the same features are implemented with different interfaces by competing providers, but also on mobile handsets which have varying operating systems and communication protocols. Attempts to change this situation are already taking place. Examples like Open Social Platform and Open Handset Alliance

[1] Authentication, Authorization, Accounting

(OMA) try to create open protocols and specifications for services such as location, identification etc. [296]. Google's Android platform also strives to create a common platform for all mobile applications [378]. In contrast to this, closed platforms such as Apple's iPhone are being deployed as well. Since the market of rich mobile applications is still developing, it is hard to tell whether if an open standard or several closed standards will be established. This may have a big influence on how to develop and deploy new devices for new fields of applications.

7.2.1.3 Semantic Web

One future technology that could spark a number of innovative new applications in the upcoming years is the semantic web. The goal of the semantic web is to extend the Internet contents in a way that will enable computers to comprehend its underlying the meaning. So-called software agents that rely on this of information will be able to assist users with everyday tasks. [270] However, there is skepticism about the feasibility of such a technology. Current attempts often rely on users' help to tag data. Besides the current lack or underdevelopment of necessary technologies there are also concerns about potential abuse. For example, it is possible that certain individuals will deliberately tag misleadingly to achieve greater exposure. Additionally, the semantic web would drastically improve the computers' ability to perform data mining which could also be used for questionable purposes. [276] Nonetheless, the semantic web in some form will be necessary in order to deal with the increasing information overload.

7.2.2 Mobile Devices

The telecommunication device is the immediate interface connecting the user to the network. With NGN making ubiquitous Internet available, mobile devices gain an importance more than ever.

7.2.2.1 Fixed-Mobile Convergence

With the arrival of so-called Next Generation Networks (NGNs) in the next few years, we are going to experience a development called fixed-mobile convergence. A wide range of services common to fixed communications networks will be ported onto mobile devices and become accessible from anywhere [277]. For the user, the difference between fixed and mobile networks will blur [302]. This means that future mobile devices will have to incorporate a variety of connectivity technologies such as GSM, UMTS, WLAN, WiMAX and possibly even the today not yet utilized 700 MHz spectrum [303] to take advantage of this development.

7.2.2.2 Form Factor

The dimensioning of a mobile device is part of the problem called single-device-paradox: small size benefits portability but restricts usability. However, newer approaches involving alternative interfaces hold the key to solve this problem. Examples range from iPhone featuring a multi-touch display to built-in projector/camera combination that project the output on an arbitrary surface and capture gestures as input. [271, 297].

7.2.2.3 Battery Life

According to a TNS study conducted in 2005, one of users' main concerns for future mobile devices is battery life [267]. As the capacity of conventional Li-Ion batteries have not been able to keep pace with the demand, new solutions such as low power-consumption components and new power technology such as fuel cell or nanotube electrodes [272, 301] have to be taken into consideration. Advances in the field of fuel cells have already taken place [294]. By 2012 the first next generation battery units may be in deployment already. With roughly ten times the capacity of today's batteries, more demanding and power consuming multimedia, telecommunication and computing technologies can be made portable.

7.2.2.4 Multimedia Abilities

As can be observed on the current generation of mobile phones, multimedia capability is becoming more and more common among mobile devices. Online multimedia content such as IPTV is expected to reach the mobile market soon, as newer technology will offer higher bandwidth. [282, 274]

7.2.2.5 All-in-One vs. Specialized Devices

The idea of an all-in-one digital mobile companion device is not new, but has been manifesting in modern mobile phones that combine more and more functionality required outdoors such as music player, GPS navigation, camera or even billing. Although such a device still cannot compete with the functionality, quality and energy efficiency specialized devices can offer, the compactness is often preferred [295]. An opposite vision has been proposed as well: mobile devices become specialized modules offering a limited set of functionality and communicate with each other. The role of a mobile phone becomes that of a personal gateway, concerning itself only with connectivity and offering network access to other modules which take care of their own fields of application the best way possible. It is not clear which way the future will take, since even experts disagree with each other on this matter [285].

7.2.3 Market

To design a successful product, examining the future development of the market is essential.

7.2.3.1 Customers

The crucial changes in the market environment by the year 2012 are driven by diverse expectations and demands of customers. Although there are a lot of particular claims to take into consideration when trying to predict the customer needs in 2012, in today's view, we assume that the most significant trend will be the merge of the real and virtual world.

Privacy
Privacy is the main concern of Internet users and it is also the top reason why non-users still avoid the Internet. Online privacy is defined as being in control of what information about oneself is made public. While we identify a growing desire for online privacy driven by a general mistrust of the Internet in both young [305] and middle aged [279] groups, the Internet is used as a platform for self-presentation as well. Blogs and Video-sharing platforms are a rapidly growing way of conveying yourself and your point of views.

Trust
Convergence of virtual life and real life raises the need to transfer the pattern for establishing trust from the real world into the online world. Testimonials, reputation and recommendation should be tied inseparably to the user's identity. Inevitably this trend is colliding with the desire for online anonymity and privacy. Tools to assess the trustworthiness of a stranger online is a precondition for future web applications. If we can trust strangers with a good online reputation, the web will offer an even better level of trust than the real world [289]. The benefits of using a real world concept of accountability and trust online may eventually outweigh the desire for privacy.

Computer Skills
In the current generation of computer users, the time spent online is still strongly correlated to age, usually due to the computer skills of the younger generation. With the current younger generation entering the working life, computer skills become increasingly more natural. Simultaneously users demand more intuitive user interfaces to conquer the compound of functionalities. Overall we identify a trend towards a higher average level of computer skills. However, personalization of the graphical user interface will grant access even to the less proficient users [290]. Pioneers in user generated content such as YouTube which simplified the process of producing and contributing content gained a wider range of users than ever before. While today such services are still rather static, by the year 2012, we assume that user generated content will have become interactive and

accessible at a new level. The boundary between consumer and producer will converge towards a new type of Internet participant - the prosumer (by Alvin Toffler).

Demographics

As the pluralistic global village grows, subcultures gain in size and influence. Specifically tailored services may help gaining access to a broader spectrum of customers. Social acceptance of new technologies among the users means that it must meet basic expectations and be perceived as useful by its intended user community. User experience and training will impact acceptance levels as will the manner in which the technology is implemented to contribute to organizational goals and working practices [275]. Another important question is the way of financing new online services; on the one hand people are used to cost-free web-services but on the other they want to protect their privacy and develop a certain hostility towards content sensitive advertisement.

7.2.3.2 Business

In our Basic Report research we concluded that there are three major possibilities concerning the future value chain in the Telco sector. One option implies the telcos to remain active primarily in the field of providing bandwidth, leaving the service domain to the web players. The second option telcos could try to extend their activities to the entire value chain, thus providing both, the network and their own services running on it. In the last option telcos partially extend into the service areas of the value chain by cooperating with service providers and providing enablers. The development of the value chain will influence the revenue streams of telcos, possibly adding new sources of income.

7.2.3.3 Competitors

The competition will remain fierce in the Telco sector and new competitors will further increase the pressure as indicated in our Basic Report. It is likely that the market will not support all of the players joining the web 2.0 hype, therefore the market will consolidate to some extent. The users will ultimately determine which service providers will prevail by their choice. Even though the providers with the largest user base will have the best chances of succeeding in the market, niche communities are likely to continue to exist as well. Interoperability between services from different providers through standardized APIs will become an essential tool to avoid losing users to other services. The cooperation between telcos and device manufacturers will foster to develop more sophisticated devices suited for new services. However, some device manufacturers may also have ambitions to become competitors.

7.2.4 Legal Issues

The most prevalent legal trends that need to be taken into consideration are Digital Rights Management and data protection laws. From a technology perspective we expect much better means to enforce intellectual property rights. In 2012 laws for data protection may not have been implemented yet, but private certifications may take up the role of ensuring the trust necessary for e-business.

7.2.4.1 Digital Rights Management

In the near future systems such as AMD, Intel and Microsoft's Next-Generation Secure Computing Base (NGSCB) [291, 304] will allow hardware assisted DRM and thus be harder to bypass. With Windows Vista, an operating system capable of NGSCB is now becoming established and hardware can be expected to follow by 2012. The NGSCB allows digital content providers the necessary security to offer video and audio on-demand services as well as SaaS[2] functionalities with lower risk of piracy. Operating system based DRM will not only suppress piracy, we believe it does also offer immediate benefits to the user such as ubiquitous availability of all purchased content, unique identification of files coupled with user-dependent contextual information as well as recommendations for related content based on data mining and new revenue models such as pay per minute.

We strongly believe that China and India, as members of the WTO, will not still be able to get away with intellectual property rights violations until 2012. Due to their rapid development they will not be able to claim a developing nation status which serves them as an excuse today [284]. If IPR violations continue to persevere in China and India, we expect trade sanctions to be taken by the WTO and conflicts to be resolved quickly and vigorously.

After the end of copyright infringements from far eastern nations, South America's booming nations may step into this position. If technological barriers to DRM are broken by 2012, these countries could pose a similar threat to global Digital Rights as China today. Whether pirated content from economically less developed countries may still be distributed extensively to strictly-regulated and DRM-protected markets such as Germany will depend on the chosen scenario.

7.2.4.2 Data Protection Laws

Today it is already possible for a company to gain access to all personal data of a user if approved in a so-called "opt-in". With this contract, the user can give the company the right to use the data for specific purposes. We have reason to believe that this freedom of contract as a basic principle of our civil code, BGB, will not suddenly be overruled in 2012. We do believe, however, that more and more users will be ready to agree to such "opt-ins" if companies clearly point out

[2]Software as a Service

the benefits and win the users' trust that the data will be processed responsibly. Depending on the government's speed to respond to the new requirements, either institutional or private agencies will provide certifications for trustworthy use of online data. In 2012 there will be established certifications that guarantee much higher consumer protection than today available.

7.3 Scenario Analysis

In order to come up with the best suitable and possible solution for Deutsche Telekom it is necessary to determine the possible scenarios which could be relevant in 2012. Considering the above-named trends we identified three scenarios that might come true in five years. According to the expected pertinence of these scenarios, we ordered them according to their anticipated probability.

Before entering the world of the ascertained three scenarios, there are a few factors that should be summarized as inherent parts of all three scenarios. We assume them to be certain.

In terms of security, AAA provides the user with one unified user profile including one log-in to different service platforms as well as the possibility to facilitate payment for the user. The fixed mobile convergence (FMC) allows users to access via both wired or wireless network, allowing a higher degree of mobility[293]. The battery-life-problem is solved by using low power-consumption components and new battery technologies. Another fix component for our scenarios is based on the trend towards multimedia abilities of mobile devices. According to this trend we presume that by 2012 it is possible to integrate multimedia features in very small dimensions.

Regarding the market developments for 2012, the current generation of youths will enter working life or study by that time. Grown up with Internet and user generated contents, the users feature a great potential of computer skills or are at least familiar with using a computer.

Concerning legal issues, the digital content providers and other providers of software services are protected from piracy by several systems like the NGSCB that approves hardware assisted DRM. This minimizes the risk of copyright violations.

Apart from these fixed assumptions, there are diverse factors that are not quite certain. Among these arguable issues are the functionality of semantic web, the question of financing, the public opinion on privacy protection and legal issues. In order to meet a wide range of possible outcomes, we created multiple eligible scenarios to picture the year 2012.

7.3.1 Stagnancy Scenario for 2012

This scenario consists of rather negative developments for the web market in 2012. A few closed standards dominate the market. Meaning that a few strong

players in the Web X.0 market will prove their superiority towards smaller players by maintaining proprietary standards. The users are forced to agree to inflexible bilateral contracts in order to gain access to the API to implement own applications. Although both types of devices are available, the all-in-one devices are in little demand compared to specialized devices. The idea of semantic web could not be realized until 2012, which means that the information overload on the web is very difficult to manage, impeding orientation for the users. Privacy protection stays a big issue among users. The anxiety of violation of privacy leads to stricter legislature and implicates elevated concentration on arrangements concerning privacy protection. These circumstances restrict the legal framework in which both the consumer and producer of web content can develop their creativity. For this purpose, the emergence of prosumers takes a turn to stagnancy as users meet with refusal to resolve the mistrust of the virtual world. The users are accustomed to use the Internet for free, turning down chargeable services, hence the the success of ad-financed services. Concerning value chains we expect limited opportunities in the market and because of fierce competition, the telcos will focus on their core business and provide increasing bandwidth at low-cost rather than indulge in offering services. They would settle for being a bit-pipe and focus only on this one commodity.

7.3.2 Down-to-Earth Scenario for 2012

This scenario pictures 2012 is slightly based on the status-quo of today, enhanced by some advancements of today's characteristics.

The issue of standardization is expected to be managed by a few closed standards. This means that the dominant players in the Web X.0 market will be strong enough in their market positions to maintain proprietary standards. Access to proprietary API is gained by bilateral contracts. Although all-in-one devices are available, the majority of users prefer specialized devices with a small feature set. Nevertheless these few functionalities would be fully developed and promise high-quality which is important to the users in 2012. The trend among users is "back to the roots", meaning that users feel a desire for simple, de-spec devices. The so-called retro-movement enters the world of digital technology and generates the desire for minimalism in the range of functions of a device. The promising semantic web is only partially functional and still can not develop its whole effect. There is also a cause for concern regarding the safety of privacy within a fully functional semantic web which causes dilemmas between the parties involved in the process of implementing semantic web. Privacy protection and the whole public dispute about web anonymity is still on-going and dealt with by legislation, public and economy. The users themselves are willing to give up some of their privacy to present themselves with pictures, descriptions and blogs in the Internet. Virtual self-expression gains importance as the virtual and real life converges. Although the European users in are still apprehensive to reveal

their complete identity on the web, there are age-groups to whom the privacy protection in the WWW is not of great importance. Especially young people who grew up with the Internet and are familiar with e.g. online communities and used to share their "lives and experiences" in such communities fall in this category. They rather want to act as prosumers who create content and are poised to be recognized online than just passive anonymous web-consumers. The users are accustomed to benefit from the Internet for free which implies that the services must be financed through advertisements to be profitable. Due to this, we assume that only a minority of users are willing to pay for online services, notably special and exclusive services. The legal restrictions are comparable to today's legislation. This includes the laws concerning data protection and privacy. The only way to profit from user data is with their explicit consent, for instance through an opt-in during the registration process. Concerning value chains we expect limited opportunities in the market and because of fierce competition against Web X.0 Market, the telcos will focus on their core competencies of offering bandwidth. They would settle for being a bit-pipe and focus only on this one commodity. The telcos would admit that the IP protocol has opened the market so far that their competitive advantage has shrunk and their traditional structures lose merit. The web X.0 domain would be dominated by a few strong players. We envision a competitive situation in which some players like Google would build up strong portals whereas others would act as an umbrella company owning a portfolio of innovative services acquired through start-up companies.

7.3.3 Trendsetting Scenario for 2012

Our favorable scenario summarizes the expected developments into an innovative and progressive setting of the year 2012. Each of the mentioned components features a far-reached development from today's aspects of the driver units.

In the year 2012 all services will embrace AAA which allows the unique identification of every single user including one log-in to different service platforms. Furthermore, the fixed mobile convergence (FMC) will allow the users to roam between any kinds of wired or wireless connection. Thanks to advanced batteries the user will hardly ever experience his device running out of power. Naturally the multimedia abilities of mobile devices are at a level of today's desktop computers. Not only the technology of devices will be highly developed, but also the average skills of the users will have improved. Although the NGSCB will curtail the user's freedom to decide over their content, it will open new sales channels for copyright owners and allow enforcement of digital rights.

The issue of standardization is expected to be solved by a few or one open standard. Standards are extremely important in the modern society of 2012. They ensure that products and services are of adequate quality and can interoperate even though they may be from different. Ultimately, they raise levels of

quality, safety, reliability and efficiency. Open standards should follow the principles of availability, and maximize end-user choice. In addition, there should be no royalty and no discrimination. The majority of users prefer all-in-one devices that offer a wide range of functions. The users recognized that mobile devices can offer a bigger benefit than just communication and features like a camera. They do not want to be forced to change devices in order to use different functionalities. The all-in-one device in comparison to different devices for respective functionalities promises to be ready to hand to save space and time for its users. The users want to have only one device with integrated multiple functions. The auspicious semantic web is now fully developed and works automatically which enables enlarging the capacity of the web and at the same time deal with the information overload streaming through the web. The issue of privacy protection lost some of its relevancy and prominence as the users are more willing to express themselves on the Internet and have the chance to decide about their privacy information. It is up to them to allow companies or market-researchers to use their available data on the Internet. Another component to contribute to the acceptance of less privacy is trust. Through reputation services that reveal reputation and certain user data, the issue of trust in the web world experiences a boost. The online reputation replaces the real life trust to strangers relying on the virtual trustworthiness. In this scenario the users also want to act as prosumers who create content and are eager for recognition, which implies that privacy protection will lose ground. The users' willingness to pay for web services contains a certain area of services. Among these are exclusive and selected services for premium customers. As the users are accustomed to benefit from usual Internet services for free, they will not be willing to pay for common web services. Nonetheless, both possibilities become common.

The legal restrictions are comparable to today's legislation except the laws concerning privacy protection. As mentioned above, strict laws concerning privacy are not necessary anymore as the majority of users do not feel offended by taking active part in contributing. Especially when they themselves hold the responsibility for their personal data online. In this scenario T-Com would not only be a bit-pipe but could extend to perform as EnableCo.

7.3.4 Conclusion

After determining the above-named scenarios we decided to which one our product should refer to. Although very far-reaching, we decided that the Trendsetting Scenario is the one that we believe would approximate to what the state-of-the-art in 2012 could be. The optimism is based on the developments that mobile and especially web-services went through the last five years. The retrospective shows a big step ahead in terms of active involvement of users in the web. Communities and blogs gained great popularity over a quite short period of

time and user produced contents tend to increase in attractiveness. The desire of users to present themselves along with their opinions and ideas on the Internet canalizes the possibilities of how to draw attention or even popularity. Especially the break-out of anonymity through user generated content is becoming very popular among younger generation. This expanding process entails a lot of changes in different areas like legislation or commercialization. We believe that the progress will not come to stagnancy but on the contrary will conquer new fields of interest. According to such a promising environment, we are thinking about services that could make users' lives easier and help them handle the mass of information occurring in his every day life. As we assume that the virtual and real life will merge, the hereinafter presented product and services are exerted to live up to expectations coherent with this development.

7.4 Personal History 4D

In the following we will have a insight into our idea of a potentially successful product that could be ready in 2012. The details of the product will be followed by a market analysis and ideas of revenue generation.

7.4.1 Product and Service

Our product, the Personal History 4D, is a classical web service at heart. However, its character could vary slightly depending on the scenario that will come true. In any case, the goal of our core product is structure the huge amount of information that the user generates and consumes over time and to allow the user easy interaction with this data. Furthermore, we want to offer value added services that assist the user by analyzing the data and providing support and recommendations.

7.4.1.1 Gathering User Data

In order to obtain data from the user our service will use two different approaches: collecting data from a mobile device and acting as a meta-service. Ideally both approaches would be realized, which would mean that a maximum of data could be obtained. Either way, once collected, the data will end up being stored in a database on our servers.

Device Centered Approach

In the chosen scenario we expect to have an all-in-one mobile device that features long battery life and a fast mobile Internet connection. These factors would be the optimal foundation for a device centered approach. In order to use our service users would have to install a client on their mobile device - or it could even come preinstalled on the device. This client would run in the background

using as little system resources as possible. The whole purpose of the client is to collect information and upload it to our servers. In order to reduce network traffic and increase efficiency, the client would most likely gather a certain amount of data before compressing it and sending it as a package. Also included in this package would be an unique identifier to link the data to the user. Once the package arrives on our servers, the containing data would be fed into the database.

Based on this, we can now take a closer look at the data that could be obtained from a mobile device. First it is important to note that every piece of information needs to be timestamped in order to be useful to our service. Furthermore, information should be location-tagged whenever it makes sense.

- User Location

  With the help of technologies such as GPS or GSM which should become standard in mobile devices, it is possible to determine the users location over the course of the day. Thanks to the expected advances in battery life, this data could be collected pretty much anywhere the user goes at any time.

- Contacts and Communication

  The users address book would provide our service with information about social contacts. It might not be appropriate to collect all of the contents of the communication carried out on the device even if it would be legal in our scenario. However, it would make sense to collect data from certain communications if the user explicitly wishes for it. The information about how frequently users communicate is slightly less sensitive and could also be incorporated in our service.

- Activities and Appointments

  The organizer function of the mobile device would provide even more interesting data concerning the users activities. A lot of the location information could be interpreted in the context from the users' calendar.

- Pictures and Video

  Most mobile phones offer the ability to take pictures and short video clips today. It can be expected that this functionality will further improve in future devices. Tagged with the location, that content would be very useful to our service.

- Music and Movie Preferences

  Listening to music on your mobile device is a standard feature nowadays and watching video will most likely gain popularity as display technologies improve and mobile television becomes widely available. Collecting all

of the actual content that the user consumes on the mobile device is not realistic because of legal and technical problems. Nevertheless, our service would profit from knowing what the user consumed and when he did it.

Meta-Service Approach

The chosen scenario also allows for another way of gathering data. As we expect open standards to play an important role for web services in the future, it will become possible for our service to interact with existing ones. It is even likely that social communities will be legally obliged to provide a way for users to migrate their data between services. Our service would make use of this by regularly checking the accounts that the user has on various web services. To enable our service to do this, the user would have to trust us with his user name and password to the web services he wants us to keep track of. All the changes that the user performs on those websites would be tracked.

Let's look at what data could be acquired using this approach. Similar to the information gathered from the device, all changes need to be timestamped in order to be useful to our service.

- User Location

  Until now, services based on location information are only beginning to show up. Time will tell how the user base of services like Qiro will develop. This kind of information might be difficult to acquire via other web services.

- Contacts and Communication

  Online communities like Facebook or StudiVZ have been very successful and continue to grow. The main feature of such communities is the ability to manage your contacts and communicate. Beyond that, users expose a wealth of data about themselves in their profiles, ranging from current activities to music or movie preferences.

- Activities and Appointments

  Similar to the organizer on a mobile device, online calendars such as Google Calendar would provide important data concerning the users activities.

- Pictures and Video

  Another highly successful group of web services are picture or video sharing sites. Most people know websites like YouTube or Flickr and many frequent them. Our service would track both consumption of content and user contribution.

- Music and Movie Preferences

Music Downloads have become a big business with the success of the Apple iPod and iTunes. It is to expect that movies will eventually follow a similar path. Tracking the users downloads at such download portals would provide our service with valuable data.

It is obvious that a wealth of data can be collected with both approaches. The key aspect of our service is to gather data as smoothly as possible. It is important that the user is aware of what data is being collected and feels in control over the process. The following will present the key steps that need to be taken to ensure acceptance of our service among users.

- Automated Gathering of Data

  One of the most important features of Personal History 4D is the automated collection of user data. This feature is critical because our services rely on a wealth of information about the user. Without the automated data collection our service would greatly suffer in usability, as it would be unattractive and tedious for the user to actively input all the data. Regardless whether via the mobile device or the meta approach, it is important that the user can carry on his everyday business while our service collects the data for him.

- Visible Gathering of Data

  Considering the importance of the automated gathering it is necessary to take numerous measures to make sure the user feels comfortable with exposing his data. One of these measures is to make it visible to the user whenever information is being collected. For example, if our client on a mobile device sends a packet to the server, the user should be notified by an icon on the display. If the user wishes to get more information about the data being uploaded, he can directly look it up on the mobile device or check the website later.

- Controlled Gathering of Data

  The user can decide what data he wants to be collected by our service. A comfortable and clean user interface is necessary to make it easy for the user to enable and disable data collection from different sources. Additionally the user can specify certain data, such as photos or video clips, to be visible to nobody except himself until he approves it.

- Controlled Access to Data

  The rights to the data belong to the user and he decides who has access to his data. It is absolutely crucial that we can guarantee that nobody can access the data unless the user allows them to do so. To fulfill this guarantee, the IT infrastructure must be well planned and protected against attacks. Communication between the mobile device and our

servers needs to be encrypted to eliminate the possibility of eavesdropping. Another important issue is that we cannot sell user data to other companies without the users consent. However, we could ask the user whether he would agree to participate in anonymous surveys.

- Processing and Presenting User Data

  In order to attract users our product will have to do more than just collect data. Based on the data, we are planning to offer a number of services, which will convince the user that there is real value in using our product. It is necessary to communicate to the users that the more data they agree to expose, the bigger the quantity and the better the quality of the services we can offer them.

Core Product

Our core product consists out of services that are directly connected to managing and presenting the collected data. The following services are the ones that would constitute our core product.

- Diary and Organizer

  Depending on the users preference and the time he wants to invest in Personal History 4D, there are different ways in which he could use the service. On the one hand, if the user wishes, he can keep a complete online diary and write his own texts. The diary entries could be spiced up with pictures that the user took that day. Later on, the user would be able to browse the entries chronologically through a nice and clean interface. On the other hand, the user can also rely on our service to automatically generate a brief overview over his past activities. This feature would provide an overview over the users accomplishments throughout the day. In order for this service to work, it is necessary that the user enabled the collection of information about his activities and appointments. In addition to that, this service would greatly benefit from data about contacts and communication as well as location data.

- History Maps

  We want allow the user to browse the data we collect with as much comfort as possible. One way of doing this is by presenting the data that was collected in a certain time frame on a map. On such a map we could highlight the location information from the user in a certain color, using the opacity as an indicator of how frequently a certain location was visited. Furthermore, we could place tags on the map representing pictures or videos that were taken during the selected time frame. Other tags could be used to indicate certain events from the organizer or diary. The user could step through time and watch how his centers of interest have changed.

- Memory Helper

  As people are confronted with the huge amount of information everyday, one useful aspect of Personal History 4D would be that it could relieve the load on the users memory. For example, if a user has lost an item, he could look up where he was throughout the day in order to find it. Other than that, he could use Personal History 4D in order to find a certain song that he listened to or a video that he watched on YouTube a couple of days ago. The key to this service will be the interface through which the user can query information about his past. Ideally the user could input a question stating his problem and receive a meaningful answer with the help of computational linguistics and semantic web technologies.

- Shared Data

  Personal History 4D would also allow sharing data with other users, similar to social networking websites today. However, as the service collects a lot of data, there would have to be different trust levels that influence what data is accessible. For example, colleagues from work might only have limited access to the users organizer data, in order to know when he can be reached. On the contrary to that, close friends could have full access to the users diary and pictures. Another interesting application would be to compare the shared data for similarities, for example the user could find out if his friends used to listen to the same music he did at a certain point in time. The user could also choose to make a certain part of his data accessible to a certain group of users temporarily. If the user visits a convention he might want to let other users at this convention know about his location.

- Inquiries

  Building up on shared data, Personal History 4D could allow users to find out the right time and place to meet another user. By analyzing patterns in the locations of both users the system could try suggest a time and place that is convenient for both. Furthermore, the system could take into account organizer data and personal preferences. For example, it could suggest a club that plays music that both users like to listen to. If the user has not seen his friend for a while, he could also ask the Personal History 4D for a list of the most important events in the shared data since the last time they met.

Value Added Services

There are some services based on the collected data that are not directly related to our core product, but still might be of interest to our users. The following services could be offered in addition to the core services.

- Support and Recommendations

  By looking at the users preferences and patterns in his everyday activities, Personal History 4D could offer support or recommendations. If the user drives the same route to work everyday, he could be notified if there is a shorter route. Similarly, if a user often visits a certain location, we could inform him about restaurants or shops that are nearby. Additionally, with the help of the information about music or movie preferences, we could recommend certain products to him. Thanks to the wealth of information that our service would have about our users, these recommendations could be much better targeted than in comparable services today.

- Reputation

  Thanks to our meta-service approach Personal History 4D could track the users contributions across many different communities. With this information we could award the most active and successful users. For example, we could distinguish between users that contribute to communities and users that only consume. We could also pick out users that have received good ratings on their contributions. By highlighting positive achievements into the users profiles our service would motivate users to become more active. This would also benefit the web services that we receive data from.

Our goal is to make these services available on any computer through our website. In addition to that, we want to make sure the user can also use our services on his mobile device as well. Some of the services might not be suited for mobile devices because of the limited screen space and the big amount of data involved. It needs to be tested how well complex services like History Maps work out on a small mobile device. This concern could also become obsolete if we see further advances in display and input technologies. In any case it is important that our content is stored independently from its representation on the website in order to be able to support different formats.

Personal History 4D should not be regarded as a competitor to existing web services but rather as an additional value for the users. We do not aim to provide all the different services available on the web by ourselves, because this task does not seem feasible to us. Instead, our product tries to incorporate information from many different sources in order to provide new and unique services.

7.4.2 Market

Beginning with an analysis of the potential customer of the Personal History 4D application, we will then focus on the size of the market and later proceed to analyzing the competition to be expected in this market by 2012.

7.4.2.1 Analysis of Customer

The customers of the Personal History 4D application can be characterized by their age, gender, education, wealth and corresponding media mentalities. In short, Personal History 4D appeals to two largely differing customer groups, depending on the targeted age group. Nevertheless, since it offers great value to all intensive users of multiple Web X.0 services, which we are convinced to be a clear majority of the population by 2012, it addresses a mainstream market.

Gender

Both men and women are the target group of our devices. Today, 53,5% of Internet users are men and only 46,5% are women. However, the percentage of women who are online is increasing, especially in the younger generation and in the older generation among those with a better education. By 2012 we expect gender equality to have reached the web, as we can already see today among teenagers: that girls use the Internet slightly more (92%) than their male peers (91%). [290]

Age

The expected customer group for the personal History 4D application is aged between 12 and 45. The private customers can be further separated into trendy teens and twens on the one hand, and technophile middle aged people on the other hand. We anticipate only a minority of users above 45 to open up to granting an application access to detailed information on their personal or professional lives. For this age group who has not had the chance to grow up with the Internet as a part of their private lives, the Internet will still be a foreign realm in 2012. Entering into a symbiosis with an application monitoring their personal lives or professional lives - an appealing concept to the younger generation - is inconceivable for them. On the other end of the spectrum we see little appeal and ability to use the application for children below 12 years of age.

In conclusion the private user group to be addressed is mostly between 12 and 45 with a mean of approximately 25 years of age.

Income and Education

The prosperity of the private user group could be compared to Apple's user base: the more senior user group is expected to have an above average income and education and is more likely to pay a premium for a lifestyle product that lets them feel like being part of a younger generation [280]. On the other end of the spectrum, the younger generation, subject to targeted marketing activities, can often hardly afford the expensive devices and services they have come to desire. For this age group the Personal History 4D application, combining many of the benefits of social communities, blogs, video sharing and many other emerging services, can offer great value due to the network effect. According to Reed's Law and Metcalfe's Law [298], the value of a network grows exponentially with

every new user "communicating compatibly". Consequently individuals have an egoistic motivation to invite friends to the network. This applies particularly for the young generation who benefits most from knowing what their friends are up to while showing off themselves.

Milieus

Potential users of the personal History 4D Application can be categorized into different media mentalities (according to a Study conducted by SocioVision and Stern) [63]. There are six different characteristic media mentalities, which are correlated with age groups and percentage of "onliners". The groups targeted by Personal History 4D differ depending on age.

The older users would be part of the categories "die Anspruchsvollen" and "die Macher", together encompassing 19% of online users. They have a background of upper middle to upper class and value individualization, self-fulfillment and ability to combine their many interest. The younger generation would be members of the groups "Digital Natives" or "Die Unterhaltungsorientierten", together comprising 46% of online users. They focus clearly on entertainment, have developed a distance to print media and spend extensive time online. These customers would be mainly from the lower class and middle class, with the "Digital Natives" ranging into the upper middle class. These two customer groups can be expected to grow within the next five years.

The service, which is dedicated to frequent users of the Internet, and which essentially requires sharing very personal information with a company does not seem to appeal to individuals who have more traditional values or nostalgics with limited Internet skills. Furthermore it excludes those who are critical towards globalization and capitalism. Therefore the application will probably be ignored by these subcultures.

The milieu of the users we are addressing differs slightly from existing social networks users. Although most members of social communities are in contact in real life and take these social community networks as an addition, there are few users who replace real social activity by online communities. This has stigmatized frequent users of social networks with labels like "geeks" and "nerds" who lack a real social life. This stereotype may continue to hinder others from getting involved in social networks at all [288].

The Personal History 4D application however, does not allow users to shy away from real life and focus on their online lives. In fact, our product actually emphasizes the value of real life and gives people with exciting lives the opportunity to communicate this credibly to their peers. Most people who use Personal History 4D will have many friends because for them this service offers the greatest benefit. This could for instance be students at universities with many friends spread across the world with whom they want to keep in touch and who they want to allow to participate in their lives virtually.

Whereas creating a blog or sharing photos and videos online today requires quite some effort, some basic IT skills and discipline, in 2012, the Personal

History 4D application would facilitate all this and open up the world of blogging or social sharing of files to unsophisticated users and allow them to become so-called prosumers.

Finding the right balance of usability and functionality will be one of the key criteria defining the success of Personal History 4D. With a very simple user interface and less functionalities a more diverse population could be addressed at the expense of customer value for those more able and eager to use all functionalities.

Excursion: The Professional Customer

The professional user group has little overlap in terms of service usage to the private customer. We expect their age to range between 25 and 45, taking into consideration that the professional application targets only white collar jobs, executives with a higher education degree. The professional user is characterized by similar features as users of the Blackberry today: dynamic business people under constant pressure who are aiming at leveraging their time and professional relationships, for instance consultants or managers of medium to large enterprises. For them money is secondary to time, and especially company money is seen as a resource to be spent generously on any useful optimization of their efficiency.

7.4.2.2 Market Size

Germany's current population today is estimated at a slowly decreasing 82 Million [299]. The "Statistisches Bundesamt" however claims that after the next census in 2011 the number of Germany's inhabitants will probably be corrected downwards drastically since the last census has been made before the reunification of Germany in the GDR and Western Germany separately [300]. Let us assume the population to be 80 million by 2012 with an aging demography. Out of these 80 million, almost everyone in the relevant age group between 12 and 45 will be able to afford a multimedia device as the required functionalities for the service will be basic functions of any smart phone in 2012. As today the market is already saturated with every user statistically owning more than one cell phone and an increasing trend towards buying more cell phones, the expected size of the market for All-In-One devices will be roughly equal to the population of the relevant age group.

Given the device as a basis for using the application, the user group who would benefit from such a device is a subset of those who will be actively using web 2.0 platforms such as Facebook, Xing, YouTube or Flickr. In our scenario by the year 2012 an overwhelming majority of that age group is expected to be weekly users of online video platforms, social networks, social photo sharing and almost everyone will use location services such as satellite navigation or restaurant search on a daily or weekly basis. Most users who are active in one of these services would also use other services. For those who use these services

regularly, the medley that Personal History 4D offers is of great interest. This could lead to a theoretical size of the market of between 25 million and 35 million users in Germany. Realistically, less than a quarter of them would see an additional benefit large enough to justify the initial investment of time for the setup and taking the perceived risk of opening up their private lives to a service like Personal History 4D. By 2012 this valuable clientele of active prosumers will be larger than today and ever more valuable. When these users decide to manage their accounts and activities via Personal History 4D, being a partner of Personal History 4D or one of its competitors may become imperative for Web X.0 services.

7.4.2.3 Competition

In 2012 the market for services and tools similar to Personal History 4D will be much further developed than today. Any company engaging in this field must expect to find a wide range of services already covered by competitors. In the following, we will focus on possible players based on existing companies but would like to emphasize that new entrants unknown today may have replaced existing companies. Therefore the names of the companies presented stand as the most prominent examples of their industry segment. Furthermore, completely new start-ups may be founded specifically to enter the business of converging time management and social networks. For instance, Facebook has been launched in 2004 in the United States. Today it has become the second biggest community in terms of online users and is growing more than 100% per year with just the English version. We do expect this trend of exponential growth of first movers to be a characteristic feature of web businesses in general. Consequently, the market will be divided among a handful of innovative companies.

Search Engines (e.g. Google)

Google is the most popular online search engine with net revenues of 10.6 billion in 2007 and income of 3 billion with annual growth figures of 73% for revenues and 110% for sales [281]. Google's size and cash flow force the company to invest into R&D heavily to maintain its growth. Soon the company will launch its open cell phone operating system called Android. Given Google's considerable know-how in search engines, it is likely to be among the leaders of the semantic web development. Since Google can amass great amounts of user data from its search engine queries and more so from Google mail accounts, it would be natural for Google to offer services relating to analyzing your activities and making recommendations. Additionally, Google has a great business acumen and already linked its advertising business to location data through Google Maps. However, this competitor does not specifically focus on Germany. Innovations on its US site usually come to Germany six months later.

Social Networks (e.g. facebook)

Founded in 2004, Facebook is the fastest growing social networking site on the Internet at the moment [287] with a valuation of approximately USD 15 billion. Now Facebook is aiming to enter the European market with the help of German Internet entrepreneurs and investors [268]. Facebook already has one of the strongest and most complete user bases in the social community environment. Offering a superior technology and greater size than any European network, Facebook will probably become the dominant player in the European and US market by 2012. Furthermore Facebook has made some of its features available for mobile users, making a move towards offering services while walking the streets. The open application platform offered by Facebook allows for faster adaption to user needs. The "TripAdvisor" application for instance already offers an location based history functionality. When entirely extended to the mobile domain, Facebook could become a serious competitor to Personal History 4D.

German Cell Phone Providers (e.g. Vodafone)

In an environment of cost pressure in the core business, the second largest German cell phone provider Vodafone could be a direct competitor of Deutsche Telekom in all kinds of mobile services [278]. With its younger brand image it has a stronger position to win the consumer market for the teens and twens. As the iPhone case has shown, Vodafone is determined to engage in fierce competition with Deutsche Telekom [292]. However, Vodafone still is much smaller than Deutsche Telekom and does not have direct access to all landline customers, a benefit for instance to allow Deutsche Telekom to offer AAA services.

Due to the specifics of the German market and the difficulty of the project, we do not expect direct competition from other European cell phone providers such as Telefonica.

Cell Phone Manufacturers (e.g. Nokia)

Nokia as the world's leading cell phone manufacturer is getting more involved with services [286]. Its new Internet platform, which is integrated into devices by default, already offers music, gaming, maps and photo sharing. As a dominant market player from the start, Nokia's devices are an easy way of distributing and integrating applications. Nokia could be a good partner for Personal History - or a tough competitor.

Publishing Houses (e.g. Verlagsgruppe Georg von Holtzbrinck)

The big German publishing companies such as Axel Springer or Holtzbrinck could be interested in engaging in the social networking community. Holtzbrinck has already demonstrated its determination to capture a share of the social community market by purchasing StudiVZ. As they see their markets shrinking, publishing houses are in search for an alternative. Their relatively good

reputation and customer's trust together with their ability to link editorial messages with advertisements for their own platforms is their competitive edge. Publishing houses and their spin-offs represent serious competitors because they understand the German market which will still be rather sensitive to privacy concerns in 2012.

TV Stations/Media Companies (e.g. ProSiebenSat1 Media AG)
In the same way as the publishing houses, media companies need to find an alternative to maintain their customer base and to keep them entertained in a more interactive world. Offering a service similar to Personal History 4D would allow them to collect more data about their users' preferences, and then use this data for pay per view services or advertisement through their IPTV channels. However, keeping their core business in mind, they would probably focus on social viewing and on context based recommendations relating to video functionalities rather than a full spectrum social network relationship and personal history application. Location would play a minor role in their services. Traditional media companies will probably be the least direct competitors.

Satellite Navigation Device Manufacturers (e.g. TomTom)
Navigation system manufacturers could engage in the business of tracking your everyday's movement, making recommendations for smarter routes and sell advertisements for shops and restaurants at your destination. Naturally, these companies are more focused on the devices and have less know-how in programming and marketing applications. For them cooperating with a cell phone provider could be valuable [273].

7.4.2.4 Concerns and Solutions

The servers for Personal History 4D would contain very personal data of many users, which is of tremendous value for companies, government and organizations. Abuse of this data could lead to very serious crimes, ranging from child molestation over the seeking of targets by terrorists, to the abuse by the government to quell gatherings of people of differing political opinion. Especially in Germany, with our history of traumatizing experience with government control, the latter could be seen as very disturbing.

Therefore, both the design of services and the marketing need to be prepared to encounter great resistance against the permanent storage of location data. Users need to be informed about the risks and the rewards of the system in an equitable and fair way. Since a small breach of trust could be perceived as only the visible top of an iceberg of a much larger problem, users will have no tolerance against any loss of control over their data. Any security breach could result in serious lawsuits sufficient to summon the end of the project. Therefore measures against the abuse of data for spam need to be addressed very seriously with the advertising partners and reliable encryption mechanisms need to be

installed.

Since data security is the heart of the service, trust will be the metaphorical blood running the system. Deutsche Telekom, being in a position of trust that is firmly based on its traditional values and history as an institution, is capable of establishing this necessary level of faith with the user - without doubt this is a tremendous competitive edge.

7.4.3 Business Model

Having had discussed about the product, services based on it, its deployment and its appeal to the market, we will now have a look at what is most important for the service provider who will distribute the terminal devices as well as operate the infrastructure. A product is successful for the company distributing and operating it only if it generates revenue and profit.

Pragmatically, the Personal History 4D terminal device and infrastructure has just the purpose to gather as much information as possible for and about the user. The value it generates is this vast amount of data gathered. Having this data gathered and digitalized, we are able to process it automatically and make certain certain assumptions such as behavior patterns, favorites, personality based on semantic content, social interaction and possibly even social trends.

- statistics about a single user
- (anonymous) statistics about a group of user
- behavior patterns
- crowd behavior
- favorites and taste
- semantic content which can give a clue about the personality
- social contacts and interactions among users

These interpreted results are can be used in different ways. While the user himself should only have access on his own statistics and usually would have interest for only those, the whole consumer and service industry has a keen interest on market's opinions in general. Whole companies have specialized themselves in market research for this reason.

7.4.3.1 Business to Consumer

B2C would be the conventional and most obvious way to charge for the product and service described above. The service subscriber pays a fee to the service provider in return for the service.

An essential component for the B2C business is a working AAA platform as we consider as given in our scenario. On the one hand, the user authentication can be directly coupled to the generated user profile and used to address the user. On the other hand, the billing for services can be carried out flexibly and without further ado.

Terminal Device

The terminal device is the piece of hardware that is supposed to gather and provide the information the Personal History 4D concept is based upon. The retail of the device is similar to that of an usual mobile phone. In case it is a specialized device for this sole purpose, it can be optimized to meet the requirements and has to be custom produced. The costs can be either directly charged to the user when he initially signs up for the service or the device is provided for free with the hope to break even with the added revenue that subscriber contributes. In case it is a standard mobile phone that meets the requirements and is able to run Personal History 4D applications, the billings can be bundled with the mobile telephony contract.

General Monthly Access Fee

The most apparent way to charge for being able to enjoy the service would be a flat-rate for all services in the portfolio.

This rate is easy to handle for both service provider and consumer, but has a few disadvantages. Aside from being inflexible once the contract is closed, the consumer is not actively encouraged to reveal a lot of his personal information to the service provider which would have been beneficial for several B2C and B2B purposes. Nor would this model encourage the service provider itself to introduce more services from the broad spectrum that could be implemented since that would not affect the turnover for consumers that are already in contract.

Selective Premium Services

Having services charged individually is an approach that would encourage both service provider and consumer to open up to new features. Instead of a flat-rate that covers for all, only basic services are included. Additional services that only adds value to certain user groups are optional. Of course the basic rate would be lower or even completely dropped.

The service provider would want to introduce more applications suiting the consumer needs and the consumers would have the freedom to choose his desired ones. Implemented flexible enough and coupled with AAA, it would encourage subscriptions to new applications while being able to unsubscribe from it at any time.

Lower Fee in Exchange for a more Liberal Information Policy

In order to provide lots of the aforementioned services, a solid base of user information needs to be gathered. Furthermore, it also serves as basis for the

B2B business. But as we know, consumers are usually reluctant in revealing user information but often can be bribed by price cuts etc.

The basic idea is to provide the service based on a monthly access fee or similar which however can be lowered or even dropped completely if the user discloses more data about himself or agrees on a more liberal usage of his user profile. This way the user profits from a lower price and the service provider profits from valuable information that is consciously approved for ulterior usage by the service subscriber. The consumer has the full control whether or not his profile data will be used for third party purposes.

Free of Charge

As described in the previous model, the extreme case of lowering the fee in exchange for disclosure of user information would be to drop the monthly fee entirely and rely on the turnovers in the B2B business. This offers a low threshold for signing up comparable to a free web 2.0 platform. However, there is the risk of possible abuse. Not only could transgressors cause damage by taking advantage of this offer by signing up multiple accounts but also corrupt valuable statistics with fake profiles.

Needless to say, the above mentioned models to charge for the service can be combined and adapted to the targeted audience.

The online diary or enriched blog is the one that the user has the most apparent access to. Since this form of blog differs a great deal from conventional blog in matters of usability, comfort and richness of multimedia, charging for it can be feasible.

The gathered data in its raw and processed form can also be interesting for the user. On the lowest level of data processing it is the raw log of his activities. On a level above that, the user can be presented with the statistics of his activities such as information about how much time he spends in the commute in average or what his favorite locations are, which is not yet of direct value for the user. And finally, the interpreted information can be used to assist the user in different ways. Suggestions based on the behavioral patterns and statistics of this single user can help him facilitate a lot of details in his daily life.

As an example, the location information that is gathered, can be analyzed and assembled into the route that the user takes. From the velocity a guess of the means of transportation can be made. Based on the route the user takes everyday, an assumption about this behavior pattern can be made. The real value is generated when the user is notified about incidents on his daily route such as traffic jam or train delay. Also suggestions to optimize the route can be made automatically.

Depending on how trust between family members, friends and acquaintances are implemented, those behavior pattern and statistics can also be made public among those trusted parties since things that they have in common can be easily determined with the digitalized behavior data. For instance, suggestions for the

time and place of a meeting point can be made based on the daily routine of the participants and their preferences.

Another service that can be enhanced by the Personal History 4D is a dating service. Having access to a large amount of data on user behavior and personality, matchmaking can become much more accurate. Of course appropriate measures to protect the privacy and abuse of user information have to be taken.

Of course the fee can be scaled depending on the range of service available, or dropped completely and replaced by the income from the B2B business.

7.4.3.2 Business to Business

The B2B aspect of this product also revolves around the information that is gathered. From a certain perspective, the Personal History 4D is nothing else than an automated survey on user behavior. However, it has several advantages over the old fashioned survey:

- It does not require the attention of the user. Unlike a survey that is taken part actively, the Personal History 4D collects the data on its own in the background, analyzes it and comes up with propositions and results automatically.

- The results can be more accurate than the estimates given by the user himself in surveys sheets.

- The results are up-to-date. In order for a conventional survey to be up-to-date it has to be repeated in certain periods. In the case of Personal History 4D the results are updated continuously.

- The user directly benefits from the data collected.

- The results can be more specific since there is much more data collected than a survey is able to. Based on a broader basis of data, answers to specific questions can be given without starting new surveys.

Of course, there are also a few disadvantages:

- Privacy is an issue whenever user data is collected for the purpose of generating revenue. For the purpose of computing statistics however, anonymous data is sufficient.

- Next to the privacy issue is the linked issue of image of the product concerning privacy. A clever marketing strategy can decide on whether the product will be popular or not. Submitting anonymous user information can be marketed as a feature rather than an intrusion into privacy.

- Misinterpretation of the data is quite possible, since a computer's semantic understanding might be wrong even with the most optimistic advancement in the field of semantic web. The analysis of the data might result in wrong conclusions.

- The statistics for all users and the conclusions about the crowd behavior might not be able to be generalized for the whole population since only the behavior of the service subscribers are captured. Demographic groups that are not quite technophile are completely ignored in this kind of survey.

The flow of user information does not have to be apparent to the user. It can benefit the user directly, or indirectly by providing other industry sectors with information about potential user demands.

In the following a few possibilities of how to exploit this large base of user information to charge business partners are discussed.

Third-Party Service Providers

Considering trust and AAA as successfully implemented enablers, raw or processed user data can be entrusted to a third party service provider who can create value using their own technology and ideas. This means that the Personal History 4D can be regarded as a new enabler, providing information about the consumers to enable various third party applications.

As an enabler, the Personal History 4D has to work closely with the established AAA platform to ensure that the third party members only gain access to information they are authorized to. An open API for easier application development can help the Personal History 4D framework to gain popularity. Some of the services a third party can offer can also be offered by the operator of the Personal History 4D itself and incorporated into the product, especially those involving computing large scale statistic data where sensitive data has to be made anonymous first.

Statistics

The direct way to make use of the statistics is to sell it directly to the interested business partner. In This case, the service provider serves as a survey agency, collecting and analyzing raw data. Due to the broad basis of accumulated data, a lot of questions can be answered without collecting new data by issuing a new survey. An example: a fast-food chain is about to open up a new branch store, but has not decided on the location yet. With the statistics on location data the service provider can suggest a spot where the most potential users such as teenagers and students frequent. Since the location data has already been stored in the databases, a new market survey does not have to be initiated. The service provider just has to combine the relevant data, come up with a conclusion and charge the fast-food chain for this information. No sensitive private data has been disclosed during this process.

The problem of this business opportunity is the lack of know-how among telecommunication providers concerning interpreting and analyzing statistic data. A market research company might be much better suited for this task, which is why a cooperation might be a valid option.

Advertising

Regarding Google's success in the advertising business, making turnovers of billions of dollars [269], using the user information to place targeted and even better tailored advertisements seems to be obvious. While Google can only base the selection of ads on the search keywords (AdWords) or the context of the website hosting the ad (AdSense), advertisement based on Personal History 4D can rely on the long-term personal behavior pattern of the target audience, achieving a higher accuracy.

The advertisements do not have to be restricted to the web platform of Personal History 4D, but can also be placed on other offers in the portfolio of the telecommunication provider, such as IP-TV, since AAA facilitates user identification.

The not-so-obvious problem arises in the implementation of this concept. While an advertisement banner on the margin of a website is quite acceptable, placing an ad banner in a similar on an already small display of the terminal device might not be a good idea. To be able to still reach the audience of whom the user information is available, we have to resort to other devices and media and fully take advantage of the ability to recognize the identity of the user by AAA.

Coupled with an existing AAA solution as we have presumed, extending the advertisement to other fields of service can be managed easily. The ads that can not be placed on the Personal History 4D device can for example be placed on the IP-TV offers instead.

On a larger scale, billboard advertisements can be adapted to the most frequent interest group of passers-by.

The same problem that we face at creating value with statistics exists here. Telecommunication companies are not specialized in advertising and most probably does not have an affiliate network of clients to market this advertising capability. To build up such a network might take some effort and time. Teaming up with a company with more experience in this part of the value chain can be a good idea.

On the other hand, building up an own affiliate network supported by AAA can be of advantage as well. Especially when it comes to smaller local advertisers who cannot and do not want to afford large area advertisement contracts. More than advertising for better known companies and brands, smaller businesses can be offered to be made known to potential customers. AAA serves as a platform to facilitate charging for the advertisement quantitatively based on the display and view frequency. For smaller advertisers this can be desirable.

Recommendation

A more direct approach than advertising would be reacting on user's requests and give recommendations to offers of third party partners from other industry branches as has been elaborated in previous sections. Instead of having the consumer paying for this recommendation, the third party partner can be charged instead, as he as well benefits from being recommended as this can generate revenue if the user follows the recommendation. This can be done via flat rate or for every issued recommendation or even shared revenue which however can be difficult to implement.

The same affiliate network as described in the advertising section above can be used here as well. An on-purpose specialized affiliate network enables recommendations that are dependent on location and profile of the user.

7.4.3.3 Implementation

The question concerning these business opportunities is whether a telecommunication company has the expertise and capability to implement these ideas.

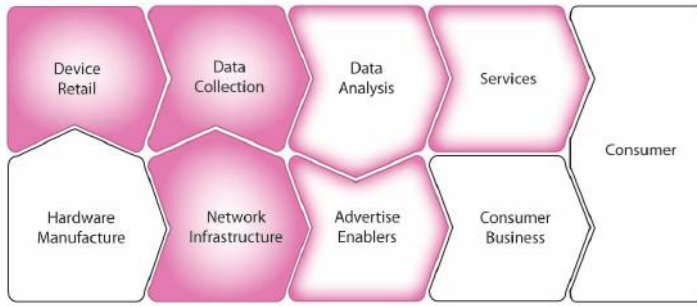


Figure 7.1: Cooperating at value creation with partners
Source: Own Illustration

As already noted, building up partnerships with more experienced companies in the respective fields might be beneficial for both. Using the existing expertise and connections of the partner the implementation period can be shortened. As shown in fig.7.1, the telecommunication company does not have build up a new knowledge base about things outside its core business. This would be an approach similar to Google's who fare quite well with this strategy.

One of the extreme approaches (depicted in fig.7.3) would imply treating the Personal History 4D as an enabler and out-source the services. The telecommunication company just provides the infrastructure, distributes the devices and operates the system. Gathered data will be passed on in their raw form. Obviously, a more or less open API has to be provided to those third party

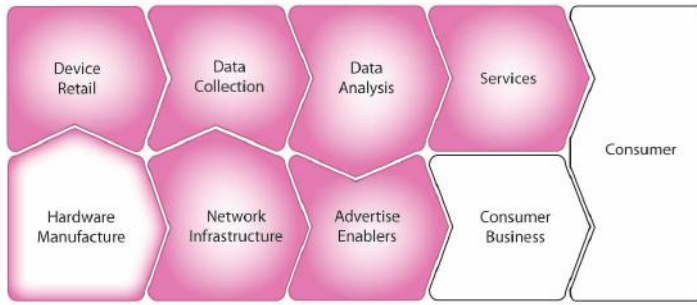


Figure 7.2: Covering as much as possible
Source: Own Illustration

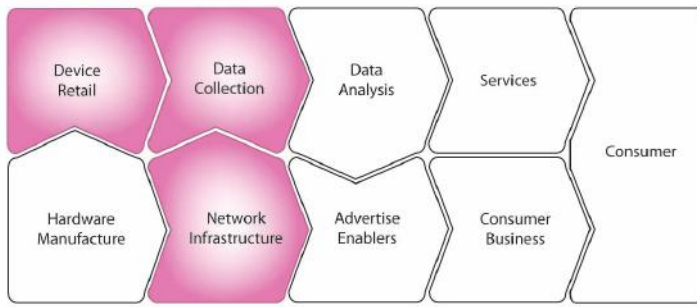


Figure 7.3: Restricting to core competencies
Source: Own Illustration

service providers. Issue of trust becomes even more important as raw and not anonymous data are even vulnerable to abuse.

The other extreme (fig.7.2) includes having the telecommunication company implementing the complete portfolio of services on its own, possibly through subsidiary companies. The advantage is to have the largest possible piece of pie. The lack of expertise in certain fields and necessity of large investments however makes this less attractive.

7.5 Conclusion

In order to sum-up our cognitions, we want to point out the important milestones on the way to our product.

After determining the important trends, we were able to frame three different scenarios that have the potential to come true in the year 2012. Among these

three scenarios, we identified the most relevant one. In our case it is the Trendsetting Scenario, creating an innovative and progressive environment, a foundation for designing a new product and services.

Our product, the "Personal History 4D", is a web service that enables the user to save a huge amount of data and structure it with the help of a fourth dimension - time. This service brings together diverse information and combines it to a useful context. One of the basic services is the diary which enables users to record coherent multimedia experience of past activities. Linked together with a location service, the system is features visualizing the user's daily routine on a map, including diverse recorded activities. The system also works as a memory helper to remember done activities and make them recallable. All of the offered services can be shared between users, and if required, synchronized to create a uniform content. Apart from user generated activities, the service could develop self-contained recommendations that would aim to facilitate the user's life.

With the added value as a live survey for business partners, we believe that this service could become a great success among above mentioned user groups with the potential to spread and be used by other user groups as well. For this reason, the "Personal History 4D" product would be worth to take into consideration.

References

[267] AME Info FZ LLC. Two day battery life tops wish list for future. URL www.ameinfo.com/70124.html.

[268] M. Arrington. Breaking: Samwer Brothers Invest In Facebook, January 2008. URL http://www.techcrunch.com/2008/01/15/breaking-samwer-brothers-invest-in-facebook/. Last accessed 20.01.2008.

[269] BBC News. Advertising revenue boosts Google. URL http://news.bbc.co.uk/1/hi/business/4227967.stm.

[270] T. Berners-Lee, J. Hendler, and O. Lassila. The Semantic Web. *Scientific American*, 2001.

[271] E. Blass. Hands-on with Texas Instruments' cellphone projector, September 2007. URL http://www.engadget.com/2007/09/20/hands-on-with-texas-instruments-cellphone-projector/. Last accessed 20.01.2008.

[272] K. Bullis. Higher-Capacity Lithium-Ion Batteries, June 2006. URL www.technologyreview.com/read_article.aspx?ch=nanotech&id=17017. Last accessed 19.12.2007.

[273] CnnMoney.com. TomTom, Vodafone Germany sign traffic information agreement, January 2008. URL http://money.cnn.com/news/newsfeeds/articles/newstex/AFX-0013-22227478.htm. Last accessed 20.01.2008.

[274] D. Cotriss. Mobile IPTV Gets Real. URL www.dailyiptv.com/news/mobile-iptv-reality-030107/. Last accessed 20.12.2007.

[275] A. Dillon. User acceptance of information technology. URL http://www.ischool.utexas.edu/~adillon/BookChapters/Dillon-acceptance.htm. Last accessed 15.01.2008.

[276] J. Fildes. Privacy worries over web's future, 2006. URL http://news.bbc.co.uk/1/hi/technology/5009774.stm. Last accessed 22.01.2008.

[277] Fixedmobileconvergence.net. Fixed-Mobile Convergence. URL www.fixedmobileconvergence.net. Last accessed 19.12.2007.

[278] Focus. Bei Vodafone droht Stellenabbau. URL http://www.focus.de/finanzen/boerse/aktien/mobilfunk_aid_106543.html. Last accessed 20.01.2008.

[279] Frankfurter Allgemeine Sonntagszeitung. "Was macht mein Kind im Internet?". URL http://www.faz.net/s/RubE2C6E0BCC2F04DD787CDC274993E94C1/Doc~ED6D25B01BD914222B2BD794F2B5E5923~ATpl~Ecommon~Scontent.html. Last accessed 11.01.2008.

[280] I. Fried. Are Mac users smarter?, 2002. URL http://www.news.com/2100-1040-943519.html. Last accessed 20.01.2008.

[281] FT.com. Markets Data: GOOGLE INC, 2008. URL http://markets.ft.com/tearsheets/financialsSummary.asp?s=GOOG%3ANSQ. Last accessed 20.01.2008.

[282] S. Fulton. Mobile IPTV Experiment in Korea Could Compete with DVB-H, MediaFLO, February 2007. URL www.betanews.com/article/Mobile_IPTV_Experiment_in_Korea_Could_Compete_with_DVBH_MediaFLO/1171491160. Last accessed 20.01.2008.

[378] Google. Industry Leaders Announce Open Platform for Mobile Devices, November 2007. URL http://www.google.com/intl/en/press/pressrel/20071105_mobile_open.html. Last accessed 12.01.2008.

[284] E. Grabar. Druck aus dem Drugstore, September 2007. URL http://www.heise.de/tr/artikel/95799. Last accessed 14.01.2008.

[285] K. Hall. DoCoMo's Betting on the All-in-One Gizmo, December 2006. URL www.businessweek.com/globalbiz/content/dec2006/gb20061212_061700.htm. Last accessed 20.01.2008.

[286] Heise. Gemeinschaftsmusik: Nokia umwirbt Apple, December 2007. URL http://www.heise.de/newsticker/meldung/101053. Last accessed 20.01.2008.

[287] hitwise. MySpace Received 76 Percent of U.S Social Networking Visits in 2007, 2008. URL http://www.hitwise.com/press-center/hitwiseHS2004/social-networking-visits-in-2007.php. Last accessed 20.01.2008.

[288] T. Hodgkinson. Why you should beware of facebook, 2008. URL http://www.theage.com.au/news/general/beware-facebook/2008/01/18/1200620184398.html. Last accessed 20.01.2008.

[289] IBM Global Business Services. Reputation Management: Building trust among virtual strangers. URL http://www-935.ibm.com/services/us/gbs/bus/pdf/g510-6327-00_etr_reputation_management.pdf. Last accessed 11.01.2008.

[290] Kompetenzzentrum Technik-Diversity-Chancengleichheit e.V. Internetnutzung von Frauen und Männern in Deutschland 2007. Sonderauswertung Gender & Diversity des (N)ONLINER Atlas 2007. URL http://www.nonliner-atlas.de/pdf/H5_Nonliner_Sonderauswertung_2007.pdf. Last accessed 15.01.2008.

[291] Microsoft TechNet. Microsoft Next-Generation Secure Computing Base - Technical FAQ, 2003. URL http://www.microsoft.com.nsatc.net/technet/archive/security/news/ngscb.mspx?mfr=true. Last accessed 20.01.2008.

[292] n-tv.de. Neue iPhone-Konditionen - Telekom beugt sich. URL http://www.n-tv.de/881956.html. Last accessed 20.01.2008.

[293] n/a. Fixed Mobile Convergence (FMC). URL http://a.dict.it/definition/lexikon//fmc_fixed%20mobile%20convergence%20%20.html. Last accessed 21.01.2008.

[294] NTTDocomo. NTT DoCoMo to Tie Up with Fuel Cell Company Aquafairy, September 2006. URL www.nttdocomo.com/pr/2006/001287.html. Last accessed 19.12.2007.

[295] S. O'Brien. Nokia: phones will replace MP3 players, June 2006. URL www.mobile-ent.biz/news/1083/Nokia-phones-will-replace-MP3-players. Last accessed 20.01.2008.

[296] Open Mobile Alliance. OMA Release Program and Specifications. URL www.openmobilealliance.org/release_program/index.html.

[297] physorg.com. Cell phone with built-in projector, March 2005. URL http://www.physorg.com/news3505.html. Last accessed 20.01.2008.

[298] D.P. Reed. Beyond Metcalfe's Law to the Power of Community Building. URL http://www.reed.com/gfn/docs/reedslaw.html. Last accessed 20.01.2008.

[299] statistikportal.de. Bevoelkerung - Deutschland, 2008. URL http://www.statistikportal.de/Statistik-Portal/de_zs01_bund.asp. Last accessed 20.01.2008.

[300] statistikportal.de. Zensus 2011, 2008. URL http://www.statistikportal.de/Statistik-Portal/Zensus/home.asp. Last accessed 20.01.2008.

[301] D. Stober. Stanford's nanowire battery holds 10 times the charge of existing ones, December 2007. URL news-service.stanford.edu/news/2008/january9/nanowire-010908.html. Last accessed 19.12.2007.

[302] TeleClick Enterprises. Fixed-Mobile Convergence Represents Slow but Significant Telecom Shift, June 2006. URL www.teleclick.ca/2006/06/fixed-mobile-convergence-represents-slow-but-significant-telecom-shift/. Last accessed 19.12.2007.

[303] The Washington Post. A Primer on the FCC's 700MHz Auction, December 2007. URL www.washingtonpost.com/wp-dyn/content/article/2007/12/03/AR2007120302428.html.

[304] United States Patent and Trademark Office. Digital Rights Management Operating System, 1999. URL http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetahtml%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=6330670.PN.&OS=PN/6330670&RS=PN/6330670. Last accessed 20.01.2008.

[305] S. Wieschwski. Studenten demonstrieren gegen das SchnüffelVZ. URL http://www.spiegel.de/netzwelt/web/0,1518,523906,00.html. Last accessed 24.01.2008.

8 Chapter 8
MyPhone

Herbert Mangesius, Sebastian J. Reinartz, Martina Ruiss, Chao Zhang

In this chapter we analyze the trends on the mobile phone market leading to progress and new technologies in the year 2012. As a reaction to these developments new mobile phones are produced. While there are different future scenarios possible, we found out that the most probable is the scenario of a multi-functional device, including a RFID chip, a fast UMTS connection, WLAN antenna and speech control, as well as a projected keyboard and a beamer. At the heart of our new phone is a large foldable display. This allows a new comfortable mobile Internet experience. The future phones become intelligent everyday companions.

Telecommunication operators have to upgrade their infrastructure enabling very fast Internet access. An interesting possibility for telecommunication operators to make money is to form the upcoming new mobile Internet in a way, that they profit from the changing way of communication by selling their enablers location information and storage to business partners and their own clients.

8.1 Introduction

When you look back in time, it was Motorola who launched the first mobile phone that entered the open market in 1983. The Motorola DynaTAC 8000X allowed a maximum talk time of 30 minutes and a standby time of ten hours, needed to be recharged every eight hours, which then took full ten hours. It was equipped with a LED display and was able to store 30 telephone numbers. It was 33 x 4,5 x 9 cm in dimension. To buy the first mobile phone, you had to pay 3.995 USD [343].

Nowadays there are more mobile phones than there are people in Germany. It is already considered unusual not to own a mobile-phone. Within a few years time the majority of all phone calls are likely to be mobile-mobile, true to the motto: "Why would you phone a building, when you want to speak to a person?" [335].

Of course today's mobile phones did undergo an immense change-process. Not only doesn't the outer appearance remind you of the beginning of handsets. Also when facing the development of the technology over the last 25 years, automatically one question arises: What else is there to come in the next couple of years?

This paper concerns itself with the future of the mobile phones and development of a new product idea – the MyPhone as an intelligent companion in 2012. By analyzing the trends on the mobile handset market, it deals with a potential future design but also takes possible new technologies and additional functions and services into account.

In the next section the needs of 2012's customers are discussed. Here we have a closer look at the handset's usability, the wish for individualization and personalization, possible concerns about health and ecological issues and the protection of minors and requirements due to the demographic change. Moreover we oppose the trend of life-streaming to privacy concerns that come along with it.

A specific analysis of prospective technology trends, which we identified as energy efficiency, mobile phone storage, convergence opposed to de-spec handsets, 4G-network, new hardware integration and mobile Internet, can be found in section three.

With both, the trends of the customer needs and the technological aspects, and considering their potential future development, we tried to come up with three scenarios, which are most likely to occur.

In section five we introduce MyPhone by firstly describing the basic product idea and potential value-added services. In order to give a better understanding of the range of functions, we added a description in narrative form of a day in a life of a person using MyPhone. Besides an analysis of potential customer groups and competitors, we dwell on some promising business models and highlight, which chances and business opportunities come along with the MyPhone.

In the final chapter, alongside a short summary of our findings, we give recommendations to telecommunication operators of what there remains to do to make the launch of MyPhone a success.

8.2 Customer Needs in 2012

When developing a new product, the costumer and his requirements are the focus point. Therefore the following analyzes important customer needs and their possible development until 2012.

8.2.1 Usability

One of the key elements towards the success of a cellphone is the interface, enabling the interaction between the user and his mobile device in a certain environment. Usability, determined through product attributes and user experience, affected by subjective feelings, are tightly linked together. Therefore customers wishes are heading towards a more natural handling of their mobile device [328].

8.2.1.1 User Interface

User interfaces are identified as one of three key technology themes in Gartner's "2007 Hype Cycle of Emerging Technologies". After a period of stagnation many emerging interface technologies are entering serious commercialization, such as virtual environments/worlds (Second Life), new displaying technologies (electronic paper) or gesture recognition (Nintendo Wii). Ambient and glanceable interfaces are on their way to become a new hype [318].

Users on the move have greater demands on HCI (Human Computer Interaction). Speech interfaces are expected to be used by mobile users in ubiquitous computing environments. Speech technology solutions cover a wide range from simply voice triggered commands to sophisticated dialog or even translation systems [338]. Considering the development of semantic web, and therefore machines being able to understand complex contents, speech interfaces could overcome simply individualized sets of command phrases and simulate human communication behavior through being aware of what we say.

Ambient and glanceable displays try to use the environment as a medium for the interaction between the user and his system. Information is presented through subtle changes in the physical environment, such as light, sound, or movement what addresses the peripheral perception of the user. Therefore changes could be recognized without getting permanent distracted and more complex and multitask actions are enabled.

Touchscreens more and more substitute interfaces with physical control elements. Control designs with virtual buttons switch for different actions

like writing an email or dialing a phone number. But as "life is activity based, not application based..." an interaction design offers the possibility to "...seamlessly integrate functions into activity based experiences ,...without threatening applications as separate windows or entities that work in isolation." [356]. The Synaptics Onyx concept for example allows answering a call by placing the phone to your ear, or sending a kiss by placing the phone against your cheek. Whereas actual touch-based interfaces provide no feedback when hitting displayed control buttons, the ones in 2012 will be able to do that.

Today, the most convenient way of surfing in the web is via a keyboard and a monitor. The success and the adoption of mobile Internet depends largely on the way we can use it. Therefore control elements which fit the size of the mobile device concurrently offering comfortable usability, especially fitting the criterion of an acceptable size, are needed. New technologies, like rollable, foldable, or flexible displays (e.g. PolymerVision) or projection systems (Canesta projectable keyboard), could be solutions for existing usability problems.

8.2.1.2 Environmental Interface

"Mobile and wireless technologies, devices and services continue to be an active area for emerging technology groups...". Especially location-based information-offering technologies "...offer both near-term and long-term promise as high-impact technologies." The mobile phone becomes more and more a device being an interface to the environment.

Integration of cellphones into other technical systems like automobiles offering an In-Car-Entertainment System with access to the Internet becomes an important trend as the CES (Consumer Electronics Show) in January 2008 shows [340].Thereby such a system is capable to substitute existing in-car solutions like navigation tools, radio and moreover may offer services like actual traffic information. Cellphones sustaining remote control functions are a very discussed topic [313], whereas the mobile becomes a universal interaction device controlling all systems that rely on a special remote mobile phone payment service and trial projects already exists in some countries. Some mobile network operators have enabled such service and started partnership with retail shops as well as public transportation system. Japan is quite advanced in the mobile phone payment service. UK has just started a trial project of paying by phone for the London subway system since November 2007 [329]. In this business model, Telco will charge both transportation system, since this reduces their workload, and the user, as this make both their financial management and travel more convenient. Of course, the payment are not limited to public transportation. Airplane tickets, football match tickets, and retail sales can all be paid by MyPhone with NFC technology. Current research find out that the amount of people holding credit cards is almost the same as the amount of people having mobile phone. This interesting finding reveals a huge market,

that could converge in a few years. Pay-By-Phone is also safer, as the mobile phone ID management will require finger print to identify its owner before paying. Therefore people do not need to worry about losing the MyPhone as they lose their credit card. This is more important when cyber-crime getting more crucial, biometric check before paying online will be much safer than credit card payment. Also a new "Pay Pal" might possibly be introduced by Telco. So in general, Telco will pay something to the bank as transaction fee. User and business entities like retail shop, video rental, subway company or online shops, who accepts mobile phone payment, will pay service fees to the Telco., like DVD-player or air-conditioning. In general the mobile phone will take over the role of a core device which features extended functionality provided by add-on devices. Examples could be wearable sensor chains, a gaming controller in which the cellphone could be integrated, etc.

Services using the mobile phone as a gateway for an exchange of local and personal information will come up. An integrated identity for instance enables payment systems using the cellphone. Moreover a dissemination of product information used in shopping environments in order to inform or help keeping decision science in mind will be possible.

By equipping the mobile device with sensors, which can sense the environment, health or local weather conditions, the cellphone could interact as a personal trainer measuring the heart rate and motion or just providing its user with local, even from several devices coming, processed environmental information, improving the environmental awareness as the Nokia Eco-sensor concept tries to achieve.

8.2.2 Individualization

In many areas of our daily life we find that people want to individualize their way of life. People dress differently and people behave differently because they want to express their mood or because they have a different background and experiences. Every individual tries to be unique in his own way.

A theoretical explanation for this phenomenon can be found in the Maslow hierarchy of needs [320]. At the basis of all needs are the physiological needs of a person, followed by safety and love needs. If all these needs are satisfied the need for social acceptance follows. The hierarchy is then concluded by the need for self-actualization. That means that people want to be seen as individuals and therefore create their environment their own way.

Since the very basic needs of all Europeans and north Americans are satisfied today, people are longing for a more individualized way of life. This trend can generally be expected to go on within the next years.

Today customers want to have an individual product customized to their specific needs. At the same time prices should be as low as possible. This large trend today ends up in a business model called mass customization [333]. In

businesses like the clothing industry individualized solutions for the customers needs were introduced. An example is the "mi Innovation Center" of Adidas, were people can design their own shoe which is then produced at an affordable level of price[1]. This kind of individual manufacturing was invented by Nike in March 2007. Their individual shoes are design by using the web interface Nike iD configurator.

This principle is needed for a very mature market like the clothing industry to make it more interesting and set new standards in an old business. Compared to that the mobile phone market still is a very innovative market. When one has a look at the begin of mobile phones, technical developments were at the focus of the OEMs attention[2].This is comparable to the first steps in Maslow's hierarchy of needs. First of all there has to be telecommunication infrastructure and the possibility to make calls and be available all the time. During the last years building a mobile phone that can be used for simple calls became a trivial task. To make a mobile phone more interesting additional functionalities like MP3 and camera were introduced. Therefore one can expect that this trend will go on until 2012, since there are still some things that can be included in a mobile phone. But while today the technical problems of the mobile phones are solved, customers might concentrate on the next level of needs, their personal wish for individualization by their phone. This need could possibly come up stronger until 2012, making the concept of mass customization interesting for the market of mobile phones as well.

A dependence on the maturity of the market can also be found for the case of the Internet. While in the early stage of the web it was mostly used for pure data processing, it now becomes part of social communication.

In the mobile market there are new technologies emerging and allow a next step in individualization concerning the place, time and identity of a user. Since mobility becomes more important, individualization with respect to the place could be used by Location Based Services (LBS) to guide the user to his destination or give background information on his current location. This is already applied in the business models of Qiro, a navigation system for mobile phones.

In 2012 it can be expected that users make use of both ways to individualize their mobile phone: on the one hand by designing the outer appearance of the phone and on the other hand by using such services by their phone.

8.2.3 Health Issues

Health is the most important possession of a human being and potential dangers and possibilities concerning the user's health condition should therefore be taken into consideration when developing new mobile handsets.

[1] www.adidas.com
[2] http://www.motorola.com/content.jsp?globalObjectId=7662-10813

8.2.3.1 Radiation

Every now and then media reports about potential dangers of microwave radiation emanating from mobile phones and mobile base stations. These are hold responsible for illnesses like cancer, depression, weak immune system and infertility [358].

The radiation is measured by the Specific Absorption Rate (SAR). It rates the amount of radiation energy absorbed by the head when the telephone is broadcasting at full power, that is, how much the body tissues is warming while using a mobile phone. In Europe the critical value of the SAR is stated at 2 watt per kilogram of body tissues [362].

Mobile phones and base stations have to send out radio waves to interact with each other. It is without controversy, that these waves also have an effect on human beings. But it is a moot question in which dimension this affects peoples' health conditions.

Mobile phones are used on a regular basis and mostly hold right next to the head. Therefore the antenna of the phone, at which the radiation is most intensive, comes very close to sensitive organs like the eyes or the brain.

With the mobile phone as an everyday tool and people naturally being highly concerned about the protection of their health, the question arises, how dangerous mobile radiation actually is [358].

As there are no long-term studies, this question cannot be answered properly yet. Although according to today's standard of knowledge the usage of mobile phones is considered harmless, customers require new techniques without imminent danger for their health [312].

As a guideline the TCO introduced a certificate for low-emission mobile phones in 2001. The labeling TCO'01 includes the SAR and also the "TCP (Telephone Communication Power), which is a new method for determining the telephone's communication ability. A good telephone must use a large portion of its power for communication and as small a percentage of the radiation as possible should be absorbed by the head. A good combination, therefore, is a low SAR value and a high TCP value." [357].

New, less radiation emanating broadcasting ways are currently looked for. With the UMTS-net maybe a first better alternative is already found. Unlike GSM a mobile phone using UMTS is in permanent connection with its base station, without constantly changing amounts of transmitted data. This causes a strong decrease of radiation [308].

8.2.3.2 Emergencies

A totally other topic, but also concerning the health of a person in certain situations, is the potential help a mobile phone can provide in the case of an emergency. Several million emergency calls are made via mobile phones every year. More than fifty percent of all of these people cannot tell their exact

location. In the majority of cases this occurs when having a car accident on rural roads or highways. This lack of information often causes a delay for the ambulance to arrive at the scene where the incident has happened [345]. Hence a mobile phone containing a technology which enables the provider or the emergency call center to locate the user's position, could lead to more rapid medical treatment.

To be of help at all times this service should therefore be available independent of cost (especially required for prepaid mobile phones) and depleted energy level of the handset used. Also an all-over net availability is essential.

But there are also cases, when the casualty person is not able to call for an ambulance himself anymore. The mobile phone could than serve as a life-saver by sensing the situation and sending out an emergency call automatically.

In addition, an integrated emergency medical service, which monitors the critical patient's health condition, can for example help, to accommodate the person with certain essential medicals or recommend further treatment according to the individual course of disease.

8.2.3.3 Ecological Awareness

An over the last years highly developing concern is the growing ecological awareness.

Global warming is an alarming signal that comes more and more to people's attention. While still controversial, most experts agree, that humans behaviors are the cause of global warming. An increase in temperature, natural disasters like hurricanes and floods and melting of glacier ice are said to be consequences of this effect [355]. But also economy would suffer from the climate change, as it could lead to a loss up to 20 per cent of the global economic performance. To counter the global warming the Federal Government aims to cut back 40 per cent of Germany's CO2-emission until 2020 [354]. Therefore many companies see themselves confronted with regulations to contribute to the protection of the environment. Even more starling, because directly effecting people's financial situation, is the rapidly increase of the crude oil price. The price of one barrel, which, at 100 Dollar, is at a record high right know, is likely to double over the next ten years. With crude oil being the basis of all production, this will have an impact on the price of all consumer goods. Therefore renewable sources of energy have to be brought forward [337].

Another approach to an ecological protective future production could be the usage of environmentally sound materials. Once again, the TCO assigns certain mobile phones with the TCO'01-certificate, which "states the substances that are completely banned from use in the telephone, cadmium, mercury, and beryllium oxide, and those which may only be used to a limited extent, such as lead and flame-retardants." [357].

Furthermore, the introduction of ecological friendly mobile phone contracts,

for instance with varying price structures depending on how ecological the user behaves, can be another opportunity. This, of course, implies the need of new technologies, recognizing their surrounding environment.

8.2.4 Life-Streaming vs. Privacy

Web 2.0 was mostly characterized by the user's own participation in it. This development is not completed yet, but will probably go on even more extensively than today in the upcoming years. The user's own partaking is realized in innumerable different ways, e.g. knowledge sharing and tagging. Besides, more and more people use the Internet as a platform for their self-generated contents. This, of course, comes along with huge concerns about a lack of privacy.

8.2.4.1 Life-Streaming

Life-streaming means the assembly of the sources, that the active web user filled with his own content. Life-streamers combine all this services and are therefore "an online record of a person's daily activities, either via direct video feed or via aggregating the person's online content such as blog posts, social network updates, and online photos." [330]. A good example for a life-streamer is Facebook, which offers the possibility to load all other websites directly into one's Facebook profile to show the user's actions in a chronological order. This kind of self-presentation and self-portrayal opens up one's life to share it with other people.

With the mobile phone as an everyday companion, this trend will also spill over on the usage of mobile handsets and can even amplify it. Life-streaming will be made possible in real-time, for instance by instantly uploading photos taken by the camera of your mobile phone. So everybody will be able to see what you are doing right in this moment. It allows people to climb into your head, look through your eyes and experience your day.

Until 2012 life-streaming will become an even more common issue due to improved mobile Internet accessibility, interfaces and applications.

8.2.4.2 Privacy

Everything users do will leave digital footprints across the web. This can include information about location, visited web sites, favorite music, recently met friends etc. But just not participating will not be enough to actually not be a part of it. One might still show up in backgrounds of photos and videos or be mentioned in blog posts. Some questions come up: "Do companies have to remove your image on request? Can you tell them not to put your image up in future or do you have to chase down every image and request a removal for each one?" [336]. But will you actually be able to track down every single picture or texts about you in the web, anyway?

8.2.5 Protection of Minors

Media reports about videos and images with violent and partly illegal contents on kids' and teenagers' mobile phones leave people, in particular parents and educators, worried. 94 per cent of all minors own a mobile phone. 10 per cent of those have already been encountered with aforementioned images [310]. The broad technical equipment of today's mobile handsets, for example functions such as taking photos and videos or exchanging data via MMS, Bluetooth or infrared, supports abusive utilization. This includes for instance popular videos called "Happy Slapping", shooting a motiveless attack on people with the camera of a mobile phone, or "Snuff-Videos", videos or pictures with pornographic content as well as rapes, sodomies, murders and executions [327]. To control children's and teenagers' use of those, an in their mobile phones integrated protection system is required. Possible options are variegate. A simple solution would be a mechanism, which enables parents to activate and deactivate certain functions, such as Internet connection or data transmission paths, by entering a PIN. Also imaginable, and maybe more effective, would be a handset with automatic recognition function. The mobile phone would be able to find out who is using it, e.g. by recognizing fingerprints, and according to that automatically restricts its functionality to preset services. Hence also the abusive utilization of other people's phone could be avoided. The handset could even recognize and ban violent contents automatically. Another option would be a SIM-card, which adopts the age of its user and can then control the functions according to the user's needs.

Nevertheless in the future potential dangers for minors will even increase. Modern and upcoming technologies, e.g. for offering information about location, not only bring along great chances but also misuse-opportunities. Hence the protection of minors is likely to become an even bigger issue until 2012.

8.2.6 Demographic Changes

People and their environment, and therefore the society, is currently undergoing a time of change. The customer base shifts and mobile phone producers have to bear this in mind when thinking about new ideas and upcoming trends. The most crucial factor is the altering society, with which Germany will be confronted in the near future. The average age of Germany's population will rise from 41 to 48 years during the next generation. The aging is due to two main factors: a declining birth-rate and an increasing life expectancy. At present, German women have 1.4 children at an average, with a downward trend. To keep the population constant, however, 2.1 children per women would be necessary. Based on this numbers, Germany's population will start shrinking in 2012. Simultaneously the life expectation, currently at 75 years (for men) and 81 years (for women), is expected to rise to 81.8 years (men) and 86.6 years (women) until 2050. In 20 years there will be more people in the age of 60 to 80

years than 20 to 40 years [315].

The aging of the population comes along with new challenges for economy and society. Since brought up today, future senior citizens will be more capable with the use of new technologies and the Internet. Although five years until 2012 are a manageable time, the customer's aging should already be considered in the development of future handsets which fit the changing customer needs perfectly.

8.3 Technology Trends

8.3.1 Energy Efficiency

Today batteries and accumulators, as energy suppliers in mobile phones, are the limiting factor concerning the size and shape and functionality of mobile devices. Moreover, the users satisfaction concerning the usage of multimedia functionalities in his cellphone exceedingly depends on the duration of power supply.

8.3.1.1 Energy Storage

Different approaches in storage of energy are made in order to ensure high availability and mobility.

Fuel Cells as portable energy source are considered as one possible future charger. NTT DoCoMo for instance developed a tool that is able to charge cellphones using water and air in the same time as a usual charging device would need [332].Besides that, methanol, ethanol, biomass, and other energy sources play important roles [321].

New generation of batteries are on their way. Scientist from Stanford University just succeeded in developing a nanowire battery that holds ten times the charge of existing ones. Therefore they speak of a revolutionary development and want to reinvent the rechargeable lithium-ion batteries that power laptops, cellphones etc. [353]. Toshiba presented the "Super Charge Ion Battery" which will be released in 2008 and features the charging in five minutes time [347]. Moreover thin flexible and rechargeable polymer-based batteries are developed at the Waseda University in Japan, fitting application requiring high-power capability instead of high-energy density, such as electronic devices [346].

8.3.1.2 Energy Charging

Due to mobility the need for high availability of energy the trend away from power socket arises.

Solar Energy is the cheapest and cleanest energy form available, as it just depends on the sun shining which causes no pollution. On the other hand

problems like usability and environmental durability occur in case of the sun not shining or during nights [321]. At the CeBIT 2007 the Chinese manufacturer Hi-Tech-Wealth presented the first solar cellphone called HTW Solar Phone S116 with an integrated camera. In urgent situations the light of five candles should be enough to do a short call, being exposed to direct sun light, 40 minutes of charging time are enough, in order to realize a 25 minutes call.

Efforts are made towards the coverage of new energy resources. In November 2007 scientists from Vienna announced the breakthrough in thermoelectric energy harvesting. Therefore electrical power is generated out of heat and can be adopted in mobile devices gaining energy out of body heat [339]. Besides this science-fiction-like technology others exist that exploit kinetic energy generated by physical movement and physiological functions.Therefore the "energy shoe", which converts energy expended on bending the shoe sole into electrical energy, is a subject of serious investigation [342]. Moreover, "a tiny generator that could power a mobile phone with your heartbeat has been developed" [316].

A highly efficient wireless power system is already developed (WiPower), that enables users charging their mobile device simply by putting it into a charging field. [331] Together with the trend of "National Grids", being fed from various renewable energy sources [324], grids of public charging-stations as well as eco-charging is thinkable.

8.3.2 Storage

The mobile phone storage generally includes three parts: internal memory dims, external plug-in memory cards and remote online storage. The first two parts - internal and external memories are considered as local storage solutions. The third part - remote online storage solution - will have a significant importance in 2012.

8.3.2.1 Local Storage

By looking at the mobile phone storage development in the past few years, it is not difficult to find out that the capacity of the mobile phone local storage is increasing with a tremendous speed. The storage size has grown from Kilo Byte (KB) to multi-Giga Byte (GB). Despite the significant change of capacity, the storage media has not changed - flash memory dominates the current mobile phone storage market up to 99%, and the analysis shows, that it will remain owning around 95% of the market share in 2012 [309]. Therefore the storage capacity of a flash memory will directly determine the local storage of a mobile phone. Nowadays, the storage capacity of a mobile phone has already reached 16GB, for example the iPhone sold in Germany has the option to install such big storage [326]. Base on this status, if we calculate the growth of flash memory with Moore's law, which is said to be still valid in the next 10 years [344], then the local storage in a mobile phone could expand to the range between 50GB

and 200GB in 2012. With such storage volume, the mobile phone will be able to store the necessary data and applications locally on the phone and provide higher quality of services.

8.3.2.2 Remote Storage

Local storage will grow large but still there will be certain limit point. The high demand of service quality and data quantity in 2012 will probably need more storage space than what local media could offer. The solution could be storing some data in a remote place, for example online. The candidate data for storing online could be less-important, back-up data or contents to be shared with other people. The points need to be considered for remote storage are the security, speed and flexibility of access, etc. Although there are some potential issues, the online storage will be implemented as standard function of the mobile phone in 2012.

8.3.3 Convergence vs. De-spec

With the technology innovation, there are more and more consumer electrical devices invented. People tend to use all the new tools to simplify their life or to support business activities, but slowly it becomes a problem to carry all of them. Users come to a point that they have to decide whether to take simple devices for specific tasks or produce a new super-device which integrates others. Mobile phone seems to have the chance to become the all-in-one device.

8.3.3.1 Convergence

If we take a look at the mobile phone available now on the market, it has evolved from communication tools to integrated communication devices, media terminals, Personal Digital Assistant (PDA), credit cards, and cameras. But that is just the start of an evolution. Each new model released onto the market bring more technology, features, and possibilities than its predecessor. In Japan, the world's most advanced mobile market, concept phones are already in production, mobile TV capabilities, GPS systems, and safety features such as child location trackers and health measurement sensors, are being integrated into the mobile phones [334]. The mobile network operator has provided different services in support of the integrated functions. These actions of both manufacture and network operator show that the general trend of mobile phones development is convergence. But why will mobile phones acquire functions from other device but not vice verse? One key factor could explain, that this is due to the high rate of mobile phone ownership. It is predicted that more than 50% of the people will own a mobile phone in 2010. This strong standing of the mobile phone encourages other creative industrial to bring their own technologies into this device, in order to get popular with the boom of mobile phones. Some

new ideas like integrating a beamer, foldable screen, laser virtual keyboard, and more healthy relate senors have come up recently. The fast developing digital and communication technology make these ideas getting closer to be implemented.

8.3.3.2 De-spec

Although mobile phones have more functions integrated, not everybody likes to have everything in one device. Some research has pointed out that, around 70% of the mobile users are not interesting in playing music on their mobile phones. Actually there are many mobile phone users seldom use other functions except making phone call. These are the potential customers longing for de-spec mobile phone. More functions will definitely occupy more memory, consume more power and increase the complexity to use the phone. In Japan, some senior citizens have complaint a lot to the phone provider regarding the difficulties to make a phone call [361]. Besides the people who do not want fancy functions, there are other people who could not afford an expensive "fancy" mobile phones, especially in some developing countries or regions. A simple phone with basic function or better customized will be more suitable for them. There are some companies already developing simple phones with less buttons, less function and even without LCD, just the basic and essential functions.

8.3.4 Future Mobile Network

Mobile network is the backbone for mobile phone communication. Its evolution impacts the whole communication industry. It can be predicted from today by looking at the relevant technology and customer needs, that the mobile network in 2012 will have faster speed, better flexibility, higher security, and larger user capacity.

8.3.4.1 3G Network

The third generation (3G) mobile network is getting spread out all over the world. The latest report from the CDMA Development Group (CDG) announces that the total cumulative 3G subscriber number has reached 421.4 million, growing by 20 million net subscribers in Q3 2007 [311]. However, compared to the total number of 3 billion mobile phone subscriptions worldwide this is only 14%. Japan, as the most advanced market, already has up to 80% of the users using 3G. But global wise it definitely needs time for the operators as well as the users to start living with 3G. High cost in setting up the hardware is one reason for the slow migration. Another reason is that some countries are waiting for the forth generation (4G) mobile network standard, and then go directly from 2G to 4G age. Base on current state and the slow implementation, the mobile network might in 3G in 2012.

8.3.4.2 4G Network

Since the 4G mobile network is still in its research stage, no formal definition has been given. However, 4G development group has identified, that some objectives need to be accomplished. Those objectives are: high speed – 100Mbps and 1Gbps for indoor and outdoor, which will be 100 times faster the current network; high capacity – more simultaneous users per cell than now; smooth hand-off across heterogeneous networks and seamless roaming cross multiple networks [322]; high quality of service, which is important for next generation multimedia support. Overall, the future 4G communication network infrastructures will consist of a set of various networks using IP (Internet protocol) as a common protocol. Various services based on IP could be provided to the users in high quality. The voice, data, and streamed multimedia will be offered to users on an "Anytime, Anywhere" basis. Application adaptability and being highly dynamic are the main features of 4G services of interest to users [323].

8.3.5 New Hardware Enabler

Mobile phones seem to be likely to fuse with other hardware devices as we could see in the past. New technologies will enable new services and different ways of usage.

8.3.5.1 NFC and RFID Technologies

NFC (Near Field Communication) is an evolution of contact-less and short range RFID-technologies (Radio Frequency Identification), which enables an easy and intuitive way of using mobile phones with touch-based technology [321]. The technology is already ISO-standardized, works in a globally available frequency range and is compatible with the existing to-be-built contact-less payment and ticketing card infrastructure, which is also ISO-standardized. Tags inside mobile phones, having personal information stored could act as keys, money, tickets, or travel cards. Moreover, content sharing between phones or posters becomes possible. This technology could even enable convergence of cellphones with bank or credit cards.

Due to [321], the NFC-enabled handset shipment will rise from 9.59 million in 2008 to 293.45 million in 2012, what amounts a rise of 3000 %. Moreover NFC enables branch-less banking and micro-financing which states a very important issue in developing countries.

8.3.5.2 Projecting Technologies

The wish for bigger, higher resolution screens usually means bulkier devices. Therefore Texas Instruments demonstrated during the 2007 CTIA Wireless convention the prototype of a pico-projector, small enough to be integrated

into mobile phones [359]. Nokia and PMA, a global research firm, expect the projector function being integrated in mobile phones already in 2010 growing to more than 1 million units. Moreover due to the same functionality projector-equipped mobile phones could even overcome laptops.

8.3.6 Mobile Internet

One of the most important drivers towards new applications for mobile phones and towards a next step in mobile communication is the availability of high speed access to the Internet. In the last decade the usage of the Internet by wire increased very quickly. In order to satisfy the customer's need to use his Internet applications from all over the world, to write mails, to send pictures and files to friends, to chat in real time, and to view movies on his mobile phone, there has to be a broadband connection to the Internet. To upload information and user created content a fast upload would also be necessary. The other way around the future existence of fast mobile networks can be understood as a chance for new business models and new applications using a persons mobility and provide him with location based information.

It is a widely accepted idea that future data transmission is then organized by all IP networks. There are plans to realize a quick development in the infrastructure to make all IP possible until the year of 2010 [306]. Today mobile phones use standards like GSM or UMTS to access the Internet. As it is explained by Nokia, there are different technologies available in UMTS networks. WCDMA[3] is currently the fastest with rates of 384 kbit/s[4]. Nokia assumes that by using the same technology, future developments may allow a total speed of 10 Mbit/s. This is a fairly high rate, allowing also video streaming and larger web downloads as well as usual calls and sending SMS. If there is no WCDMA connection available the slower standards EDGE[5] and GPRS[6] are used.

Other technologies like WLAN or WiMAX also seem to be fast methods to access the Internet though much more so-called hot-spots would have to be installed since their ranges are quite limited. But the most spectacular upcoming technology seems to be UMTS LTE[7]. This technology was tested in an experiment by Nokia Siemens Networks and the Heinrich Hertz Institute Berlin in December 2007 [341]. They reached a connection speed of 173 Mbit/s which also overtake the usual DSL connections and would enable a totally new web experience on mobile phones.

While it now seems possible to access the Internet much faster in 2012, since UMTS LTE should be available in 2010, the connectivity no longer is the bottle neck of mobile Internet usage. As also expected in the Gartner hype

[3] Wideband Code-Division Multiple Access
[4] www.nokia.com
[5] Enhanced Data Rates for Global Evolution
[6] General Packet Radio Service
[7] Long Term Evolution

cycle UMTS LTE could generate a high-quality mobile broadband services to enterprises and residential users at reduced cost. In conclusion a reason why people might not make extensive use of the possibility to surf in the world wide web by using their mobile phone could be that the appearance of web sides using XML and their small displays is very different from usual web sides. A better user interface would possibly allow people to make use of the mobile Internet more frequently.

To reduce the complexity of the different possibilities to build up connections with a mobile phone, Nokia tries to introduce a so-called Application Level Roaming. It shall be possible to browse between e.g. cellular networks and WLAN automatically. The user should not have to worry about what infrastructure he is currently using. Handing over a call from one access router to the other would have to be realized by techniques like CXTP[8] [319]. Thereby leaving a local access point with a fast Internet connection into a region missing a broadband access would cause no further problems and a smooth usage of the Internet and calling functionalities of the mobile phone would be possible. In the long term so-called femtocells, connecting mobile phones by a UMTS signal to the Internet, could in 2012 rule out the usual wire connections finally.

8.4 Future Scenarios

Since we have now analyzed the most important customer needs in the year 2012, we develop different scenarios for the future mobile phone market. In the next section we shortly explain how the different scenarios can be found. Our three scenarios will then be presented in the following sections.

8.4.1 Scenario Development

The first step to find out what the future might look like is to analyze the different drivers and customer needs. In the last section we could explain their possible developments.

Now one usually starts of with a matrix, showing how strong the interaction between different drivers really is. For example, convergence is a driver that is strongly connected to the amount of energy available. When the customer wants to use a beamer the accumulator has to have a quite high capacity. Therefore we identified a strong correlation between those drivers since a multi-functional converged device would not work without a sufficient amount of energy.

But in contrast to that, there are other drivers like usability that is not directly connected to the need of a converged device. By putting some effort into the user interface one can increase usability. As a consequence we identified a weaker influence of usability onto convergence.

[8]Context Transfer Protocol

These correlations between all drivers of future developments were discussed and quantified approximately for all possible combinations. The drivers taken into account are convergence, demographic changes, energy, functionalities, health, individualization, technologies, and usability.

Already at the stage of the drivers analysis we found that the influence of health issues is quite low. Today it is expected, though not proven yet, that there is no effect on people's health from the mobile phone's radiation. Therefore we assumed the number of possible scenarios with a negative effect on health to be zero.

Taking the resulting matrix as the basis for our scenario development, we now identified the drivers beginning with the one having the largest influence on the others. This so-called key driver is convergence.

That can also be understood by having a look at the past developments in the mobile phone market. Today we already find functionalities within our mobile phones which have their origin in other electronic devices like the camera. Including more and more functionalities people are now dissatisfied with this development and are no longer willing to pay for this development since they do not know how to use all functions. At this stage usability comes into play.

Taking into account the key driver there are two different solutions to the usability problem: converging functionalities with a much better user interface or a de-specked mobile phone which is easier to handle due to the lower number of functionalities. Therefore we take usability as the starting point of a tree diagram which develops to different end points by combining the drivers customer needs and technologies.

At this point there are some bifurcations that are a priori senseless, e.g. including all technologies available into a cheap de-specked mobile phone. We therefore crossed out these developments.

In the end we identified three scenarios from the basic needs of the customer. For the de-spec branch of the tree there is a highly individualized and more expensive design phone scenario while at the same time there is a cheaper and very easy to use mass market phone with the basic functionalities.

Again combining all reasonable combinations, the convergence scenario ends up in a scenario of an individualized phone, including a large amount of technologies, that develops into a helpful intelligent every-day companion.

8.4.2 Scenario 1: De-specked Low-cost Mobile Phone

In contrary to the development of the last couple of years, the demand for a simple mobile phone without redundant functions will emerge. People will be fed up with integrated features, which they pay a huge price for but never use anyway. The wish for a travel back to the basics of traditional mobile telephones with telephoning and text massaging as the only functions appears. This goes hand in hand with the requirement of easy-to-handle devices. Concerns about

the protection of minors will rise even more until 2012. The most crucial factor for the purchase of a new mobile phone will be the price. More than ever people will compare prices of different handsets and the financial criteria will outweigh the longing for a personalized device. This can be seen as a promising opportunity.

Today's mobile phone will undergo a complete de-spec procedure. Without additional services integrated it can be produced very cost-efficiently. Further sources of cost-savings are the chip, the screen, and the battery as the most expensive components of the device. An opportunity would be the use of a black-and-white-screen, as a high-resolution color display is not necessary for this purpose. The handset will be made out of very cheap material. To save development expenses for new energy suppliers, the well tried lithium-ion -accumulator will be implemented. The all-over aim is to sell the product at the lowest price as possible.

A low-cost-device will appeal to many different target groups. The trend is heading towards owning a second or even a third mobile phone. By the end of 2010 every 100 citizens of Germany will own 120 mobiles at an average with an upward trend [307]. With the main handset as a high-end feature phone, the additional one won't need all those fancy functions. It mainly will serve as a leisure time handset, for example for going to a party or to the beach, where the loss or theft of an expansive phone could be feared.

Children and teenagers with little allowance could use the handset as a beginner mobile phone and still have the chance to communicate and to contact their parents in the case of an emergency. The currently highly discussed problem of violent and pornographic video and images on their mobile phones would be banned. As it will still take a couple of years, until the elderly generation will be completely familiar with new technologies, seniors often appear over-strained by multifunctional devices, which they have to pay for nevertheless. A low-cost de-spec handset will therefore completely serve their needs.

Due to the proceeding globalization the potentially biggest business opportunity is the entering of new markets with the low-cost-mobile phone and hence, with an affordable export product, helping providing a worldwide access to mobile communication. "In the next five years, over 80 % of new mobile phone subscribers will be from the emerging markets of Asia, Africa, and Latin America." [314]. In the developing world, where the availability of other forms of communication, e.g. roads, postal systems or fixed-line phones, are often limited, mobile phones can simplify peoples' everyday life. According to a study by the London Business School, in a typical developing country an increase of ten mobile phones per 100 people could result in a 0.6 percentage rise of the GDP growth [360].

8.4.3 Scenario 2: De-specked Individualized Mobile Phone

As mobile phones reached a diffusion in society, ranging from young children going to kindergarten to their grand- and grand grandparents representing the eldest people, the design of devices will adapt to divers age and society groups and their specific needs. Moreover, people start rethinking the use of mobile phones. In the past they had to pay high prices for multimedia and smart phones, without using the whole amount of functionalities. Due to the deep dissatisfaction arising from the discrepancy of what they really want and what they get, the demand of highly individualized cellphones comes up, which map specific customer needs in terms of usability, functionality and design.

The social group of the eldest together with the group of young children have problems using their mobile phone, as control elements are either very small, or provide no physical feedback, are too complex, or just offer a very unhandy usability. Especially old people are not willing to put high efforts into learning again from scratch how to use a new mobile device. Besides that, people are concerned about health issues, especially radiation, as manufactures underlay regulations, which by long term experiments are not proven to be strict enough. Additionally OEMs do not want to undergo voluntarily quality tests, provided for example by TCO. Ecological awareness and the need of being flexible, independent and always available has lead to an integration of power providers like solar, kinetic, or fuel-cell energy converter.

In 2012, there will be a high diversity of customized despec-phones with buyers, who are willing to pay for quality and custom-tailored devices. Besides that, they are willing to pay for showing their social affiliation, as well as to differ from others, through using their special-designed cellphone, which is highly integrated into everyone's life. A despec version of a mobile allows a high variation and combination of design factors for mobile phones, ranging from an adoption of flexible, precious, or bio-degradable materials, to function-orientated design of interfaces, as well as services.

"My first-mobile-phone" aiming on parents buying their children a cellphone, which allows for example direct-calls to parents simply by pressing a big "parents-button". Moreover, control functions for parents could be integrated, like sending a signal in case of the child leaving a certain area. Such a phone would look very kittenish for sure, maybe having the shape of one's favorite action hero or comic character.

Mobile phones for the old generation, coping with handicaps resulting from their age, could use a cellphone, which has very big buttons or reads to them their messages. Maybe it could completely be controlled by a speech interface. Helping functions, for example giving a defined signal when the owner is close to a bus stop, would be valuable for age-related blind persons orientating themselves in high-traffic areas. Moreover control elements to often used or important services, like calling special people or the ambulance in case of an emergency, concurrently providing location information.

In contrast to this the mobile phone is used as a lifestyle-product. Special-designed despec-phones, for instance designed by Armani, Gucci or others, which are wearable like jewelery e.g. earring-, necklace-, ring- or bracelet-phones come up. Wearable and besides that very playful concept-phones will be used to express oneself, representing certain personalities.

Moreover, occasional and concept mobile devices will come up. Examples could be the "Sports-Phone", for hiking or diving occasions, which informs about height, temperature, or upcoming risks, like a bad weather front. A concept phone, as a mobile device that fits the concept one person has of himself, could be the "music-freak", which includes the fitting design as well as all services and hardware components, that are valuable for someone, who always wants to be informed about the latest hits and has high demands on quality of sound, etc.

8.4.4 Scenario 3: Convergent to Intelligent Companion

Comparing to its ancestor, the mobile phone has not only become smaller and lighter but also grabbed more and more functions from other electronic devices. Based on the drivers analyzed before, a very possible scenario will be, that the mobile phone become highly convergent. Not only convergence between fixed and mobile but also devices and services.

Nowadays, many consumers are substituting their wireless phones for wired phones and making the wireless service as the only telephone service. A mobile phone device could connect to the mobile cellular network as well as the land-line network. This convergence is known as Fixed Mobile Convergence (FMC). Although the industry has suffered from too many technical approaches and too few standards at the early stage, now the industry has coalesced around the dual mode WiFi/cellular approach. The Voice over Wireless Local Area Network (VoWLAN) approach is futuristic, and it connects to WiFi at home and uses cellular network in public. After several years the traditional phone and old land-line will totally be replaced by mobile phones and new generation network.

Besides FMC, many other devices are also convergent towards mobile phones. In the past few years, radio, mp3 player, digital camera, and PDA functions have been integrated into the mobile phone. With the fast developing technology, it becomes possible to integrate even more devices into the mobile phone.

Concerning the usability, the display screen and input method of a mobile phone will be improved in 2012. Integrating the projector into the mobile phone could be a good solution to solve the display problem. In CTIA Wireless 2007 Exhibition, Texas Instrument introduced the DLP[9] pico projector, which already has the size to be integrated in a normal mobile phone [359]. Another advanced display technology, that might be integrated into the mobile phone is the polymer display. The new polymer material can be folded or wrapped

[9]Digital Light Processing

up. About the keypad people would like to integrate the computer keyboard, but it is hard to fit so many buttons into a rather small device. The virtual keyboard from the iTech make the integration of keyboards become possible. It acts exactly like "ordinary" keyboards: a direction technology based on an optical recognition mechanism enables the user to tap on the projected key images, while producing real tapping sounds. The success integration of above mentioned two key features will make the convergence between mobile phone and laptop more realistic. Other convergence from credit card and keys could be realized by Near Field Technology (NFC) and bio-metric scan function. Some basic healthy care measurement device will also be integrated as those sensors will be placed into a mobile phone.

Not only electronic devices will converge into the mobile phone, but also some services related will be transferred to the mobile phone. The stand-alone and combination of new services will increase the usage of mobile phones. For example the high speed access, voice communication, and camera functions together make the high quality video conference possible. The virtual keyboard, big storage and projector functions make the mobile office realistic. The GPS function together with the healthy monitor function will be helpful in emergency situation. On top of that, the mobile phone contains a lot of personal information which can serve as personal identity in business or private life. Therefore services needed for personal authentication will convergent to mobile phone. Some examples: access to office, home and car; paying public transportation and buying tickets or goods in a shop.

With such broad range and fast convergence of different devices and services, the mobile phone will evolve from a basic communication device to an intelligent companion of human being.

8.4.5 Scenario Evaluation

Though there is a realistic chance for all three scenarios to occur in future, their probability of occurrence as well as their impact is quite different.

For the first scenario we assume the market in the European union as well as in the USA to be very small or even not existing. Phones without any additional features could also be produces today at very low costs and would not produce any additional benefit for the customer compared to the mobile phones that are available today. But in countries where the infrastructure for modern communication systems is not available today, these phones could definitely be an interesting option for people with very small salaries.

The second scenario is an interesting option also for the high-tech industry and highly-developed countries. The development of individual phones having the form of bracelets or earrings and a highly effective user interface could be a challenge for the high-tech industry. The desire of the customer to have such an individual product, maybe marketed in the upper price segment, could be large

enough to be interesting for the developers. But after all, this kind of phone would most probably be a niche product since it does not suite perfectly for the daily use.

The third scenario, a convergence scenario of all current and upcoming technologies seems to be the logical continuation of the status-quo in mobile communication. In this scenario a lot of available technologies are included into one device. The customer's individualization would be rather a software process than a hardware process. The devices are optimized concerning connectivity to the Internet and user-friendly navigation between the different purposes the customer wants to use his multi-functional phone for. The mobile phone becomes a every day companion as it already is the case in wide parts of Asia, the European Union and North America. Large parts of the population are already used to this kind of convergence in their mobile phones and are interested in and open for new technologies. Today people adapt very fast to the change in the way they communicate. Therefore the acceptance for such a device could be very high since it is just a further development in the direction mobile phones developed before. The market size should be quite significant since today many people already have a multi-functional mobile phone while the number is still growing.

8.5 My Phone

8.5.1 Product Idea

The future mobile phone we expect to be found on the market in 2012 is a strongly converged multi-functional mobile phone, taking over functions from ID management, payment, communication, Internet access for various information services, and contact management. In this chapter we want to describe our mobile phone, visualized in the following digital mock-up.

In 2012 there is most probably a fast Internet connection available all over the European countries. Therefore we assume our phone to be compatible to the most frequently used UMTS standards. One serious candidate could be the UMTS LTE standard, which allows very fast broadband access to the Internet. A WiMAX antenna will also be installed in order to be able to login into local area networks.

To efficiently generate customer value from that, a better user interface is needed. Therefore our phone owns a large screen, providing the user with a fine quality Internet appearance. The web pages one visits by using the mobile phone should appear to the user as he is used to it from usual Desktop computers. Therefore the screen has a size of approximately 20cm x12cm. While this is quite large the device would not find large acceptance unless it has a foldable screen. Our phone possesses such a foldable screen which is hidden inside the phone when it is in the folded state. The size of the phone is quite critical since

the user should still be able to easily put it into his trouser pocket. In the end the size of the folded phone is comparable to an average phone of the year 2008 with measures of approximately 7 cm x 12 cm.

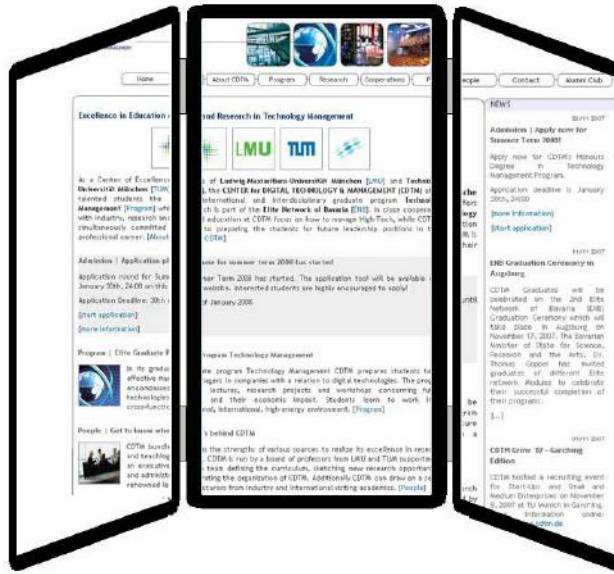


Figure 8.1: MyPhone's large, foldable screen
Source: Own Illustration

But since the size of the screen is not the only feature needed for a comfortable Internet session, innovative browsing by speech control is supported by software and hardware. While dialing a personal contact is already possible today by saying the contacts name, using an efficient search mechanism like "Google" or just browsing web pages is not yet supported for voice control. The possibility to scroll and write as usual is still supported by a touch screen display as it was also included in the IPhone in 2007.To not make the mobile phone user-unfriendly, calling and writing text massages should still be possible when the large screen is not totally unfolded. Therefore a smaller display which covers the front of the mobile phone is also included. This display is also a touchscreen display, supporting individualization needs of the customer by using software changes to make the front of the phone appear in very different ways. Thereby we guarantee that the outer appearance of our mobile phone is not much different from the phones that are available today. Therefore we assume a maximum of user acceptance and a fast diffusion on the market.

Figure 8.2: MyPhone, left: front side with touchscreen, right: back side with camera and solar cells
Source: Own Illustration

For various multi-media applications our phone includes a camera and detector on its back. Cameras are already included in mobile phones in the year 2008. But supported by software applications the phone should also be able to check the users identity by scanning his eyes to make personal data available on the phone. This goes hand in hand with growing security concerns when more and more identity related services become available on the mobile phone. NFC and RFID technologies for payment are included in order to make payments possible and to substitute usual credit cards in the future.

A small sensor unit identifying movements of the whole phone makes it possible to navigate by moving the whole device. A call could for example be started by raising one's hand to the ear. The phone automatically detects this movement and starts a call.

According to the upcoming issue of health control our phone is connected to an additional band-aid via Bluetooth, checking all important vital functions of the user. This data is not processes by the mobile phone but instantly send to a web service via an UMTS connection. Thereby the elderly could also gain interest in our phone, which along the way provides a "super-simple" and intuitive user interface.

Our mobile phone includes a large flash memory for personal data with a

high demand for security. Data with a lower security demand can also be stored in an online storage contacted via UMTS. The flash memory available in 2012 will have a size of several 10 GBytes and therefore also provide space for MP3 songs and movies as well as text documents.

Since the communication paradigm of the young customers has changed and many of them use the Internet to manage their contacts, the online and offline world seem to merge. Provided the dimension of mobility, totally new applications for a social become available. Using the location information from a GPS signal or the cell information of the telecommunication provider a personal contact of the user will make use of that to make calls like “Hi, where are you?” superfluous.

Our mobile phone in 2012 is most probably equipped with a modern lithium-ion accumulator providing enough energy for the usage of the larger display. The accumulator is charged either by a conventional wire or by the highly efficient solar cell on the back of the phone.

A beamer, probably consuming the largest amount of energy, is also included in our phone. Since there is a trend to integrate some tasks people today do with their computers, a beamer would provide the possibility to watch movies with friends or present slides to business partners.

Figure 8.3: MyPhone with integrated micro-projector
Source: Own Illustration

We do not expect a beamer to be an appropriate substitution for a larger screen since for efficient use a wall has to be close to the customer. This contradicts the idea of being mobile and therefore leaving out the foldable screen would most probably result in lower customer acceptance.

In order to make it more similar to a notebook our mobile phone is equipped with a keyboard that can be projected onto a table when the beamer is used.

Therefore, assuming a sufficient CPU power, the mobile phone could possibly be a serious competitor for sub-notebooks.

8.5.2 Value-Added Services

Value-added Services (VAS) are offered beside the core-services of MyPhone, in order to provide a more convenient use of the mobile device, as well as to extend and to excite its functionality and therefore create new value for the user. As MyPhone shifts the sense of a mobile device from a terminal to a gateway, VAS apply to a more convenient usability of locally and globally offered services.

Extended ID-Management

MyPhone, highly integrated into ones life, acts as a personal gateway to local and global services. It serves as ones "digital identity", required to authenticate and authorize local, respectively global data exchange and access to some system, whereas different systems or services require different personal information. Electronic Payment using MyPhone for example demands a high security level and trustworthy information, whereas accessing a social platform simply requires a user name and password. In order to obtain the overview concerning revealed personal data, a trusted and extended ID-Management (IDM) system, automating and easing AAA-processes in all facets of accessing mobile services, fits further customer needs.

Using MyPhone with extended IDM guarantees a single "digital identity". The customer for example will never have to subscribe to platforms, fill in address fields for delivering goods, or other personal information fields. Instead, the extended IDM system will handle these AAA-actions for the user by first time accessing asking for permission to reveal the required personal information and from then on doing it automatically.

Concurrently the customer shifts the responsibility on to the provider of the extended IDM-system and feels more free, as he has not to cope with issues concerning legality and trustworthiness of services.

Moreover, the extended IDM offers parents the possibility to assure that only G-rated content will reach their young children over the mobile device. In doing so the extended IDM-service acts like a firewall for age specific, deregulated content, thereby for example damming up the spread of "happy slapping"-videos and other X-rated material.

Extended IDM is an intelligent system, also managing your friends and contacts, by providing them with certain rights to access personal information or content, for example in communities, where you can choose to whom you make your profile and data visible.

Geospatial Virtual Community

As Internet goes mobile the real world and web will merge. A combination of the enablers location, presence, and storage provides the basis of a geospatial virtual

world. This virtual reality can be seen as an enhancement of the real world, as real world locations will be tagged with certain information, available from a virtual layer, the 'digital world sheet'. Thereby value is created and allocated to certain locations. Within this virtual layer MyPhone owners create their content only visible for other MyPhone owners creating a geospatial real-life entertainment environment.

Wherever you are, whatever you experienced, geospatial UCC allows the user to make pictures or videos of a special place, make some comments, and save all this together with a time and location tag, as well as an information about who is allowed to access this created data, stored in your personal geospatial diary. People, for example someone identified as your friend, then can follow your tracks either on a web page or directly by receiving a message at those places, where the user created certain diary entries. By accessing the diary the user gets a real picture of what had happened in that certain environment.

Besides streaming ones life in the 'digital world sheet' , MyPhone users have the possibility create more serious and relevant information, which may help another MyPhone user when he comes to that place. An example would be tagging the location Munich train station with information about the cheapest hostels or nicest beer garden in the city. Besides that, people may search the virtual layer for historical information about the place they are located and stream for example movie scenes of battles, which once took place, etc.

MyPhone Add-ons

MyPhone has a wireless interface for exchanging data, which enables the user to extend the MyPhone functionality by a high diversity of Add-ons.

In a physiological-functions-monitoring-system the user fixes certain sensors like a heart rate sensors and a motion detector on his body, which communicate with the MyPhone device. A Monitoring software receives the measured data and processes it in different ways depending on the purpose the user has.

The information could be used in order to optimize training situations. A person who wants to do sports in order to maintain his physical health will be warned of the heart rate rising too high. Therefore an ideal physical strain can be achieved.

Besides that, the physical measurements could simply be observed and in case of an emergency MyPhone contacts the nearest hospital and a doctor. This functionality is especially for old people of a great value, as often they die on a hard attack or suffer from its consequence, as nobody found them or contacted the ambulance in time.

A gaming interface, as an add-on device for MyPhone, could provide a better usability for people who want to play games while being mobile. The cell phone can be integrated into the gaming tool, which comprises of all physical gaming control functionalities. The cellphone simply provides the display and mobile access to the Internet, whereby online games can be played, as well as games in a group of friends (like LAN-parties).

8.5.3 User Scenario - One Day with MyPhone

It is 12 o'clock on Friday morning. MyPhone starts making noise in order to wake up Horst. Horst has just quit his stressful job at the Investment Bank "Mac Linsey". His doctor told him his raised blood pressure could either be caused by an overload of work and stress, or it is genetic. In order to find out whether his health problems are irreversible, Horst decided to do a long-term health monitoring using MyPhone. Equipped with a heart rate sensor patch and a blood pressure sensor bracelet, MyPhone sends the data it receives directly to his doctors online health service-platform.

At 12.10 MyPhone switches on the news broadcast of n-tv "markets at noon", with the latest financial information. MyPhone projects the news on the ceiling of his sleeping room. Finally he opens his eyes. It seems to be the same conditioning-effect as in Skinners dog experiment. Financial news have been a very essential part of his life, so he knew why he teached MyPhone to start showing broadcasted financial information, in case he does not react to the wake-up alert!

Sitting at the breakfast table, Horst already thinks about what to do in the evening. He asks MyPhone: "MyPhone, what movies are running in the cinema next to Jenna J.'s place?". After a second MyPhone reads out the actual program, while Horst is busy with eating. By the way, Jenna J. is his replacement at work. He met her once, when he quit his job and after introducing themselves they accepted each other on the spot in their MyPhone 'Xtended ID-Managing' system as close friends. Therefore MyPhone also knows where Jenna J. lives.

While gaging on the last bites of his sandwich, Horst says to MyPhone: "Write Jenna an email and ask her for going to cinema with me this evening!". MyPhone enquires by voice, "Do you mean Jenna J. or Jenna P.?", "I mean Jenna J., Jenna P. is gone for me, delete her and shut up for the next hour!", Horst replies - silence.

Two hours later Jenna J. agreed, Horst is to pick her up 6 p.m. at home. Lucky as he feels he wants to send her a kiss. But damn, last time he did this it was 2007. Now he decides to teach MyPhone how to send a kiss, as he really has a crash on her. He presses his lips onto the front MyPhone display and says: "MyPhone, that is a kiss.". "Please do it again, I have subtotally learned what a kiss is!", MyPhone replies. Horst does it again, telling to MyPhone that was a kiss. He did not care about kissing more than once, as MyPhone " looks" like her: He took a photo of her in a second and now uses it as wallpaper on his overall display phone, so he imagines he kisses her!

In the evening, standing in front of her door MyPhone starts vibrating, changes colors like crazy and behaves like insane. Taking MyPhone out of his pocket and watching it, MyPhone says: "Horst! Jenna J. left a note for you tagged at in front of her house door." "Shut up, I want to read it," Horst counters. The message is:

"Love is in the air,
I hope at six you'll be there!
I gave your MyPhone ID
permission for entry.
But in case you are late,
your entry rights will degrade!" xxx Jenna J.

Fortunately, he is in time. So he opens the door by putting MyPhone onto NFC reading field at the front of her door and confirming his biological identity with his fingerprint at the MyPhone front display.

Insight her flat he seems to be alone. So he connects MyPhone, stating his portable, individualized entertainment system, to her compatible music system and listens to his favorite love song playlist. While doing this a friend calls him. Horst takes the call by moving MyPhone to the ear. Horst tells him about the strange situation sitting alone in a cute girl's flat, listening to love songs in order to beat the boredom. So his friend proposes to do a love song karaoke battle via the karaoke-conference portal "Global Karaoke Champ". MyPhone projects the karaoke videos together with each others face onto a wall and they start battling. Lucky Horst, that Jenna J. also seems to be a "Karaoke Champ", as she has a compatible microphone, which he uses right now.

When Jenna J. arrives at 8 p.m., she is too beat-up to go out. So they decide to get to know each other more in detail. Horst unfoldes MyPhone in order to have the big display and orders: "MyPhone, open my photo gallery and show my 100 most viewed pictures in a slideshow!" MyPhone immediately accomplishes his order. "Well conditioned MyPhone!", Jenna J. replies to Horst and they relax the rest of the evening in an intimate atmosphere, while getting to know each other better, using their individualized mobile media center.

8.5.4 Market

Before launching a new product, one important question hast to be answered first: Will there be any customers, who actually are willing to purchase the product? Therefore the producer at first has to identify the customer needs and requirements, which the product provides solutions for. There will never be the single one perfect consumer, but lots of customers with different characteristics, who can be attracted by the same product nevertheless. This chapter tries to make a proposal, which target groups should be addressed when launching the new MyPhone.

Segmentation according to traditional features such as age, gender, habitation, material status, profession etc. seems long since being enough for further market analysis. Although these people are very alike in external characteristics and even if they could be sociodemographic twins, they, at the same time, can differ

a lot when it comes to internal values and lifestyles. Here the Sinus-Milieu-analysis mentioned before is of great avail. It divides Germany's population according to their view of life and way of living, which can, but does not need to occur in the same social layer. Thus ten different customer segments can be identified differentiating in their social status (profession, education and incomes) and basic orientation.

The target groups which seem to match best with MyPhone are the 'Etablierte', 'Moderne Performer', 'Konsum-Materialisten' and 'Hedonisten' [348].

The first group, the 'established ones', is the highly-educated elite, which identify themselves by high exclusiveness standards. They make up 10% of the population of Germany. They mainly belong to the medium age group above 30 years (with a focus point on 40 to 60 years) and have an above-average educational level. Besides being interested in politics and economy, they are very open towards technological advance. On this account and as they always intent to be among the first trying out new devices they would profit from MyPhone as a multi-functional mobile phone in both professional and private life [349]. The foldable screen as a fascinating new technology can be used as a starting point to direct their attention to the mobile phone and arouse their curiosity. As part of the higher income level, the established are able to and even enjoy spending money on exclusive goods and are therefore the ideal customer for the exclusive MyPhone.

The 'modern performers' (10 % of the population) make up the youngest of Germany's milieus with an average age of beyond 30 years. They nevertheless reach a great educational level and have a high income or live by the support of their well-off parents. Their main goal is to live out their multi-optionality and flexibility in all circumstances. They love to experiment and be spontaneous, and will hence have fun testing the various possibilities of the MyPhone. With its numerous functions its flexibility matches perfectly with the modern performer's desire. The camera, the possibility to pay with your handset, the participation in online communities, surfing the Internet while being outside. Being raised in the time of multimedia, they enjoy the intensive usage of modern communication technologies, again both when doing business and in private. They want something special and are willing to spend a lot of money on it [350].

In contrast to the "Etablierte" and the "Moderne Performer" the remaining two groups can be numbered among the lower social classes. The group of the "consumption materialists" (12%) mainly consists of workpeople with the elementary school or the CSE as the highest degree. Maybe because of their limited financial situation this milieu shows a distinct desire to consume as much as possible to demonstrate that they can keep up with other people. As a result the mobile phone is one of their most important possessions. [351]. They see it as a status symbol and therefore it is essential that the latest technical equipment is integrated. The consumption materialists would probably be the group which makes the most use of functions like the mp3-player, watching TV

or surfing the Internet. Moreover, the MyPhone will attract this target group by its fancy design. The foldable screen and the touch pad serve as eye-catchers and guarantee that all attention is on the owner. In this customer segment the word-of-mouth-propaganda provides additional output.

On the other hand, the "hedonists", which make up 11 % of Germany's population, represent the fun-loving modern underclass and lower middle class. With an average age of 30 years and in many cases without vocational training, the people only own little funds. However, according to their pronounced requirement for entertainment, this little money is spent on technical goods like mp3-player, computers and cameras [352]. As the MyPhone integrates all of these functions in one single device, it presents a potential alternative for this costumer segment.

Although these four target groups differ a lot in their financial situations, we suggest fixing the price in the medium to upper price segment. Over the next couple of years the quality of the integrated functions will even more improve, so that the mobile phone can fully replace additional expensive devices like a camera or a game console. The established and the modern performer don't bother and even enjoy spending quite a sum on a valuable product. But also the consumption materialists and the hedonists are willing to pay a high price, because one of the reasons for the purchase is the demonstration of their possession, a higher price is even more appealing.

With this it is our aim to market the MyPhone as a young, modern lifestyle product with a noble and classical design and high technological standards, which serves as an intelligent companion in everyday life.

Besides selling MyPhone to private customers, contracts with companies present another market opportunity. Due to [317], "by 2010 80% of large enterprises will have bought their last desk phone for mid-level and senior-level employees". They will then be replaced by mobile phones, which are customized to their business needs. In this we see high potential for future market areas.

8.5.5 Competitor

MyPhone as an intelligent personal companion in 2012 will be highly involved in people's daily life and business activities. Producing such a popular device like a mobile phone will not only bring revenue to producers when selling it, but also give them advantage in offering services or running business on top. Therefore there will definitely be a hard battle among different manufactures. The emerging players, especially the tech innovators, have their innovative technologies and ideas as killer weapons. Other potential players, like Telcos, might have their own product rolled out together with tailor-made services or enabling functions. It is obvious, that the battle will not be limited to hardware, but will extend to the services and business model around the new device.

Established Manufactures

Established manufacturers like Nokia, Samsung and Motorola without doubt are the most competitive players in making next generation mobile phones. Their many-years' experiences in making mobile phones, established mature production work flow, globally well-known brand, special know-how in mobile technology, advanced research labs, and deep understanding of user behaviors make them stand out from other competitors. The conference "2012: Stories from the Near Future" held by Nokia in New York in 2007 introduced their vision of the mobile phone in 2012 and how people can live with that new device [325]. Some exposed ideas are quite innovative and unique, which show that they are not only concerning about technology but also the society impact, people's behavior and customer needs. As the mobile phone will be used so intensively and widely, manufacturers must think in more aspects carefully. Last but not least, the established manufacture have more financial strength for early advance research as well as for later on mass production.

Emerging Manufactures

As the cake in mobile phone industry in 2012 is so big, other emerging manufactures also wants to get a share on that. These players are consumer electronics giant like Apple, innovative tech companies like Polymer-Vision and other web or high-tech companies. The innovative companies will focus more on the hardware of the mobile phone, because they have and will try to apply the new technology and make a innovative next generation phone. The Internet companies will more focus on the services provided around or the software platform run on the mobile phone - like Android from Google. Some electronic companies like Nintendo will try to integrate their console as part of the mobile phone or partner with other companies to make revolutionary gaming device. Few leading electrical product giant like Apple will focus on both sides, production and services. The strength of these emerging manufactures are the expertise in their own fields, either new technologies or web know-how. But they also have some obvious weakness: some of them do not have good branding, most of them do not have much experience in mobile phone production as well as in mobile communication market. It is not only risky but also requires huge investment to either shift their business focus or establish new production line. Nevertheless, they are good candidates to make the new generation phones in 2012.

Future Players

Besides above mentioned two kinds of predictable players in the next generation mobile phone production competition in 2012, there could be more players coming over in the next years. Here we analyze Telcos as potential players and see how Telco can behave in the competition. As of today, most of the Telcos are not producing mobile phone devices. Instead, they get the phones from manufacturers tor a reasonable price and sell them to the subscribers with

contract. Only few of them, in Asia, will require the manufacturers to make the phone up to their requests. It is possible, that in the next years Telco builds up close partnership with the mobile phone Original Electronic Manufactures (OEM), so they could start producing MyPhone based on their own ideas. In this case, Telco owns more part of the value chain, which covers both hardware production and services area. Besides gaining more revenue from selling the device, they can also be freed from trouble and constraint coming from phone manufacturers. Even more, they will have complete control of the services they provide. This is extremely important when some device like iPhone comes up later. Telco do not want to lose services as well as shares of revenue. A few days ago, China Telcom refused to accept the sharing plan offered by Apple. So, maybe in the next years, Telco could consider producing the MyPhone designed by themselves, or at least get them delivered directly from OEMs.

8.5.6 Business Models

The contract based service between users and mobile phone operators will remain as the dominate business model in the next 5 years. But what definitely will change are the services bound to the contract. New business could be conducted based on the new technologies and concepts from MyPhone. Here several possible ways to generate revenues are discussed, and overall they could be considered as one general business model for Telco to gain revenue with MyPhone in 2012.

8.5.6.1 Mobile Phones: From Hardware to Service Support

When we have a look at the mobile phones that are available on the market today we find phones that are mainly used for SMS and usual calls. The device itself is -beside tariff and price- the most important factor in the decision making process of the customer when he acquires his new phone.

In the future there will be a lot more services available with the mobile phone. This should have an impact on the choice of the customer since there are more ways for a telecommunication operator to separate from the other telecommunication operators.

Therefore the telecommunication industry possibly undergoes a change towards a different sight onto the mobile phone. It is no longer just the hardware the client buys but a gateway to different services that are enabled by the new phone. The customer value then is much more than just being available as it was the case in the beginning of the era of the mobile phone. The real value for the customer is increased by the services he can use now and the things he can work on or do by using his mobile phone.

Though the Internet is already available on the mobile devices the value for the customer was low. Therefore revenues for the telecommunication operators were low as well while the investments for the UMTS licenses in Germany were

enormous. Building a gateway to a new world of services available on the mobile phone could therefore be an interesting option for a telecommunication operator as well.

On the other hand, one part of the contract signed by customer and telecommunication operator will still be the phone itself but not the services connected to it. Since we showed that the need for individualization could most probably grow within the next years, the individualization of the device itself could be an interesting option. Selling different versions of the same device, e.g. differing in the materials used, could be interesting for the customer. The already mentioned strategy of mass customization could lead to an increasing interest in a mobile phone. The customer could be willing to pay for the possibility to choose the color, pattern, or even the shape of his new mobile phone. There could also be a market for those clients who are interested in a solar eco-mobile phone.

Other devices that could be sold by the telecommunication operators are add-ons to the mobile phone. They could develop a package of sensors for health care or a game controller that could be adapted to the phone by Bluetooth. This could then be used as an enabler for online games and open a totally new market of those people who want to participate in online games and either have no computer at their homes or at the place they want to play right at that moment. Together with the fast Internet connection of the phone one could merchandise such a device with an additional contract and an additional basic fee of 5 euros per month.

No matter if the telecommunication operators are building these devices on their own or if they partner with other companies like Apple, they should find a way to participate in the financial success emerging from the new possibilities. A phone with a larger screen is not an interesting device because of its large screen but because of the services that can be used by that.

8.5.6.2 Service for MyPhone

The intelligent companion MyPhone won't be intelligent without the services around. As the Internet goes mobile, the services currently offered online will be available for mobile phones with the support of next generation mobile network. Telco as the unique mobile network operator will have the best opportunity to enable new services by using different enablers.

Extend ID-Management Service

Extended ID-Management will bring a lot of convenience to users in both the online virtual world and the real world. From electrical payment to online community access, from personal contact management to children browsing management, all places requiring personal identity will be eased by using the extended ID management. The time and efforts saved from this personal profile management could be used to do other more valuable things. Therefore Telco could charge the user for this useful and convenient service, in a reasonable

price.

Based on different level of customer needs, Telco could offer several types of profile management solution when signing subscription contracts with the users. First option could be pay by service. The user might only be interesting in using their profile in certain business or daily life activities. For example, they only want to have the personal identity in the online community, only for the electrical payment or only content filtering services for their kids. Then they just pay for the selected services.

Another option is to select the whole package of profile management and pay on monthly or yearly basis with the contract. Within this option, it can further be differentiated between basic package or premium package. The basic package will includes the basic services like mobile payment identification, online community cross platform universal ID management, personal contact management, ticket or location access services etc. The basic ID management services will also enable the user to access the user generated content in the geospatial virtual world. But as this are just basic services, some advertisement will show up alongside the information user access. To avoid the annoying advertisement and enjoy more personalized services, user can upgrade to premium ID management package. As a premium user, all services available with the basic package will be included. In addition, advertisement will be filtered according to the user's preference. Moreover, a personalized menu will be shown on the screen when entering your favorite restaurant.. Selected news and information will be sent to your mobile device every morning. Other additional personal identity can be added to the mobile ID profile, like Miles&More membership, National Car Rental membership and endless extension possibility. All MyPhone ID-Management user can search, download as well as create contents in the geospatial virtual world. But premium user could additionally access the professional content like lone planet mobile version in a lower fee, have higher access speed and bigger online storage capacity. Whenever a new content is created, your MyPhone ID will automatically be attached to your content and either protected or shared with other people based on your preference.

Pay-By-Phone Service

Mobile phone payment service and trial projects already exists in some countries. Some mobile network operators have enabled such service and started partnership with retail shops as well as public transportation system. Japan is quite advanced in the mobile phone payment service. UK has just started a trial project of paying by phone for the London subway system since November 2007 [329]. In this business model, Telco will charge both transportation system, since this reduces their workload, and the user, as this make both their financial management and travel more convenient. Of course, the payment are not limited to public transportation. Airplane tickets, football match tickets, and retail sales can all be paid by MyPhone with NFC technology. Current research find out that the amount of people holding credit cards is almost the same as the

amount of people having mobile phone. This interesting finding reveals a huge market, that could converge in a few years. Pay-By-Phone is also safer, as the mobile phone ID management will require finger print to identify its owner before paying. Therefore people do not need to worry about losing the MyPhone as they lose their credit card. This is more important when cyber-crime getting more crucial, biometric check before paying online will be much safer than credit card payment. Also a new "Pay Pal" might possibly be introduced by Telco. So in general, Telco will pay something to the bank as transaction fee. User and business entities like retail shop, video rental, subway company or online shops, who accepts mobile phone payment, will pay service fees to the Telco.

Extended Location Based Service

Location based services are getting more and more popular and will definitely have great impact on people's future life. Mobile network operator have the best position to make any business based on location, as they directly own user's location and personal information. The location based business in 2012 will definitely be beyond providing the position of user together with a map, but will be more services combined with other business activities. For instance showing the affiliate restaurants, banks, cinemas or other interesting location, nearby. Or showing the traffic on the road and suggest a best route to the destination. Telco will not charge the user for such services but the business partners who want to be shown on the user's MyPhone. They can also sell the enablers to business partners and let them create different services MyPhone can use. Especially for the traffic optimization, the city will pay to the Telco because this will significantly reduce the pollution and CO2 emission of traffic, which helps them solve a very serious social problem.

8.6 Conclusion

As we argued in our article, the most probable scenario for the future mobile phone market is the diffusion of a multi-functional device. Since it could take over some functionalities of notebooks like Internet access and a more professional contact management and can equally well be used for payment and identification purposes, the mobile phone becomes an intelligent everyday companion. The phone we developed includes a beamer and a projected keyboard as well as fast UMTS Internet access, RFID chip, and speech control.

Two scenarios with less impact on the mobile phone market were also shortly described. These scenarios are based upon the customer's wish for increasing usability. One of the scenarios proposes a low-cost phone which could be interesting in regions were telecommunication is not yet established and salaries are quite low. The second scenario includes a "lifestyle" phone with basic functionalities. It could be designed as a piece of jewelry. But since it is very different from the mobile phones of 2008 and doesn't fit for all purposes we

consider it to be a niche product.

When taking into account the customer needs we found that including a high speed Internet connection would open up new possibilities to use the mobile phone. To make the Internet access an enjoyable experience our mobile phone comprises a large screen and the possibility to navigate the web browser by speech and by using the touch pad. As an implication for the telecommunication operators one has to state, that the telecommunication infrastructure has to be improved in order to be able to handle higher data traffic. With the new 4G networks and UMTS LTE a connection speed of 173 Mbit/s would be possible. At places like universities or railway stations several users could demand for a considerable bandwidth which has to be provided by the telecommunication operators. Calls as well as data traffic in the Internet will be processes by all-IP networks.

To make the Internet change into a virtual layer of mobile participants with valuable new applications for the customer, the telecommunication operators have to put some programming effort into including their enablers like storage, location information and ID management.

At the same time they have to be careful not to endanger their reputation as a trustworthy company. Enabled by the new possibilities available with our phone, the telecommunication operators have the possibility to shape the mobile Internet and thereby imply new applications for the classical mobile phones.

The new mobile phone could be used as a gateway to make up new businesses and find new applications and business partners for new business models. Making money by directly selling location information is one way while using the phone as a credit card is another. Due to the size and trustworthiness of the telecommunication operators it could also be possible to serve as a credit grant for customers paying with their “My Phone”.

References

[306] J. Best. Optus plans all IP future by 2010. URL http://www.zdnet.com.au/news/communications/soa/Optus-plans-all-IP-future-by-2010/0,130061791,339282398,00.htm. Last accessed on 20.01.2008.

[307] BITKOM. Zahl der Mobilfunkanschlüsse steigt weiter in Deutschland, March 2007. URL http://www.bitkom.org/49778_44673.aspx. Last accessed on 09.01.2008.

[308] B. Brodersen. Strahlung bei Handys liegt weit unter vorgeschriebenen Grenzwerten, June 2004. URL http://www.teltarif.de/arch/2004/kw26/s14144.html. Last accessed on 28.12.2007.

[309] cellular news. Flash memory will still dominate mobile phone storage in

2012, November 2007. URL http://www.cellular-news.com/story/27571.php. Last accessed 21.01.2008.

[310] CO. Vermehrt Gewaltvideos auf Handys von Jugendlichen: JIM-Studie 2007 veröffentlicht, December 2007. URL http://www.inside-handy.de/news/10451.html. Last accessed on 04.01.2008.

[311] A. Colby. 420 Million CDMA Subscribers Worldwide in Q3 2007, November 2007. URL http://news.soft32.com/420-million-cdma-subscribers-worldwide-in-q3-2007_5644.html. Last accessed 21.01.2008.

[312] dsltarife.net. SAR-Wert - Gefahren der Handy-Strahlung überschätzt?, February 2007. URL http://www.dsltarife.net/news/2612.html. Last accessed on 28.12.2007.

[313] dsltarife.net. Mobile Phone S116 - erstes Solar-Handy kommt aus China, March 2007. URL http://www.dsltarife.net/news/2855.html. Last accessed on 27.12.2007.

[314] N. Fabris. Private Branded Handsets Will Generate Over 10 Billion USD for Operators in 2007, April 2007. URL http://www.abiresearch.com/abiprdisplay.jsp?pressid=846. Last accessed on 09.01.2008.

[315] förderland. Der demographische Wandel. URL http://www.foerderland.de/1067.0.html. Last accessed on 06.01.2008.

[316] Futures News. Tiny generator that can power a mobile phone with your heartbeat, July 2007. URL http://futuresnews.org/technology/tiny-generator-that-can-power-a-mobile-phone-with-your-heartbeat/. Last accessed on 06.01.2008.

[317] Gartner. Predicts 2007. mobile devices and applications reflect key changes at work and home, 2006. URL http://www.gartner.com/resources/144300/144343/predicts_2007_mobile_devices_144343.pdf. Last accessed 19.01.2008.

[318] Gartner. Watch Mobile, User Interface and Web 2.0 Innovations, 2007 Hype Cycle for Emerging Technologies. Technical report, Gartner Inc., 2007.

[319] D. Hogrefe. Mobilkommunikation II, Inter-domain Mobility in DAIDALOS. *Georg-August Universitaet Goettingen*, -:–, 2007.

[320] W. Huitt. Maslow's hierarchy of needs, 2004. URL http://chiron.valdosta.edu/whuitt/col/regsys/maslow.html. Last accessed on 20.01.2008.

[321] R. Humbach, S. Tasa, and V. Roto. The way we live next, October 2007. URL http://www.nokia.com/press/twwln. Last accessed on 02.01.2008:.

[322] S. Hussain, Z. Hamid, and N.S. Khattak. Mobility management challenges and issues in 4G heterogeneous networks. In *Proceedings of the first international conference on Integrated internet ad hoc and sensor networks*, volume 138, 2006.

[323] J. Ibrahim. 4G Features. *Bechtel Telecommunications Technical Journal*, December 2002.

[324] Cambridge Environmental Initiatives. Future Technologies for Energy Supply, 2005. URL http://www.cei.group.cam.ac.uk/futuretech/. Last accessed 05.01.2008.

[325] Jung. Mobile Technology: 2012, May 2007. URL http://www.newyorker.com/online/video/conference/2007/jung. Last accessed 21.01.2008.

[326] M. Kwan. Europe Apple iPhone Will Be 3G, 16GB, 499 Euros, September 2007. URL http://www.mobilemag.com/content/100/340/C13298/. Last accessed 21.01.2008.

[327] Landeskriminalamt NRW. Neue Phänomene bei der Handynutzung durch Kinder und Jugendliche, May 2006. URL http://www.ajs.nrw.de/juschure/pdf/LKA_AJS.pdf. Last accessed on 04.01.2008.

[328] A. List. Onyx: Das Handy der Zukunft hat keine Tasten. URL http://www.pressetext.de/pte.mc?pte=060822026. Last accessed on 04.01.2008.

[329] Mark. New Nokia Oyster Tube Phone is now official, November 2007. URL http://www.phonesreview.co.uk/2007/11/28/o2-news-update-new-nokia-oyster-tube-phone-is-now-official/. Last accessed 21.01.2008.

[330] P. McFedries. Lifestreaming. URL http://www.wordspy.com/words/lifestreaming.asp. Last accessed on 04.01.2008.

[331] D. Melanson. WiPower touts breakthrough in wireless power, September 2007. URL http://www.engadget.com/2007/09/24/wipower-touts-breakthrough-in-wireless-power/. Last accessed on 27.12.2007.

[332] R. Melzer. NTT DoCoMo: Akku laden mit Wasser und Luft, July 2006. URL http://www.areamobile.de/news/5639.html. Last accessed on 06.01.2008.

[333] M. Müller, R. Reichwald, and F. Piller. The relationship of quality, customer satisfaction and involvement in the context of mass customization offerings. *Customer interaction and customer integration, Series on business informatics and application systems, hrsg. v.: Blecker, Thorsten; Friedrich, Gerhard; Hvam, Lars; Edwards, Kasper*, pages 341–353, 2006.

[334] mobilementalism.com. DoCoMo wellness phone measures lardiness and bad breath, October 2007. URL http://mobilementalism.com/2007/10/03/docomo-wellness-phone-measures-lardiness-and-bad-breath/. Last accessed on 21.01.2008.

[335] mobileshop.org. The mobile phone user guide - history: Future. URL http://www.mobileshop.org/history/future.htm. Last accessed on 19.01.2008.

[336] D. Mulley. Privacy in a world of lifestreaming. URL http://www.mulley.net/2007/07/27/privacy-in-a-world-of-lifestreaming/. Last accessed on 08.01.2008.

[337] n-tv.de. Öl reicht nun noch 12 Jahre: Bundesregierung unter Druck, January 2008. URL http://www.n-tv.de/899884.html. Last accessed on 05.01.2008.

[338] B. Pakucs. Butler: A universal speech interface for mobile environments, 2004. URL http://www.speech.kth.se/~botte/publications/mobhci_04.pdf. Last accessed 04.01.2008.

[339] T. Pichler. Durchbruch bei Stromgewinnung aus Wärme erzielt, 2007. URL http://www.innovations-report.de/html/berichte/energie_elektrotechnik/bericht-96462.html. Last accessed on 05.01.2008.

[340] A. Postinett. Im Zeichen der Mobilität, January 2008. URL http://www.wiwo.de/pswiwo/fn/ww2/sfn/buildww/id/133/id/337347/fm/0/artpage/2/artprint/0/SH/0/depot/0/index.html. Last accessed on 05.01.2008.

[341] B. Reder. Feldversuch: Mobilfunk mit 173 MBit/s. URL http://www.networkcomputing.de/nwc/home/artikel/archive/151/article/feldversuch-mobilfunk-mit-173-mbits/mag/Mobile%20Computing/. Last accessed on 20.01.2008.

[342] H. Reichl. Energy shoes and fuel cells. *Fraunhofer magazine*, 2000.

[343] Retrobrick.com. Motorola DynaTAC 8000x. URL http://www.retrobrick.com/moto8000.html. Last accessed on 18.01.2008.

[344] Reuters. Moore's Law Coming to a Close, September 2007. URL http://www.itbusinessedge.com/item/?ci=33841. Last accessed 21.01.2008.

[345] roadtraffic-technology.com. New Mobile Phone Emergency Locator Based on PTV's Tracking&Tracing Platform, September 2006. URL http://www.roadtraffic-technology.com/contractors/it/ptv/press1.html. Last accessed on 03.01.2007.

[346] Royal Society of Chemistry. Flexible battery power. ScienceDaily, March 2007. URL http://www.sciencedaily.com/releases/2007/03/070323141052.htm. Last accessed on 05.01.2008.

[347] C. Schmidt. Super-Akku mit vielfacher Lade-Kapazität, December 2007. URL http://computer.t-online.de/c/13/82/11/96/13821196.html. Last accessed on 27.01.2007.

[348] Sinus Sociovision. Die Sinus-Milieus in Deutschland 2007, 2007. URL http://www.sinus-sociovision.de/2/2-3-1-1.htm. Last accessed on 14.01.2008.

[349] Sinus Sociovision. Sinus B1 (Etablierte), 2007. URL http://www.sinus-sociovision.de/2/ba-2-3.htm. Last accessed on 14.01.2008.

[350] Sinus Sociovision. Sinus C12 (Moderne Performer), 2007. URL http://www.sinus-sociovision.de/2/bc-2-3.htm. Last accessed on 13.01.2008.

[351] Sinus Sociovision. Sinus B3 (Konsum-Materialisten), 2007. URL http://www.sinus-sociovision.de/2/bh-2-3.htm. Last accessed on 13.01.2008.

[352] Sinus Sociovision. Sinus BC3 (Hedonisten), 2007. URL http://www.sinus-sociovision.de/2/bj-2-3.htm. Last accessed on 14.01.2008.

[353] D. Stober. Stanford's nanowire battery holds 10 times the charge of existing ones, 2007. URL http://www.innovations-report.de/html/berichte/energie_elektrotechnik/bericht-100522.html. Last accessed on 05.01.2008.

[354] M. Streif. Der Klimawandel kommt! URL http://www.klimawandel-heute.de/. Last accessed on 04.01.2008.

[355] M. Streif. Folgen, March 2007. URL http://www.klimawandel-heute.de/folgen/. Last accessed on 06.01.2008.

[356] Synaptics, Inc. Introducing the Onyx Concept. URL http://www.synaptics.com/onyx/. Last accessed on 05.01.2008.

[357] TCO Development. Mobile phones - what are we labeling? URL http://www.tcodevelopment.com/. Last accessed on 08.01.2007.

[358] teltarif.de. Wie gefährlich ist die Handy-Strahlung? URL http://www.teltarif.de/i/strahlen.html?page=2. Last accessed on 28.12.2008.

[359] TexasInstruments. DLP Projection Technology Goes Even More Mobile, March 2007. URL http://www.dlp.com/tech/press_releases_details.aspx?id=1323&year=2007. Last accessed 21.01.2008.

[360] The Economist Intelligence Unit Limited. World telecoms: Helping the poor help themselves, July 2005. URL http://www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=7608&categoryid=&channelid=&search=ringing. Last accessed on 10.01.2008.

[361] WebJapan. Back to basics, January 2005. URL http://web-japan.org/trends/science/sci050114.html. Last accessed 21.01.2008.

[362] K. Zoller and E. Dillmann. Handy-Strahlung. URL http://www.br-kinderinsel.de/kinder/fragen-verstehen/klaro/lupe/2004/00563/. Last accessed on 28.12.2007.

Chapter 9

9 T-Storage - Making Life Easier

Faraz Aghanajafi, Michael Gross, Nelly Markova, Benedikt Sager

At the beginning of our report we deducted three different possible scenarios concerning an online storage solution service, based on a detailed analysis of relevant drivers and developments. The first scenario consists of a peer to peer solution and the second one - "High Capacity" is based on the assumption that the current and future developments turn out to revolutionize the telecommunications market. The last scenario is based on a moderate development. It is considered to be the most-likely one, thus will be analyzed in more details later. To put in a nutshell, Deutsche Telekom should not become a pure bit pipe provider and should offer an online storage solution, "T-storage", basically on its own. As there is already high competition in the business sector for online storage, it makes sense for DTAG to concentrate on the private sector. Because people will use more devices in parallel in 2012 the online storage solution must offer the possibility to synchronize various devices with the online hard disc, taking into consideration the different features of the devices. Furthermore, it is important that the DTAG starts to develop operating systems for mobile devices on its own as this would offer the possibility of innovative features for the online storage solution. In addition to that, it is important to diminish the concerns of people concerning privacy. However, collaboration features are important and have to be offered. Moreover, T-Storage must include new features from the field of entertainment and software. In order to fight copyright offenses and to make the online storage solution more comfortable T-Storage customers should

have the possibility to buy software and media files online and distribute the new products via synchronization on the different devices. Besides an integrated access to T-Storage on devices people own, a web interface has to be developed in order to offer the possibility to access the online hard disc on a device that one does not possess. At the end of the report we go into details concerning the business model and revenue streams as well as the stable positioning of DTAG at the market of online storage. There is already (and will be) high competition in the field of online storage, however we consider that Deutsche Telekom have a sustainable competitive advantage, as it offers a successful combination of a range of features and the competitors mostly implement just some of them. Even if they would like to copy this holistic solution, they will need different key forces for each of the features. But it takes a long time to acquire the key forces, as they are base on completely different capabilities. And that is, what makes it difficult for any competitor to reproduce such a storage solution and thus makes the competitive advantage of the Telekom sustainable and the market positioning stable.

9.1 Introduction

The next generation networks offer a lot of new enabled applications. Nowadays in the telecommunication industry it is widely discussed, whether provider should implement some of them and thus change their role in the value chain - from a bit pipe provider to a whole solution designer. In particulate storage is an interesting enabler to look at. The falling prices and the increasing speed of mobile Internet connection as well as ubiquitous Internet use and the growing amount of devices people possess, create a demand for the personal storage being available anywhere and anytime. Additionally synchronization capabilities, enabling the customer to have his current data on all the devices (s)he uses, make an online storage service with synchronization options very attractive. In our report after performing some trend analysis, we deducted 3 possible future scenarios concerning online storage applications. In the second haft of the report we dealt with the most-likely scenario and the respective product. At the end, we addressed the issues of business model, payment procedure and competitors environment as well as described an action plan with future steps for realization.

9.2 Relevant Developments and Drivers

In this chapter different essential developments and drivers that are important until 2012 shall be explained as they will be the basis for different scenarios presented later.

9.2.1 Customer Needs

Very important drivers that will have a strong influence on which products will be demanded and accepted come from customer needs.

9.2.1.1 Standardization

Standardization is a noticeable need which future service developers of storage solutions will have to face. The digitization of customer and supplier data in businesses has emerged the need for more (cost and time) efficient management of resources [370] as well as the need for increasing automation of internal business processes and of inter-business relationships such as ordering and data exchange in the ongoing process of adopting e-commerce. An ideal case would be a completely automated process of ordering and data exchange through the whole supply chain. Companies will also increasingly consider business process outsourcing (BPO) to external providers [412], which will affect areas like CRM. By 2011, the amount of manual business process controls will have been reduced by 70% compared to 2006 [370].

One aspect of standardization is interoperability, which means that new services and devices will have to integrate into the existing environment (sec. 3.2.3) in the business. The increasing importance of virtualization and hardware emulation solutions [404] and recent partnerships of formerly oppositional companies like Novell and Microsoft [407] indicate that interoperability will be a dictating driver.

Another aspect of standardization is the usage and development of common file formats and protocols. As the accessibility of data from different devices and operating systems becomes more frequent, also the common compatibility and scalability of file system formats for storage solutions is demanded [408]. Many companies try to address this need by developing new dynamic file systems like ZFS and new access protocols [414], which are expected to become major technologies by 2010 [408]. In the quickly changing and therefore increasingly diversifying digital business world, it is crucial to have common data formats. This demand which has increasingly come up during the last years especially driven by public and large business departments has for instance resulted in the ongoing conflicts of future common document formats OpenDocument (ODF) and OpenXML (OOXML) [384]. These formats show different ways to address the need for common formats. Their adoption rate is expected to be extremely in the rise and at the "Peak of Expectations" in the next 2 to 5 years [384]. Therefore future service platforms, whether open or not, will have to consider interoperable control and access in order to stay widespread.

Also on the private customer side there is need for common standards. The ongoing digitization of social life and contacts will result in the use of many different services and platforms on every which the user has an own profile, data and settings (very few are currently compatible). This decentralized management of data means a lack of comfort and will have to be addressed centralized identity management solutions like OpenID [403] and becomes especially important for establishing new services for which users do not have to set completely new preferences, profiles and accounts. This need is in many ways contradictory to the need for security and is noticeably different among US and EU customers which also will have to be taken into account for future standards, depending on the dominance of the need "security" or "open/standard ID".

Another need in the private customer area are standardized user interfaces, challenging service providers to provide new functions although using familiar interfaces and intuitive navigation, which is also indicated by the massive success of the iPhone.

9.2.1.2 Entertainment

Nowadays in a world driven by fast-paced technologies digital entertainment plays an essential role. People eagerly buy enormous amount of media, such as films, music, games and software, and they also are willing to pay a lot for

using online applications every day and everywhere. The trend towards growing importance of digital entertainment and Internet will strengthen in the next 5 years. Mobileconnect forecasts a tendency to ubiquitous mobile using of online data and applications for the coming years. This development can be attributed to the more sophisticated mobile devices, the high-speed Internet, and above all the wide popularity of web 2.0, communities as well as the many interactive online applications, which in particular trigger the frequent usage of mobile Internet [401]. Heike-Scholz also highlights the future importance of digital entertainment and Internet: "Broadband households will almost double from 300 million to 540 million subscribers by 2011 and mobile users will reach a whopping 3.4 billion. ... Next-generation wireless devices will drive demand for wireless games. Globally, video game spending is expected to rise from $32 billion in 2006 to $49 billion in 2011, a 9.1 percent CAGR" [409].

The number of people making use of "on-demand media" is growing extremely fast. A Gold Media survey forecasts a 25-time-increase in IPTV branch, totally acquiring 2,5 million of customers by 2012. The revenues will also grow enormously and reach 420 million Euro, compared to today´s one that account only 12 million a year [385]. A serious legal problem is copyright infringing of entertainment media. It can be attributed to the way media is distributed. Selling digital media on CDs and DVDs allows the user to copy them without great obstacles. Storing media not any more on separate devices but somewhere centrally, will tackle this problem. The model of replacing physical media with online purchased one is successfully implemented for Software, e.g."Software as a Service" (SaaS). and widely accepted also for music and films, e.g. Apple online music store. According to analysts at the end of 2011 the revenues of SaaS worldwide will add up to 14,5 Milliard Euro, representing 25% of the purchased software. By comparison, today´s revenues from SaaS are 3 times smaller [389].

9.2.1.3 Mobility

Concerning mobility until 2012 two different developments are conceivable.

The first development could be that smart phones with new revolutionary features like Apple's iPhone are widespread and it will be natural to have mobile Internet access. According to Jupiter Research 1.2 billion people will use mobile Internet until 2012 [423]. The same marketing research institute estimates that 70% of these users will use HSPA [423] and offers a fast Internet connection of 3.6 Mbit/s. In comparison the average DSL connection offers today only 2Mbit/s [413]. Today only 5 million people use HSPA. The reasons for this dramatic development could result from the other needs which are mentioned later in this chapter. People could for example have the wish to use enlarged communication platforms such as ICQ and Skype not only at home but wherever they are. In addition to that applications that are nowadays just used

on desktop computers could be demanded to be available on mobile devices in the future. Other developments which could make mobile Internet necessary is location based information [382], services that offer information about the place of residence of friends or colleagues and of course entertainment. It is imaginable that people want to watch movies while traveling via live stream or even use IPTV. However, this development is possible but improbable.

Rather a more moderate development seems to be more likely. It is estimated that by 2010, more than 50% of cellular subscribers in the U.S. and Western Europe will access the Web on a mobile device at least once a week [394]. Moreover, the mobile Web will extend onto devices such as Ultra Mobile PCs (UMPCs), Web tablets, media players and game machines [394]. Besides increasing necessity mobile Internet will grow because of falling prices [395]. People are nowadays not willing to pay for expensive offers for mobile Internet but increasing integration will enable manufacturers to produce low-end smart phones retailing for under $120 by 2010. These will bring sophisticated mobile Web platforms to a broader user base [394]. The Fachhochschule für Ökonomie & Management made a survey and found out that 68% of the people think emergency services are important and only 22% of the interviewees thought information about cash dispensers and a navigation service to the nearest petrol station would be desirable [373]. Therefore it seems that the average customer of the future wants little more mobile Internet features but he is far away from using mobile Internet each day and causing extremely huge data traffic.

9.2.1.4 Security

Today security represents a crucial issue referring to the ubiquitous use of Internet. That is also one of the most important perceived barriers to Internet use by businesses (B2B and B2C sectors). A study of IfD proves that Germans feel truly concerned about their privacy, legal protection and data security. Regardless whether referring to secure carrying-out of payments in the private sector or to platform security for the business sector, in both customer segments security is of utmost importance and will be also in the next five years. Thus, if DTAG is going to provide any type of central or distributed storage for its customers, it will have to thoroughly consider issues, regarding the privacy of stored data as well as the security of data transmissions.

A further aspect of security in terms of group communication and collaboration is the file access rights management. These applications will come more and more into use with the next generation networks and the ubiquitous high-speed Internet access they provide [369]. For an online storage solution is important to be able to assign various types of rights to different users or groups [363].

Additonally, Deutsche Telekom has an image and brand name of trustworthiness and stable reputation, which DTAG can use to support its customers and in this way lock them in. Many e-commerce platforms, as well as m-commerce

which will be of great importance in 5 years, require user membership for certain time before they are accredited trustworthy membership status. Telekom, using its name and the sophisticated information it has gathered about its customers, including financial details, can provide guarantees for them. Thus, this will save them long and unnecessary trial periods and at the same time have lock-in effect. Surely, this is a competitive advantage of DTAG, as not every online storage provider could come up with such a solution.

9.2.1.5 Communication

The need of people to communicate and express themselves will remain one of the most important drivers for any development in the telecommunication branch in the future and therefore will be analyzed in the following.

The development of the users behavior and need concerning communication is quite hard to predict. One possible trend for the next five years could be, that the communication via the Internet will be totally integrated into daily life and social networks and communities will have extended their importance as a mean of communication and socialization. Concerning these networks the trend will be towards, even more, self-portrayal, advanced presence and contact management shaped by the increasing interaction of users [419]. That means the user wants more and more to present himself and is willing to share a lot of, maybe even very private, information with others on such a network in case to have a common communication channel with his friends. So the people will see and use social networks as another mean for communication, which will be part of their life. On the other hand, especially when looking at Germany with an aging population, the development of the mentioned integration into daily life could be less important and will not happen that fast. In this case the quality of content and the usability will be much more interesting for the customer [368].

As the user want to share more information and data, for example photos or videos, the need to define public and private spaces giving the user the possibility to decide who is able to access certain data and to hide information from untrusted persons, will increase. Also group space as well as individual space play a crucial role for making social communities work and will be even more important in the future.

Having a closer look at the wish of the user to present himself on the Internet or social communities and looking at YouTube or Flickr, it becomes clear that the number of producing users [397] on the web will strongly increase until 2012. But therefore an easy-to-use application is needed in order to create content fast and without any special expertise of the user. In the future such applications could be used to give the opportunity to not just share photos or videos, but to create own professional content as a non-professional user.

9.2.1.6 High Capacity Infrastructure

According to Holger Kubsch, Senior Manager Rotating Memories with Samsung, storage capacity will increase remarkably during the next years [391]. The reasons are that people use PCs on a rising scale for entertainment and that music files, photos and other media files need more storage capacity because of a higher quality. Since file size will increase and people will have more media files they probably will want to share with friends, a higher storage capacity and a faster broadband Internet access, including fixed line and mobile web, will be necessary. A faster Internet connection is not only required in order to share files but also to use new Internet services such as IPTV that offers a picture and tone quality that can be compared to nowadays television quality on the condition that the Internet connection is fast enough. Dependent on the supplier 16Mbit/s are required. HDTV makes a VDSL connection with 25Mbit/s necessary [420] which is nowadays only available in bigger cities.

Therefore it seems likely that almost everybody who has the possibility uses a broadband Internet connection. However, the German federal ministry of economics and technology estimates that until 2010 50% of German households have a broadband Internet connection [381]. Therefore it is imaginable that a broadband Internet connection is natural in 2012 but it is also conceivable that just a little more than 50% of the German households are willing to pay for such a connection.

9.2.2 Technology

As most of the developments in the telecommunication sector will be enabled through advance in technology the technological developments are essential, when talking about the year 2012.

9.2.2.1 Infrastructure

During the next years the development of the Internet access speed of the past will for sure continue. The question is if all areas can profit from this development. The DTAG wants to improve the availability of DSL in rural areas and new technologies like WiMAX could accelerate the development. Even the German government supports the expansion of the broadband network [416]. Therefore it seems possible that a broadband Internet connection is available all over Germany in the year 2012. However this cannot be taken for granted as serious technical problems would have to be gotten past [415]. One solution for rural areas could arise from the new distribution of radio frequencies and WiMAX. If the European Commission gets its plans through frequencies that are nowadays used for television and will be free in the year 2012 will be used for providing a wireless broadband Internet connection in rural areas [380]. As the frequencies will not be free before 2012 and WiMAX demands a huge

amount of investment still two possibilities seem to be possible: a nationwide DSL availability due to subventions but in the year 2012 there could still be areas where no broadband Internet connection is available at all. When talking about fixed-line Internet connection speed one has to distinguish between rural areas and metropolitan areas. In urban regions a new type of DSL called VDSL with so far unrivaled speed is already available. It is possible that by 2012 VDSL is available in large parts of Germany. However, if the Telecom looses the monopoly of the VDSL network soon the DTAG will probably reduce the investment in the VDSL network [411] and in 2012 ADSL will still be the most widespread Internet connection. A similar development can be seen on the mobile Internet market. Nowadays mobile Internet is only available via UMTS in metropolitan areas. During the next years new technologies like WiMAX, UMTS LTE and WLAN hot-spots will make mobile Internet connection on the one hand faster [395] and on the other hand increase the supplied areas. Another question will be, whether trend towards Peer-to-Peer (P2P) network structure continues or a more centralized network solution will prevail.

No matter which technology will prevail, the mobile Internet connection speed will be comparable to nowadays broadband Internet connections. "Network operators are adding bandwidth to enable new services, such as media streaming. In regions where spectrum is limited, some will increase capacity with additional metro-area wireless networks, such as WiMAX. So although wireless spectrum is theoretically a limited resource, we believe that demand will not outstrip supply in the U.S. and Western Europe through year-end 2011" [394]. However, different developments have to be taken into consideration. Perhaps mobile Internet will be available all over the Germany until 2012 but this seems to be unrealistic. Due to the high costs the DTAG and its competitors could as well limit their mobile network to urban areas. A development that it is undisputed is that the costs for mobile Internet will decrease until 2012. New flat rates will bring transparency to the market [413].

9.2.2.2 Device Hardware

The kind of future devices and their hardware will determine how data storage will work in the year 2012 and therefore it is important to look at the future developments in this sector until 2012.

First of all the storage capabilities of devices will be much higher [391], with at the same time lower costs, than today leading to the assumption that much cheaper memory will be available for local as well as mobile devices. An important point will be the cost development of different storage types, especially whether the mobile storage will remain more expensive than local storage or if both will be more or less equal in price, as these development will lead to completely different scenarios. Also it will be possible by 2011 to store more data online as it is likely that the cost to store 1 GB of external

controller-based disk storage will decrease to $1.05 [364].

With such new dimensions in storage and also processing power new generation of devices will be possible. These devices could be even smaller with higher performance, but such an "omnipotent" device with an all-in-one integration of features and services still will not fall below a certain size due to usability reasons, for example the need for keys and a screen. So an alternative could be the designing of small interlinked devices, which will be slightly less powerful providing only basic features, like phone, building altogether, over a small-area-network, such an "omnipotent" device. These different developments will result in totally different demands concerning future storage solutions. Other design aspects of future devices will only play a minor role concerning a storage solution in the year 2012.

9.2.2.3 Software and Services

Many areas of software and service development will be affected by ongoing changes by 2012, including the definition of "software" and "service" itself.

On the *access technology* side, the development of open APIs may dictate the way different services communicate in the future [398]. APIs of a certain platform allow external services and software to access functionality provided by the platform or piece of software. Many different open API approaches have started recently, none of which has yet become a standard. One approach is not to only open the specifications, but also the whole platform technology, as initiated by Google Android [378]. Supported by strategic involvement of device manufacturers and web companies putting expertise into the development and expanding the user base, such a platform has a potential to become a reliable and efficient base for services like storage. But also closed platforms from Microsoft and Oracle are increasingly opening up their specifications [390] instead of the whole platform. Due to the recent success of proprietary platforms, a realistic alternative to the "fully open" platform case could be the case of a few established platforms being able to communicate via common algorithms, e.g. in case of a central ID solution, profile synchronization between different platforms or a common billing solution [402]. For a storage solution provider, it will be of crucial importance whether it will be in control of the platform or not, which probably would not be the case in the open platform scenario, or whether it will have to release several different versions for different platforms. This decision will also depend on whether there will be one preferred 'almighty' end-user (mobile) device with a single OS - similar to some advanced smart phones or the iPhone today - or, also possible, rather the usage of multiple specialized devices with different OSs [367].

A correlating development will also be the *spread of open-source software compared to closed-source software*. Recent indications and developments show that open-source software will be widespread in business (infrastructure) solu-

tions [376], while the private customers will mostly rely on commercial software. A storage service provider wanting to address both customer groups will have to consider these differences. This decision could also include a fully or in parts open-source development of the storage solution in order to form a vivid developer community.

Developments in the area of *integration technology* are likely to solve many of these problems regarding different platform specifications. Where just open APIs are not enough to assure full interoperability of services - e.g. for full-featured storage services which need many platform-internal and hardware algorithms - virtualization technology can help to reduce development costs and to grant inter-platform compatibility regardless of the internal platform structure. Virtualization technology makes it possible to emulate whole operating system [422] or even full-blown hardware environments ("guest systems"), regardless of the system the emulation is running on ("host system"). The adoption rate of virtualized solutions by private customers is going to rise dramatically, from 5 million PC users utilizing virtualized software and virtualization solutions to approximately 800 million PC users in 2011 [383].

Virtualization technology could be used to make services easily available on multiple (mobile) devices. Due to advancing integration capabilities of web services, the differentiation between local software and web-based software will be outdated by 2012. The demands and current developments indicate that end-user web services will look and behave like locally installed software.

This development, especially in the business area [404], leads to the delivery of *software as a service (SaaS),* affecting the whole way of software distribution, installation and support. The rapid growth of "on-demand business solutions by design" shows that development of business software is heading to customized solutions built from standardized modules and automatically delivered as full web service [375]. In this case, a successful storage solution can be simply one of these modules, or even made compatible by using virtualization. Also private customers will use online services instead of "classical" local software in areas of application in which access to the data from different devices and locations is important. Using SaaS, the customers will not have to care about administration, since configuration, updating and optimization will be done remotely by the vendor. According to Gartner, the SaaS segment will show an annual growth of 22% until 2011, twice the growth rate of the whole enterprise software segment [399].

Nevertheless, it can be expected that highly specialized software like commercial graphics rendering programs will in parts still be distributed on hard media, but in case online software distribution services like "Click-n-Run", which automatically install the software after the purchase, are successful, also commercial software could be distributed this way. In this case, a storage service would make sense as an "online HDD" with advanced and integrated upload and synchronization functionality for data produced in these locally installed

pieces of software.

9.2.3 Market

Another important driver will be the market development, which will have a strong influence on how a future scenario for 2012 could look like.

9.2.3.1 Market Trends

Mobile Internet is going to gain in importance considerably in the next few years. In order to analyze the trends and future developments, it is important to have a look at the applications people will usually use on their mobile devices and how frequently they will surf on their cell phone.

"Analysis" has published a survey stating ARPU increases in the next 5 years because of non voice services: "Most Western European mobile markets are yet to see a further decline in voice ARPU. However, progress in mobile Internet should ensure total ARPU for the whole region grows by 10.2% between 2006 and 2012. Combined with a growth in active subscriptions, mobile service revenue will increase at a CAGR of 5.4% per year, reaching EUR195 billion in 2012." [410]

To be more precise, according to Gartner one of the most frequently used online mobile applications in the next few years will be the wireless email. This solution is today not so common for private users (2% of all e-mail accounts) but it is supposed to be mass solution and a standard by 2012 [366]. Additionally, according to an analysis of "Strategy Analytics" 32% of all mobile devices will be GPS-enabled by 2012, thus another widespread application is supposed to be in the field of Location Based Services [421]. Besides, as mentioned in Entertainment chapter, people will also use mobile Internet often for entertainment purposes, such as casual gaming.

After having considered, what the main and most significant applications for the mobile Internet in 2012 are, let us take a look at mobile Internet itself, the purchase models, such as data by data or flat rate, how much and how often it will be used. According to Mobileconnect the first mobile Internet flat rates have already occurred and in a few years we will have ubiquitous Internet connection [401]. As storage solution would refer not only to the data on the mobile phone, but also the the on the laptops, it is worth paying attention to the traditional fixed line Internet, too. The number of households using narrow band connection decreases permanently. US has today the highest number of broadband subscriptions worldwide (66 millions), and a broadband penetration rate of 21.9 %. Not far behind is Germany with a penetration rate of 21.2% [400]. The mobile Internet stands shortly before breakthrough to mass market. From all these facts we can conclude that in the next 5 years we can count with widespread Internet connection, at least as fast as broadband (mobile and home). However, we assume that in the best case there will be very high-speed

and ubiquitous Internet everywhere, or in a more moderate case, there will be high-speed mobile Internet but still within limits. To be more precise in the latter case, the mobile Internet will be much faster that today, but not as quick as Internet connection at PCs.

The mobile devices are expected to be considerable better and besides not at all as expensive as today [405]. However, to keep them as handy and portable as today, the manufactures/users should consider outsourcing some of the components, such as processing power and storage. On the other hand, other supply chain participants, such as Telcos, should think about offering such possibilities to the consumer.

9.2.3.2 Market Regulation

Another important aspect that influences the development of the telecommunications market is regulation. The European Commission, makes big efforts at the moment in order to restructure the Telco markets in Europe. In order not to go beyond the scope of this report only two main proposals shall be mentioned. The first aspect is Functional Separation. If the European Commission succeeds in introducing Functional Separation the DTAG would no longer have any advantages of their network in comparison to their competitors. But the German government [388], the Telcos and even the competitors of the Telcos [372] are against the plans of the European Commission. The decision on this topic remains to be seen. Therefore until 2012 two different developments seem to be possible: The network and the services that are offered by the DTAG have to be separated or the Deutsche Telekom could be allowed to keep the network.

The second aspect that is important is the aim of the European Commission to establish a new European single telecommunications market. Their "objective is to open the Single Market with its 500 million consumers for business – and to ensure that economies of scale, cross-border services and increased competition lead to innovation, new services and tangible consumer benefits." [406]. The national authorities are again not of the Commission's opinion as no national authority wants to hand over power. Therefore again two developments are possible and likely again and depend on the question whether the European Commission can get their plans through arises again. If the Commission succeeds the Telcos have on the one hand the chance to access new markets but will on the other hand be confronted on the former national market with new competitors. In case the national governments succeed the Telcos will just like today be limited to the national markets and have difficulties to expand Europe-wide.

9.2.3.3 Value Chains

One important driver for future developments in the storage sector will be the position of the Telco in the value chain. The first possibility could be

the Telco as a bit-pipe provider, which means it won't be able to broaden its role to a platform owner or web X.0 service enabler. This will lead to the consequences that the value chain will look exactly the same as in the current Internet environment. So the Telco will only occupy the access sector of the value chain with no direct contact to the user.

A contradictory development would be the Telco as a solution designer becoming the value chain leader. In this case the value chain would look totally different from today's with the Telco covering a broader range in the value chain by designing and implementing own solutions in different sectors. So the Telco would become the dominant player similar to the situation before the deregulation of the telecommunication market, which seems to be a very unlikely future.

The Telco could also be an equal partner in the future, who is co-designing the solution. It could then partner with web players or device manufacturers, which would reduce the risks for both partners and, at the same time, generate higher revenues. Also in this case the Telco will be able to strengthen its position and build up a healthy economic bases not just relying on the core segments like access providing and network control. All these developments will have different impacts on how the future market will look like and also in what kind a traditional Telco will be able to play a role on the future storage market.

9.2.3.4 Competitors

Many web companies and device manufacturers have entered markets in which telcos have been dominant for a long time. One major development is the competition for owning future service platforms. A popular strategy of attracting people to use the own platform is to make use of value-added services by connecting different services in order to make people who are attracted by a particular popular service (like entertainment services or freemail) also use other services because of their easy integration into this service.

Many established as well as start-up companies will have started storage services until 2012, using different technologies and targeting different customer groups. Amazon with its S3 solution mostly focuses on business customers and has become an established business service provider. In the private customer market, there will be multiple competing services like Microsoft's Skydrive, Google's expected GDrive and new efforts like Wuala. The detailed analysis for competitors which are specifically relevant for our product is given in section 9.5.4. The success of these competitors will largely depend on the customers' adoption of different technologies, e.g. whether P2P or centralized storage will be preferred, or whether full-blown or streamlined integrated storage solutions will be accepted.

Despite the competition, there is a chance for telcos to provide an advanced and feature-rich solution, since sought-after abilities from a storage solution

in 2012 will surpass those of current simple services. For this reason it may be of advantage to partner with other companies with relevant expertise. One scenario is partnering up with a web company with valuable experience in the field of web services. Besides, also the partnering with device manufacturers could be reasonable in order to expand end-user contact and combine special functionalities of the own storage service with popular capabilities of the device. Furthermore cooperating among telecommunication companies can help to expand the user base and infrastructure resources dramatically, which could be a considerable move due to the close dependence of storage services on the infrastructure.

The mentioned partnering scenarios could, of course, already be present for competing storage web services at the time the telco's new service enters the market.

9.3 Possible Scenarios

After having analyzed the various drivers three conceivable scenarios shall be derived from the different developments.

9.3.1 Scenario Deduction

In this part we will have a closer look at three different scenarios for the year 2012 concerning online storage.

9.3.1.1 P2P Solution

Our first scenario is based on the assumption that Peer-to-Peer (P2P) networks will prevail in the future and services like OceanStore [417], Wuala [371] or similar, which already today provide basic online storage functions, are gaining importance in the upcoming five years. Especially in the business sector people will consider P2P solutions as a true alternative, which is underlined by the fact that already today P2P is considered a "big money spinner" [393] by Internet service providers with a potential to become a $28bn until 2012 [393].

The main prerequisite of a widely available high-speed broadband access will be given in the year 2012 resulting in the possibility of accessing the Internet nearly everywhere with a high bandwidth. Also, as discussed before, the storage prices for mobile and hard disk storage will be at an all time low. Due to this development in 2012 the storage capacities of the normal end-user devices will have increased by large giving the customer the option to share some Gigabytes of his HD in order to receive the possibility of gaining a lot more space via P2P storage, which will be necessary as at the same time the storage need will also be significantly higher than today.

Also we will see a customer in the future who is already used to the P2P system from other areas, like streaming or file-sharing, and less concerned about privacy. Especially the fact that his data is stored physically on many different computers around the world will not be a problem for the future user.

Assuming that the market will have developed towards a more ad-driven environment with more price awareness of the customer who will be more interested in services which are offered for free, paid services, which are for example based on subscription, will be replaced by different kinds of premium services. Due to that question of price, a storage solution has to be very cost efficient by outsourcing as much resources as possible. With a P2P network, where every user contributes memory, such a system could be set up with very low costs and at the same time allow the user to extend his memory nearly unlimited as long as enough other people cooperate in the network sharing parts of their storage capacity. This would lead to a very good scalability of the system in means of easy extension to more storage and users.

The traditional Telco would play in this scenario the role of a pure bit pipe player, concerning online storage solutions. Other companies like Google or Apple will be the ones who have the end user contact and will provide the software to be installed on the customers computer in case to use their storage service.

9.3.1.2 High Capacity Solution

The next possible scenario is referring to ubiquitous high speed Internet connection. According to mobility and infrastructure sections there will be high-speed mobile Internet in the next years. Regardless that the speed depends on which solution DTAG decides to implement, in any case it will be noticeably quicker than today. The following scenario deals with the case with the fastest connection. As already mentioned in market trends, most probably mobile broadband will be associated with a flat rate payment method and also according to Ericsson this is the accounting model that additionally drives usage of mobile Internet, for reasons of transparency [379]. Thus, in this case mobile storage prices will be still more expensive than data transfer one. Considering the comparatively low data cost, the customer will have to pay for data transfer, a storage solution will be a feasible enabled application. Besides storage application intertwined with a lot of additional features, will be really attractive to the pro/ consumer.

As already mentioned in Entertainment section, there is general trend to high integration and penetration of digital entertainment into everyday life. Having large amount of music, films, games the user will need accordingly a lot of storage. An online storage solution is much more convenient for the customer, as the data is always available - anywhere and anytime. Moreover, the media does not take up any physical space and can be always easily retrieved and recovered. Given the ubiquitous Internet and the flat rate access, there

are no more obstacles to the storage solution realization, implementation and establishment on the market.

According to Value Chain section in this scenario the Telekom would primarily appear as a solution designer. This solution makes only sense, given the cheap transfer rates everywhere around Europe at least or even worldwide, so telecommunication provider should consider partnering among them.

9.3.1.3 Moderate Development

Our third scenario is above all characterized by rapid development in the next five years. However, progress will be more moderate than described in a scenario above. Until 2012 almost the whole German population has access to a broadband or at least really fast Internet connection. As DSL cannot be offered nationwide because of technical problems the situation in rural areas will get better because of Internet access via UMTS or WiMAX. Today only 18 per cent of German households have a broadband Internet connection. By the end of 2008 for 95 per cent of the German households DSL shall be available and by 2010 50 per cent of the German households shall have a broadband Internet connection. Concerning fixed-line Internet access high speed DSL is still widespread within this scenario but in metropolitan areas VDSL outstrips DSL. Not only fixed-line Internet gets more quickly but also mobile Internet. UMTS LTE and WiMAX allow fast Internet connections with mobile devices. Despite higher transfer rates prices for mobile Internet access decrease considerably. With the dramatic drop of prices the usage of mobile Internet will be affordable for a broad social stratum. In addition to the development of Internet access the development of devices plays an important role in the scenario. During the next years prices for storage will decrease just like in the past but mobile storage will still be more expensive than hard disc storage. Moreover, more and more people will use multiple devices with different operating systems. While desktop computers and laptops will not lose importance PDAs and Smart phones will be far more widespread until the year 2012. Moreover, people are in this scenario willing to pay for innovative web services.

9.3.2 Selection of Scenario

For the scenario selection we consider three aspects: a probability check (“How possible are is the scenario?”) of the scenario, an analysis of the way customer needs are addressed (“Are the needs satisfied in such a scenario?”) and the relevance of the scenario for a telecommunication company (“How interesting or promising is it for a telecommunication provider to enter the market in such a scenario?”).

In the first Scenario P2P is widely accepted even for storing private data. Looking at current approaches like Wuala [371], the availability of such a technology by 2012 is probable. Nevertheless, taking into account the needs

of the (European) customers for privacy and security, the widespread usage of P2P for private data sharing seems very unlikely. Furthermore, this scenario would not offer promising circumstances for a Telco, which would be forced down to a "bit-pipe provider".

The second scenario implies a very optimistic development of ubiquitous instant broadband technology. By 2011, only few European carriers will have introduced mobile broadband technologies like WiMAX [387], other similar technologies still being in an immature state. Therefore widespread availability is most unlikely.

In contrast to the first two scenarios, our scenario of choice draws a moderate development. It can be expected that fixed-line broadband will be available in most areas and widely accepted, but customers will still need to access their data offline. Furthermore, this scenario is very interesting for the Telekom, as in this case an experienced Telco can act as a end-user solution designer with direct contact to customers.

9.4 Scenario Analysis and Product Derivation

In order to derive a product that fits to the scenario of moderate development the scenario has to be analyzed and effects on the possible product have to be evaluated.

9.4.1 Value Chain

Before thinking about a product, it is crucial to decide how the position in the value chain should look like. Earlier in this report three possible positions of the DTAG in the value chain have been explained. The first position was the DTAG as a pure bit pipe provider. In this case, the DTAG could not make much profit, being locked out of the profitable web X.0 market. This decision would be extremely passive and conservative and the profits that are in the web X.0 would be left to other companies without a fight. Instead of being just the bit pipe provider the Deutsche Telekom should try to become a solution provider or at least to be an equal partner for other web players. These positions in the value chain involve on the one hand a bigger risk but on the other hand contain the chance of getting a piece of the web X.0 revenue cake and therefore the DTAG should not restrict itself to the pure bit pipe provider and therefore the Deutsche Telekom should think about offering a complete online storage solution.

9.4.2 Competitors

After having decided what position one wants to take in the value chain and having an idea how the product should look like the question is who the exact

target group should be and if some competitors already have or plan to offer a similar product. Concerning storage solutions business customers have to be ruled out as Amazon already offers storage capacity to companies and seems to be established on this field. Also in the field of private customers exist a few simple online storage products. But the DTAG can offer value added services and new features with the online hard disc and not just the possibility to upload data on a server. To put in a nutshell, the Deutsche Telekom has the biggest chances of success with offering an online storage solution that offers trailblazing features for private consumers.

9.4.3 Market Regulation

Besides competitors upcoming laws and new ideas of market regulation could threaten the success the Deutsche Telekom has with a new storage service. The European Commission wants to introduce Functional Separation as mentioned earlier. If Functional Separation is put into action the DTAG would no longer have any advantages in comparison to their competitors concerning the network. Up to now nobody can foresee if the European Commission really succeeds and can introduce Functional Separation. Therefore, the DTAG should only offer new services that do not depend on the DTAG being the network owner. In the case of the online hard disc it would be an advantage to own the net, as intelligent node placing would have positive effects on the speed of the service. However, intelligent node placing is not a condition for an online storage space but rather a possibility if the DTAG is allowed to keep the network infrastructure.

Furthermore, the European Commission will perhaps create a European Single Market. This would just broaden the customer basis and have no further influence on the product except new competitors.

9.4.4 Multiple Device Usage

Many people today have a PDA, a smart phone, a laptop and a desktop computer and the percentage of people that use multiple devices in parallel will increase until 2012. Using multiple devices in parallel is often difficult as for example not all data of the desktop computer are on hard disc of the laptop and even if they were there the question whether the data is up to date arises. Up to now it is really time consuming to synchronize a laptop with a desktop computer. As it therefore will be desirable for many people to have an online hard disc there is nowadays a gap in the market that can be filled by DTAG. Making use of an online hard disc one could save all the data online and synchronize different devices with the online storage space. It would no longer be necessary to have different devices at the same place in order to synchronize them. If somebody is at work and has his laptop with him and wants to work on a file he has created the day before on his desktop computer it is not necessary that he has the file

with him on a device like a USB-stick but it is enough to synchronize the laptop with the online storage space. The only condition is to have Internet access.

9.4.5 Infrastructure and Market Trends

In the scenario of the moderate change fixed-line Internet as well as mobile Internet will be considerably faster than today and broadband Internet connections will be far more widespread than today. However, mobile Internet will not be offered all over the country and it will always be slower than fixed-line Internet. Still mobile Internet will gain more and more users and the percentage of households that use a broadband Internet connection will increase. As a consequence an online storage solution can in principle be offered as huge amounts of data can be transferred via mobile and fixed-line Internet. As Internet access, especially in the mobile world, will not be offered everywhere and anytime it is impossible to offer a storage solution where ones data would only be available with an Internet connection. Therefore although using online storage each device will need a local storage space like today in order to have the possibility to work offline. As a consequence an online storage space must offer the possibility to synchronize different devices with the Internet in order to load data on a local storage space or to add files that were created while no Internet access was available. The fact that an online storage space cannot replace local storage but only be an additional storage space will not diminish the customer basis as local storage prices will be decrease during the next years. However, mobile storage will still be much more expensive than hard disc storage space for desktop computers. Therefore the mentioned synchronization possibility must contain more features than only making a copy of the online storage space and transfer it to the chosen device. Rather the customer that will use different types of devices, that have different local storage spaces, in parallel like a mobile phone, a PDA, a laptop and a desktop computer must have the possibility to chose which data he wants to have available on which device while not having an Internet connection. In conclusion the online storage space contains all the data a person has and the synchronization feature distributes the chosen data to the respective device.

9.4.6 New Services Requiring Individual OS

Another aspect of our scenario that is worth of note is software. Especially the operating system on mobile phones is of interest. Nowadays the OS on a mobile phone is developed by the manufacturer and companies like the DTAG only have little influence on the operating system. This system may have traditional causes. In the past mobile phones had just one function – telephony and of course the manufacturer was responsible for the software. In our days mobile phones are more little computers and therefore it is now important how the

operating system looks like as the services a provider can offer strongly depends on the OS. Various trends concerning the operating system can be seen. Google works on an open operating system for mobile phones called Android and also big telecommunication companies like the DTAG. In order to keep all doors open the DTAG should develop an own operating system as new services could be offered. However, it is important that the services of the DTAG are also available with other operating systems as nobody knows what type of operating system will make its way. Of course there will be features of a product that can only be used with the operating system of the DTAG but the core functions should also be available with another OS. As a consequence, our product - the online storage space - must work with various operating systems.

9.4.7 Security Concerns

When it comes to privacy in the web people tend to be careful and react anxious. This attitude will not change during the next years and therefore it is really important that a new online service conveys to be safe. This is especially important when it comes to safe ones private data on a hard disc that one cannot access physically and turn it off when it seems to be necessary. Companies like the DTAG are trustworthy to many people and therefore can offer a product like an online hard disc.

9.4.8 Communication and Collaboration

In the next years the trend to Satellite navigation device manufacturers (e.g. TomTom) towards self portrayal in the Internet will continue. But many people want to determine which people can see the information they put into the web. Therefore an online storage space should contain the possibility to share information with other people which means that the owner of the online storage space can grant other people access to a certain part of their hard disc. This feature would make it unnecessary to send huge files. In addition to that, various types of access accounts are imaginable. Undoubtedly, it is necessary to offer services that cover the new form of self-portrayal and communication in order to get a huge customer basis.

9.4.9 Entertainment

Entertainment will gain importance in the field of telecommunication in the future. More and more people download videos and music and want their media to be available everywhere. However, pirate copies got common and although big music labels and film studios make big efforts in order to dam up offenses against the copyright no improvement can be seen. This offers new possibilities for a company offering an online storage space. The company can for example partner with big music labels. Customers that use the online hard disc could

then by their music online and the music label could load the file onto the online storage space. The customer had the advantage that it is really comfortable to by media and the music label could dam up copyright offenses as the customer would have no direct access to the file. The same procedure is imaginable with software.

9.4.10 Product Idea

After having analyzed the chosen scenario and elaborating the effects on the online storage product the whole product can now be deduced. First of all, the DTAG shall take the role of the solution designer and offer the whole product including the value added services. The target group consists of private consumers as this niche is not yet covered by a competitor. In order to have bigger chances of success the online hard disc must include revolutionary features that go beyond storing data on a server. It is indispensable to offer the possibility to synchronize various devices with the online hard disc. As shown it is even necessary to have the possibility to choose which data shall be synchronized with what device. In order to have the possibility to offer the mentioned necessary value added services the Deutsche Telekom should think about developing an own operating system. Nevertheless, it must be possible to use the online storage solution without an operating system of the DTAG. Furthermore, it is very important to state the safety of the online storage solution by using the reputation of the Deutsche Telekom. Besides, the synchronization feature the online storage must include the possibilities to allow several persons various access accounts with different authorities and to buy media and software online from partners of the DTAG which load the bought product directly on the online hard disc in order to dam up offenses against copyright. In order to follow the corporate identity of the Deutsche Telekom and to make it obvious for the people that the service is offered by the DTAG we decided to call the product *T-Storage*.

9.5 T-Storage

In the following the product T-Storage as our online storage solution that is based on the moderate development scenario shall be described.

9.5.1 Functions and Features

The function and features of T-Storage are making it a unique and innovative solution that will be presented in detail in this section.

9.5.1.1 Storage Functionality

The core functions of our solution include basic storage functionality. The user is granted some online storage space, which is expandable on subscription basis. The files and installed software in the online storage space are organized in a folder structure, similar to local storage. The online storage space behaves like a usual hard drive: Files and folders can be created, saved and deleted. Files are accessible either via integrated access or web access, even though the online storage itself does not include a full OS or equivalent. These different methods ensure the access to the online file system from multiple devices, regardless of the OS running on them.

9.5.1.2 Software Services

The new product T-Storage with its revolutionary storage concept does not limit the use of today's software that is delivered on CDs or can be downloaded but offers new ways for delivering software. As each single device needs a local storage space in addition to the online storage space one can install software just like today. Concerning this type of software nothing will change. Programs can be installed without any effects on the online storage space. This type of software can of course not be transferred to multiple devices via synchronization with the online storage space but has to be installed on each single device. So far nothing changes concerning software but T-Storage offers new possibilities.

Nowadays software piracy is a big problem and causes immense economic damage that runs into billions. According to the BSA (Business Software Alliance) 28 per cent of software was used illegally in Germany in 2006 [386]. This problem can be solved with the online storage space. In order to dam up the illegal use of software the supplier of the online storage space has to conclude treaties with as many software producers as possible. Then people that use the offered online storage space have the possibility to buy software in the Internet with the supplier's partners. The customer can decide while ordering the software on how many devices he wants the software to be installed and buy the necessary licenses. The software producer loads the software on the online storage space but the customer has no access to the space the software is now located and the software can therefore not be copied. Rather the software will be installed with the next synchronization process of each single chosen device. Of course the programs can only be installed if the operating system on the respective device allows it. By this way software piracy can be fought against in an unprecedented way as the user has no direct access to the software and therefore cannot copy it.

But not only software producers have advantages but also the user of the online storage space. Buying software online, paying for it with the next bill of T-Storage and installing it via synchronization raises the user friendliness and the comfort. It is no longer necessary to keep software on CDs. You can buy

and install software wherever you want. If the customer decides to buy a new desktop computer it is no longer necessary for him to have the software at hand but it is enough to synchronize the new device with the online storage space and if the necessary licenses are available the chosen programs are installed. In addition to that freeware can be offered in this way. The user can load the freeware on the online storage space and if he uses a new device or a device that does not belong to him for example in an Internet cafe or while staying with a friend it is possible to have the freeware installed on the new device and everything that is necessary is an Internet connection. The overall requirement is that the different operating systems on the various devices work with the software. A solution would be software that is based on java and is independent of the respective operating system. This type of "universal software" has already been explained in chapter three. Users that use freeware, open source programs and java based software could work with each device and use the software they are used to.

Nowadays the operating systems on mobile devices are produced by the device manufacturers. As a consequence the mobile phone service providers have little influence on the OS of mobile devices. The situation will change during the next years and the service providers will take over the development of the operating systems and therefore the OS can be optimized in view of the using of online storage. Still a mobile phone from the supplier of the online storage space should not be a requirement for using the online hard disc. Rather the optimized operating system should be an incentive to buy a mobile phone and the online storage space from the same supplier. By this way the supplier could tie the customers to itself. But it is imperative that as many features of T-Storage as possible can be used independent of the mobile device and the operating system as only few persons would buy the online storage space when the online hard disc could only be used with a new mobile device.

9.5.1.3 Integrated Access

People storing data in the online storage space want to access and modify the files easily, the most important ones even if they are offline. Our solution offers integrated access, which means that the online storage space is integrated into the user's local system as a normal hard-drive. This can for instance be accomplished by offering a software which - among services described below - installs drivers for a virtual hard drive (VHD), making it look like a usual hard drive (HDD) to the system. These drivers support common internal file system commands like copy and delete. This piece of software will be made available for several operating systems and has to be installed once on devices on which the user wants to use the integrated access. This method makes it possible to access the files in the online storage space via the local file browser (e.g. Windows Explorer) as well as through local applications.

The file access is determined by different file modes: The first time the user connects to the online storage, a list of the files available in the online storage space is downloaded so that the user can browse all the files in the online storage space without having to download them, even if he is offline. So not the files, but only links to the files are downloaded. Files which are only represented by a link on the local machine are in the so-called "ghost mode", which is the default mode. In case the user clicks on such a link which exactly looks like a symbol representing the real file, the real file is downloaded from the online storage space. Now a full copy of the file is locally available and can be changed ("full mode"). Symbols of files in ghost mode are a bit transparent, while symbols of files in full mode have full opacity. Moreover, the user can select via an embedded menu entry in the file browser if he wants to have contents of a particular folder in full or ghost mode. He can set different file mode preferences for different devices, e.g. set a folder containing large videos to full mode for access via his home computer and to ghost mode for access via his mobile devices.

On the local machine, there is always a synchronization service running in the background. One of its functions is file version management, similar to current solutions like SVN: It periodically compares the local files in full mode with those in the online storage space and updates either the local or the file in the online storage space to the newest version, depending on which one is newer. Not the whole file, but just the "changed bits" are updated, reducing data traffic and power consumption. Furthermore, the older versions of the file are not gone, but saved in a subversion register, which makes it possible to restore any previous revision of the file. Besides, files which are marked to be deleted by the user are kept in the version management system for some time before being terminally deleted in order to make it possible to undo the deletion. The file version management can avoid file version conflicts, e.g. if the user modifies a file in full mode on his laptop with temporarily no Internet access and in the meantime changes the original file on the online storage space from his smart phone with Internet access. All the relevant functions of the file version manager like "recover to version", "update" a.s.o. are accessible through the system menu (in Windows: the menu which appears by "right clicking" on a file symbol).

The second function of the synchronization service is to update the list of the files in ghost mode in case new files have been deleted from or added to the online storage space. Of course also new locally created files which have locally been saved on the VHD are added to the online storage space. Thirdly, the synchronization service is responsible for updating software which has been installed via the online software system described before. Furthermore, changes of settings are synchronized with the online storage space.

9.5.1.4 Web Access

Although the user can access the online storage space via integrated access on his own devices, there may be occasions in which integrated access is not available, e.g. when working on public computers. The web access feature allows accessing the online storage space using a web browser. For this purpose, our solution offers a user-friendly web interface which lets the user perform the common tasks described in the last section - and even more. After logging in, the user sees the "welcome page", which is a customizable modular start page.

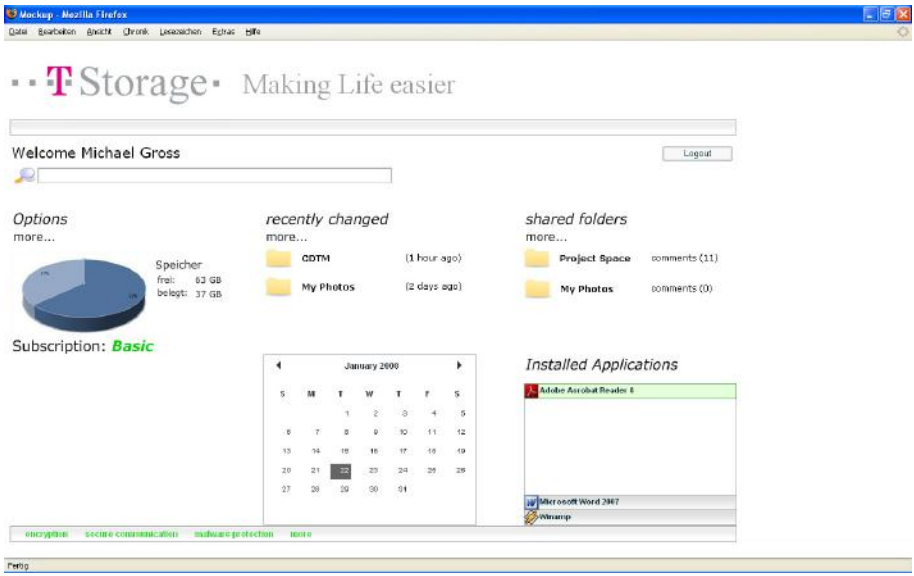


Figure 9.1: Welcome Page
Source: Own Illustration

The user can select from many modules available for the start page, i.e. a field showing the files recently changed, commented, shared or a module giving an overview of the space usage of different folders available in the online storage space. Another module of the start page is the "My Universal Apps" module, which lets the user start universal applications bought through the online application service online without having to install them locally. Furthermore, the welcome page is open for external modules which offer value-added services (e.g. calendar, weather, email overview a.s.o.). For this reason, the API of the welcome page is publicly available, similar to the concept of Facebook plug-ins.

The core of the web interface is an online file browser, an interface which is similar to a local file browser: where you can see and browse all files and folders. The file browser supports menus, buttons and mouse gestures for common tasks

and resembles, as a Web X.0 application, more a desktop application than a web page. The online file browser has preview and view functions for the most common document and media file types. These files can be viewed in the online file browser by simply clicking on then. Alternately, there is the preview function: Instead of using icons, the files in the online file browser are symbolized by previews of their content which are shown as small thumbnails above the file names.

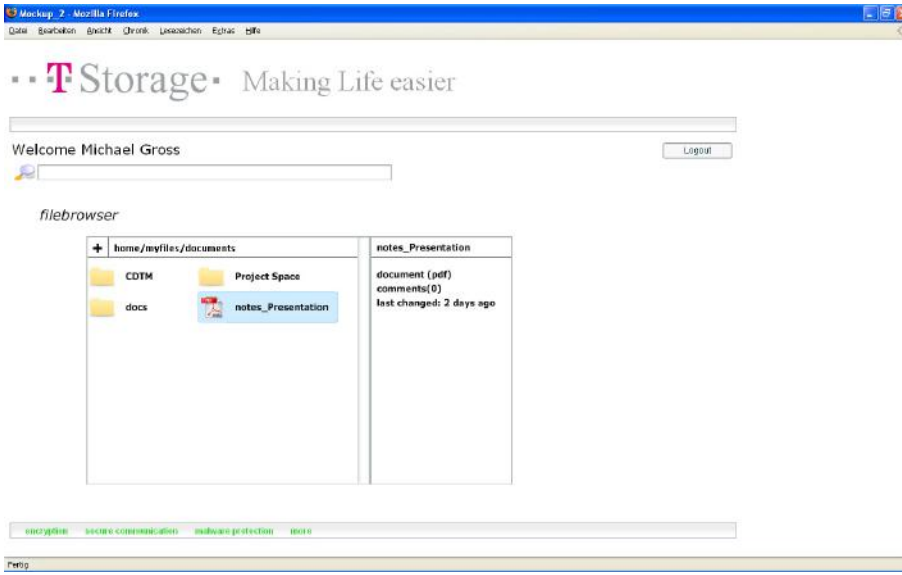


Figure 9.2: Online file browser
Source: Own Illustration

Additionally, the view function includes slide show functions for media content and multi page viewing for documents. The technology for realizing these functions will be definitely available before 2012, since many of the features listed in this section could be implemented using present technologies like AJAX and Flash.

The sidebar offers the most important information about the current folder or the selected files, such as access rights, modification date or file size. All files in the online storage space are indexed, which makes searching files using the search bar very fast. File properties like file type or comments and the contents of documents are also indexed. As a result, the user can search for documents on a particular topic, filter files of a particular type or look for a particular piece of software bought through the software service.

Similar to a local file browser, the online file browser supports drag and drop. Whenever the user drags a file from the local OS interface to the area of the

online file browser or towards a directory shown in the online web browser, that file is uploaded to that particular location in the online storage space. Progress bars on top of the online interface indicate the progress of the copy process.

The key purpose of the online file browser is to allow the user to organize the data stored on the online storage space efficiently. One of the additional features of the online file browser compared to a local one is the "*Virtual folder*" function. Virtual folders are symbolic folders, in which the user can group appropriate files and information together: Files from different locations on the online storage space can be added to a virtual folder without moving them, and online content (web pages or selected parts of them) can be linked into a virtual folder and appear as small thumbnails in it, as if they were "real" documents saved in the virtual folder - a function which we could call "*bookmarking 2.0*". Of course, like all the files stored on the online storage space, the link to the online content (bookmark 2.0) is commentable and its contents are indexed so that it can also appear as search result when looking for content using the search bar. In the file browser, the virtual folder behaves like a usual folder.

In the settings center, the user can set security settings (next sections), account settings and settings concerning the subscription (expanding online space, bought content a.s.o.).

9.5.1.5 Collaboration

T-Storage does not only enable people to synchronize several devices in a user friendly way and to have the possibility to have access to their data and storage space wherever they want but the online storage space offers new possibilities of interacting with other people. Using online storage makes the tedious uploading of huge files unnecessary and allows sharing files no matter how much storage space they need. Today it is still not easy to share files which go beyond 100MB. Besides a few upcoming solutions the files have to be passed on by an external storage device like CDs, DVDs and hard discs.

People that use T-Storage are no longer confronted with this problem. As all their data is located on the online storage space they can share files by allowing the respective person access to their online storage space. Everything that has to be done is to share the file on the online storage space and to send an email containing a link to the file. The respective person can than download the file no matter how big it is. Of course the file access can be restricted to one single person and be secured against unintentional access by a password and by limiting the possible download time-frame.

But T-Storage does not only revolutionize the sharing of large files but it offers completely new functionalities. Using an online storage space offers the possibility to set up several public online spaces. It is conceivable to make pictures, videos, CVs or anything else accessible to everybody in the web or to an enclosed circle of people like it can nowadays be done on platforms like

StudiVZ or Flickr. T-Storage offers even more possibilities. Various qualities of access authorization are conceivable. Persons can only be allowed to open the shared files others can be allowed to open and to comment on them and other people can even have the right to change the files or upload new files. Therefore T-Storage offers the functionality to be used just like an SVN but no server space has to be bought if someone owns an online storage space.

9.5.1.6 Security Functions

A malware scanner in on-access mode is activated for all data in the online storage space so that every file which is created, uploaded or changed is automatically scanned for viruses and similar threats. The online storage space uses an *encrypted file system*. Furthermore, both integrated and web access modes are established through an encrypted connection like SSL.

A major security concern of most (European) Internet users is a service provider possessing the profile data of its users. Moreover, the demand for a centralized profile and ID solution will emerge. It is only a reasonable move to *outsource the profile and login data* in order to address these needs. Instead of trying to establish an own login system, our service supports the most common central ID solutions. Thus the login procedure is as follows: On the web page for the first time registration the user simply logs in with his login data from a central ID solution, sets a few preferences and downloads the software package in case he wants to use integrated access.

It always has to be visible to the user that he is protected, so in the web mode, a selection of the most important enabled security options are shown in the module at the bottom corner. In the integrated mode, a tray application offers the same interface.

Although being aware of a secure service, there will always be documents of special confidence, which can be stored in "*Safe Folders*" (SF). The files in the SF are either protected by a password or by a special mouse gesture, or both. Besides, Safe Folders can be "hidden" and one can set a special gesture or password in order to unhide them. Further, in case the user forgets to close a SF, it is closed automatically after a preset time limit.

9.5.1.7 Content Services

Besides the sharing functionality T-Storage offers new ways of using media like e-papers, music and movies. Just like software media content can be bought online and be loaded on the online hard disc. Therefore one can use his music, his movies and any other form of media content at home and everywhere else. All that has to be done is to synchronize the devices. Therefore new services are imaginable. For example one could by a newspaper subscription. Each day the newspaper is loaded on the online storage space by the supplier. After getting up the customer can synchronize his devices with the online hard disc and the

newspaper is available on each single device. It is no longer necessary to buy a printed version of a newspaper or to download it and put it on an external storage device like a memory card that can perhaps not be used with every device. The positive effect would be that I can use the same media wherever, whenever and with every device I want to. The new functionalities of T-Storage can cause problems concerning digital rights-management. Therefore it has to be defined which type of content is allowed to be shared. Otherwise T-Storage could be for example used as a music database that could be accessed by many people.

9.5.1.8 Setting Preferences

Three modules let the user view and change settings of the online storage space: The *access central*, the *security central* and the *interface central*. These "centrals" are available as local applications (installed by the driver package) in the integrated access mode and as modules in the web access mode. For usability reasons, the interface of the local software and the online modules is identical. The settings in a center are categorized under a common outline. The status of most settings, e.g. malware protection, is either 'on' or 'off', where 'on' is indicated by a green font color and off by red. The search bar lets the user look for a particular setting by *name, description or by simply entering a question*. For this reason, each setting option is tagged with preset descriptions and questions internally so that the search engine can show the best matches.

9.5.2 Business Model

A new and innovative product that has interesting and sought-after features is mostly a prerequisite for a successful business – but only this does not suffice. A really important part of the product development process is, how the product will be marketed and sold. In this chapter we are going to explain which functions make our product unique and why we believe it will be marketed with great success. Additionally, here we will specify the target groups, market segments and the pricing strategies.

9.5.2.1 Positioning and Segmentation

As mentioned in the market and competitors section, there are many different players at the market, working on similar solutions, what makes the exact positioning of our product at the market compared to the competitor's ones really essential. The most other market players offer some specific solutions e.g. Amazon - for the business segment, Microsoft has a platform-dependent solution. Our target market will be the segment of private customers, where there is no high completion. Besides, a sustainable competitive advantage of "T-Storage" is that it offers not only online-software but a holistic solution

to the customers. It is a platform-independent, flexible and adaptive solution characterized by user friendliness, high reliability and is provided with a lot of additional features and also many value added services by partnering with other web 2.0 companies as well as e-commerce ones. To be more precise there are competitors maybe they are even better but they implement just one specific feature of our storage solution, while Telekom´s online storage space integrates felicitously a range of them. The competitive advantage is sustainable, because even if the competitors copy some of the value added features, they would be hardly able to implement all of them. The reason is that they require a range of capabilities: trusted brand name and reputation, because of security and data privacy issues; ability to efficiently position and transport the stored data, which only a telecommunication provider is able to do, as it has an access to the strategic network nodes; possibility to offer incentives for partnering. To conclude the T-Storage‘s targeted market is the segment of private customers, where it is stably positioned.

9.5.2.2 Marketing and Sales Strategies

Surely advertisement is a good way to get the people hear about the product, though it doesn't target the specific user but is more random. Promoting a product in the right segment is much more efficient, because the user can try it out, thus tends to believe more into the product than if he just hears that the product is good. We consider even that is important to let the potential customers try the full (premium) version of the product for limited time, as only in this way he will experience the value of the online storage and demand will be created. A free streamlined version for unlimited time will not be able to produce such impact on the potential customer. Doing more promoting than advertising will not lead to higher customer acquisition cost due to the effectiveness, but probably even lower, as T-Storage is a sophisticated product, thus it is difficult to describe and explain all the advantages but it is easy to perceive them experiencing it.

The online storage space offers also collaborating functions (see Collaboration) in a way similar to all web 2.0 applications. Since viral marketing is the cheapest and the most efficient way to reach large amount of people (the core marketing mean of online communities), it will be an appropriate decision to build in a function such as invite a friend. When the customer would like to work together on a document with a friend / colleague, he will send him a link and his friend / colleague will be able to sigh in and use a streamlined version. This feature adds two advantages for the Telekom. Firstly, the colleague or friend could try the software (i.e. probably creates demand) and additionally the client could work on the document with everybody he has to work with not only the T-Storage clients (i.e. T-Storage does not have any period of reaching critical mass).

Besides all usual sale channels, such as shops, online, intermediary, etc the

Telekom could approach also the laptop and mobile devices producers and offer a preinstalled T-Storage on all devices. In this way customers will automatically get the 30-days trial period.

There should be also a reward for recommending the service to a friend. After the new user joins the platform – the T-Storage client receives e.g. 1 month of free usage or additional Gigabytes.

9.5.2.3 Pricing

How much the product costs, has crucial influence on how good it will be sold. We consider entering the market, neither with a too low price, nor with a too high price. The 30-day-promotion is our strategy to attract the user at the beginning.

Additionally, there should be different pricing models for various customer groups, as only offering many different price levels we will be able to reach a lot of customers. For instance, offering a small, medium and large package concerning the storage space available online. For the traffic usage there will be 2 main models – data-by-data (only for mobile) and flat rate (home and mobile).

Furthermore, T-Storage could be purchased in addition to another Telekom service or as a separate solution. In the first case the user will get an extra discount.

9.5.3 Payment and Value Chain Position

With T-Storage the Telekom could expand its business on almost the whole the value chain. Thus the DTAG will have direct customer and end-user contact getting revenues through subscription payments.

In order to attract more customers we will introduce a variety of charging models. First of all we will have an installation fee, which is supposed to cover our expenses for software development. Than we will charge for amount of hard disk space used. And additionally each customer will have to pay a flat rate fee (Home / Mobile) or data-by-data for mobile Internet. We are going to combine these three payment categories and bundle them into packages, as for example one for customers making use of synchronization and online storage function extensively, another one that is supposed to be used seldom and a third possibility for medium user. Besides these offers additional packages will be planned after doing some market research.

The costs for the infrastructure will be the main expenditure highly influenced by the question whether there will be Functional Separation or not. In both cases the placement in the value chain will guarantee high revenues. Another cost factor will be the suppliers for the storage and server infrastructure. But prices for hard disk drives will be lower than today reducing the problem to the maintenance of the system. Further expenses will be caused by the

network usage, again depending on the Functional Separation. Administrative costs should be also considered as well as customer support, because T-Storage promises the user to simplify common tasks on his PC and therefore the customer expects a good support in case of malfunction. As mentioned in Business Model, a part of the sustainable competitive advantage of the Telekom is trust and customer support is a good way to strengthen believe in its brand name.

9.5.4 Market Players and Competitors

The online storage market in the year 2012 will be very strong with high revenues [377]. The offered services will be mainly adopted by consumers and small businesses, while bigger enterprises will be slower in adopting [377]. In generally it will be very important to be the first in field with a certain service in case to attract people and create a strong user-connection. Failing with such an approach could be very disadvantageous for "Product" as the ideas and concepts will not be seen as something "new", but only as a "cheap" copy. With the competition in the storage sector expected to grow strongly it is necessary to analyze possible competitors for our product in following.

9.5.4.1 Microsoft

One certain player will be Microsoft. One problem of Microsoft will be the declining customer base and image as more people tend to use other Operating Systems than one of the different Windows versions and more people will be opposed to the Microsoft monopoly. But of course in 2012 Microsoft will still be the leading company in terms of Operating Systems especially for inexperienced and longtime customers, who are used to Windows products. In Web area, that is in particular interesting concerning our product, Microsoft will have further improved the so-called "Cloud" Internet services, that are in development today [396].

Microsoft is already today present in the online storage market with its Microsoft Live Skydrive. Although this service is only a basic solution, it has to be expected that Microsoft will have continued to develop the product in order to adopt to the market situation and therefor will offer a competitive storage system to our "Product". Bundled with the other Microsoft Live services the Skydrive has to be considered as a interesting and threatening solution, depending on the type of services offered on the platform. As mentioned above it will be crucial to differentiate from other storage providers and products. The targeted clients will be from private to business all kinds of customers. There will be, similar to the "Home" and "Business" Edition of Windows Vista, different product versions in various price categories. Also a basic version maybe available for free or in combination with other Microsoft products on the Live platform or others.

9.5.4.2 Amazon

Another competitor for "Product" will be Amazon, which will be in 2012 more like an alternative Microsoft for the web computing era. To reach the aim of a of web-operating system and the idea of a "cloud-computing", Amazon will have developed itself away from a e-commerce giant to a Software company [392][418]. Also Amazon will have bundled its services and extended Amazon Web Services (AWS), which already today includes Amazon S3, a basic online storage solution. Such a system won't be in place in 2012, but a lot of business customers will make use of capabilities provided by Amazon to easily rent, for example like today, computing power and storage space. Especially small and medium-sized enterprises will remain the main customers of Amazon. In this business segment it will have a strong stand and be a noticeable competitor, maybe even the market leader.

At the same time Amazon will have problems to gain a considerable share of private customers due to the numerous competitors and the mentioned focus on business partners. So for T-Storage a competitor like Amazon will be not that dangerous as DTAG product will focus especially on private customers offering a very specialized solution with the focus on a variety of functions.

9.5.4.3 Google

The web-player per se, Google, will also in 2012 be a dominating power in the web business and we will see the web much nearer to Google executives' vision of a "cloud-computing". Also Google will have come closer to its other main goal of being present on all computers with its services like Google Toolbar in order to gain the same advantage Microsoft once had with Windows being preinstalled on nearly every PC or as Technology Analyst Amit Agarwal puts it, "Larry and Sergey have even more ambitious dreams - they want Google software installed on every computer that's running Microsoft Windows" [365].

To reach the first mentioned aim the recently announced GDrive online storage solution [374] will have developed into a powerful product with a high popularity, as all Google products in the past have proven to be well accepted by the customer, and it will be integrated in all different Google services available on the market. Which is necessary, together with GoogleDoc and similar products, to create a "cloud-computing", where the user is able to access his data everywhere and work everywhere. GDrive will focus on both, consumers and businesses, with different payment models. The service will be free for private customers and a certain amount of data but offered on a subscription bases for business partners.

The biggest disadvantage of Google will be the question of trust. That means people will perhaps not see Google as the company that is appropriate for handling very private and sensitive information. So despite a high popularity the customers will be aware of the risks of a free service and the resulting

personalized advertisement. In case of business customers this problem will not play a role as the business relationship will be different.

Nevertheless Google will be a strong, maybe the strongest, opponent in the online storage market, because of the fast adoption and new initiatives. Therefore it has to be considered in early stage of strategic planning.

9.5.5 Risks and Chances

After having discussed our product T-Storage in detail, we would like to have a closer look at possible opportunities and risks. In general, the section Business Model and Market and Competitor analysis imply that there will be great chances, but though we would like to perform a sophisticated evaluation of strengths and weaknesses, in order to determine, where our opportunities and threads are.

One of T-Storage‘s most significant strengths is that it offers an integrated solution to the customers. In particular this means, that Telekom‘s online storage space provides not only simply storage space, but a lot of additional functions and features, which mostly fit customer needs in the ubiquitous computing era. For instance, the already discussed functions, like synchronization, collaboration, and contented services - realized through a wide partnering network contribute to a unique storage solution. A further advantage of T-Storage is the established brand name of DTAG, which is associated with high trustworthiness. Thus, the user will feel more comfortable to entrust his personal data to Telekom, who is more reliable and secure as other offering similar solutions. Another strength could be traced back to the fact, that Telekom is in control of the network. At this strategic position it can distribute the network load and storage capacity most efficiently. This benefit might be diminished, in case the Functional Separation will be in place. Furthermore the Telekom already has a wide customer base, so T-Storage has the possibility to easily attract a lot of customers at the beginning.

On the other hand, there are also some weaknesses, that have to be considered carefully. First of all, implementing and developing an online storage space is not a core competence of a telecommunication provider and Telekom does not have a lot of experience in this field. Perhaps, this could have the consequence, that people will be prejudiced and not consider our solution among the best available. Besides, due to the focus only on private customers the T-Storage is not covering the whole market.

Considering the strengths of Telekom’s online storage solution the resulting opportunities become clear. Foremost the good integration into the existing portfolio has to be mentioned, which could attract a lot of customers with the offered bundled package of services providing almost everything they need. Additionally T-Storage, as a innovative product, will make a high development rate possible, which will be a great opportunity in order to stay competitive

and gaining high market shares in the online storage sector.

On the other hand, there is high competition in the field of online storage. This problem could be tackled by introducing an innovative and unique product, which we consider T-Storage is (see Feature and Functions Chapter and also above Strengths paragraph). Another tread could be not being the first on the market. This problem could be addressed by shortening and intensifying development process, if necessary. Furthermore, as Telekom´s core competence is not to produce an online storage solution, the T-Storage could be perceived by some of the customers as not the best solution in this field. However knowing the threads and considering them, and reevaluating the solution is the most successful way to position our product stably.

9.6 Strategic Implications

In order to succeed with T-Storage, an effective strategy is needed which, maximizes the chances on the one hand, taking into account risks on the other. These actions include smart and rationalized technology implementation, strategic partnering, integration of value-added approaches and corporate identity strategies.

9.6.1 Readying the Technology Base

As T-Storage uses many new features which closely rely on technological developments, the first step to take is to ready the needed technologies by 2010, which is a realistic time frame, as T-Storage was designed for a moderate development of relevant technologies until 2012.

Concerning network technologies, it is crucial for DTAG to accelerate and continue its IP Networking, broadband and NGN efforts, especially concerning media NGN clusters and in-house storage enabler technologies. Furthermore, it will be important to improve fixed-line and mobile broadband availability in general. Existing media content infrastructure like T-Home and Musicload backends (e.g. servers, nodes, clusters) will have to be highly integrated into T-Storage infrastructure so that streaming content platform costs and development time are minimized.

Wherever appropriate technology by DTAG for a certain feature is lacking, DTAG should consider partnering with technology solution providers, instead of trying to develop new technologies and protocols from scratch. This approach will enable DTAG to stick together the technology basis needed for the product using already-mature solutions. For the purpose of ensuring compatibility of the offered software among many operating systems and devices, companies like Codeweavers, Salesforce/OpenXchange or VMware, which offer virtualization solutions, could be considerable partners.

An efficient strategy concerning additional storage data centers that are needed to host the new T-Storage service will depend largely on whether there will be Functional Separation. If so, it will be best to build up the needed data centers in-house, which would make optimizing the data transfer for the network and node-placing easier. It should remain a major effort of the Telekom to avoid Functional Separation.

Starting to develop the T-Storage service, DTAG will have to take into account outsourced customer profile data, as time will show which prevailing open ID platform will have to be implemented before launch. Furthermore, the platform API should be constructed for easy opening of certain functions (third-party support.

9.6.2 Looking for Content Delivery Partners

As already noted, media content delivery through own media platforms (T-Home, Musicload) integrated into T-Storage will also make it easier to address major media content providers like Sony and Universal in order to expand the contracts to T-Storage content services. Unlike other media shop owners like Apple, DTAG will have to be a less restrictive contracting partner, e.g. by using common media formats, opening up the media platforms to third-party promotional approaches and to smaller (local or independent) media companies.

The success of the built-in software service will largely depend on the quality of the offered pieces of software. Thus DTAG should approach big software companies like Adobe, Ulead and SUN. Pointing out the unmatched copyright protection of T-Storage should make it more attractive to these companies. Furthermore, opening up specifications for universal applications and T-Storage widgets should be a considerable move in order to form a vivid web X.0 developer community around T-Storage, accelerating its establishment as platform.

9.6.3 Corporate Identity and End-User Access

The only way to compete with Google and Microsoft is to focus on the key strengths of DTAG: reliability, trustworthiness and quality of service. By early adoption of base technologies, the actual development of the product can start by 2009/10, giving the developers enough time to form a mature and well-implemented product with a smoothless user experience (innovative interface). The aspects trust and security will have to be outlined in the outer presentation of the product, giving security guarantees to the customer in order to lock them in. Additionally, underlining the fact that T-Storage is a holistic solution will attract technology enthusiasts.

To strengthen end-user contact, Telekom should broaden its efforts concerning OS development (OS branding, Android) to a more active role of OS development, even by partnering up with device manufacturers like HTC.

In the end, a successful T-Storage project among other end-user approaches of DTAG could prevent the Deutsche Telekom from being forced down to a pure bit-pipe provider and open up new areas of growth in the web X.0 business.

References

[363] Internet file storage, access, sharing and collaboration services: Poised for growth. *Gartner*, .

[364] Predicts 2008: Emerging technologies make storage hardware and software more effective. *Gartner*, .

[365] A. Agarwal. Adobe Deal Hints at Google's Long-Term Strategy. URL http://labnol.blogspot.com/2006/06/adobe-deal-hints-at-googles-long-term.html. Last accessed 11.01.2008.

[366] A. Belkner. Gartner: Der fortschreitende Demokratisierungs-Prozess wird die drahtlose Mailabfrage für die breite Masse zum Standard werden lassen, July 2007. URL http://www.info-point-security.com/forums/showthread.php?t=3392. Last accessed 21.01.2008.

[367] M. Blosch. Executive Summary: Convergence: Fusion or Fantasy? URL http://www.gartner.com/resources/108900/108902/executive_summary_convergenc_108902.pdf. Last accessed 05.01.2008.

[368] P. Bross and A. Garbers. *Medien, Ordnung und Innovation*, chapter Digitale Konvergenz und Handlungskonsequenzen. Springer, 2006.

[369] M.W. Cain. Key Issues for Unified Communications and Collaboration. *Gartner*, 2007.

[370] F. Caldwell, C. Adams, and T. Eid. The 2006 Planning Guidance for Compliance: Risk-Orientation, Standardization and Automation, 2006.

[371] Caleido AG. Wuala P2P storage solution. URL http://wua.la/de/home.html. Last accessed 20.01.2008.

[372] Computerwoche. EU-Regulierung: Kommen die Telcos ohne Netz? URL http://www.computerwoche.de/%20%20nachrichten/1847538/. Last accessed 13.11.2007.

[373] connect. Hat mobiles Internet Zukunft?, June 2007. URL http://www.fom.de/3341.html. Last accessed 21.01.2008.

[374] K.J. Delaney and V. Vara. Google Plans Service to Store Users' Data. URL http://online.wsj.com/article/SB119612660573504716.html. Last accessed 09.01.2008.

[375] R.P. Desisto. Key Issues for Software as a Service, 2007.

[376] M. Driver, C. Haight, M. Govekar, R.W. Schulte, D. Gootzit, B. Gammage, M. Harris, M.R. Gilbert, K.M. Shegda, N. Drakos, B. Igou, A. Mac Neela, G.J. Weiss, A. Di Maio, G. Young, J. Pescatore, G. Johnson, M.A. Silver, A. Jump, L. Anavitarte, B. Hostmann, A. Bitterer, T. Friedman, D. Feinberg, B. Elliot, B. Hafner, and Y.V. Natis. Hype Cycle for Open-Source Software, 2007.

[377] M. Dubash. Online storage market set to explode, says researcher. URL http://www.computerworlduk.com/technology/storage/hardware/news/index.cfm?newsid=6860. Last accessed 09.01.2008.

[378] K. Dulaney, R. Cozza, and F Troni. Google-Sponsored Mobile Platform Likely to Be a Market Force.

[379] Ericsson. Flat rate drives mobile broadband. URL http://www.ericsson.com/solutions/operators/news/2007/q1/20070313_flatrate.shtml. Last accessed 22.01.2008.

[380] European Commission. The digital dividend: New airwaves for new wireless services, . URL http://ec.europa.eu/information_society/doc/factsheets/tr7-digitaldividendw.pdf. Last accessed 21.01.2008.

[381] Federal Ministry of Economics and Technology. Zukunft Breitband. URL http://www.zukunft-breitband.de/. (21.01.2008).

[382] Focus Online. Mobility: das mobile Internet. URL http://www.focus.de/digital/computer/chip-exklusiv/tid-8359/computer-trends-2008_aid_230111.html. Last accessed 20.01.2008.

[383] B. Gammage and G. Shiffler. Virtualization Forecast Scenarios.

[384] M.R. Gilbert, K.M. Shegda, R.E. Knox, M.A. Silver, G. Phifer, J. Lundy, T. Bell, K. Chin, D. Feinberg, N. Drakos, D. Newman, T. Friedman, C. DiCenzo, L. Latham, D. Logan, W. Andrews, D. Gootzit, and Bace. Hype Cycle for Content Management, 2007.

[385] BITKOM Goldmedia. Studie: IPTV 2012 - Marktpotenziale, 09 2007. URL http://www.iptvportal.de/iptv-studien/goldmedia-studie-iptv-2012---marktpotenziale.html. Last accessed 20.01.2008.

[386] golem.de. BSA: Piraterie-Rate bleibt konstant, May 2007. URL http://www.golem.de/0705/52292.html. Last accessed 17.01.2008.

[387] M. Gutberlet, N. Jones, K. Dulaney, N. Rickard, D. OConnell, P. Redman, S. Fabre, and B. Tratz-Ryan. Predicts 2007: Carriers Will Spend Billions to Try to Survive IP Revolution, 2007.

[388] Handelsblatt. Deutschland kündigt Widerstand gegen EU-Pläne an, November 2007. URL http://www.handelsblatt.com/News/Politik/International/_pv/grid_id/1153460/_p/200051/_t/ft/_b/1352115/default.aspx/deutschland-kuendigt-widerstand-gegen-eu-plaene-an.html. Last accessed 20.01.2008.

[389] K. Hoffmann-Remy. "Software as a Service" mausert sich zum Hype, April 2007. URL http://www.it-business.de/themenkanaele/marktforschung/trends/allgemein/articles/64235/. Last accessed 20.01.2008.

[390] T. Holwerda. .NET Framework Library Source Code Now Available. URL http://osnews.com/story/19176. Last accessed 20.01.2008.

[391] H.-J. Humbert. Festplatten: Status quo und die Zukunft, October 2006. URL http://www.tecchannel.de/storage/grundlagen/451271/index2.html. Last accessed 14.01.2008.

[392] A. Iskold. Amazon - The Real Web Services Company. URL http://webservices.sys-con.com/read/262024.htm. Last accessed 09.01.2008.

[393] R. Jaques. ISPs eye P2P as big money spinner. URL http://www.computing.co.uk/vnunet/news/2197374/isps-eye-p2p-big-money-spinner. Last accessed 07.01.2008.

[394] N. Jones. Mobile Web Trends 2007 to 2011. *Gartner*, 2007.

[395] J. Kaack. Das Handy wird zum Smartphone. URL http://www.mittelstandswiki.de/Mobilfunkdienste. Last accessed 20.01.2008.

[396] M. LaMonica. Microsoft fleshes out its online services strategy.

[397] Arthur D. Little. *Web reloaded? Driving convergence in the "real world"*, chapter 4, pages 26–39. 2006.

[398] J.-M. Lowendahl and M. Harris. Findings: Facebook Could Be the New Face of SOA for Higher Education.

[399] S.A. Mertz. Report Highlight for Market Trends: Software as a Service in the Enterprise Application Software Markets.

[400] Miniwatts Marketing Group. Broadband Internet Statistics, 09 2007. URL http://www.internetworldstats.com/dsl.htm. Last accessed 21.01.2008.

[401] Mobileconnect. Mobile Trends 2008: Anywhere, anytime!, 12 2007. URL http://www.mobileconnect.ch/de/2007/12/18/mobile-trends-2008-anywhere-anytime/. Last accessed 20.01.2008.

[402] NewsTicker.org. giropay: PayPal strategischer Partner des neuen Online-Bezahlsystems. URL http://www.news-ticker.org/pm.php?news_id=4487356. Last accessed 07.01.2008.

[403] OpenID Foundation. OpenID Centralized Login. URL http://openid.net/. Last accessed 20.01.2008.

[404] K. Potter and G. Tramacere. Report Highlight for Vendor Survey Analysis: Virtualization, IT Utility and Hosting in the Business of IT Outsourcing, Worldwide, 2006, 2006.

[405] C. Pütter. 2012 mailt Otto Normalverbraucher schnurlos, August 2007. URL http://www.cio.de/knowledgecenter/mobile_it/841002/. Last accessed 21.01.2008.

[406] V. Reding. Better Regulation for a Single Market in Telecoms. URL http://www.europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/07/624&format=PDF&aged=0&language=EN&guiLanguage=en. Last accessed 13.01.2008.

[407] Novell Press Release. Microsoft and Novell Announce Broad Collaboration on Windows and Linux Interoperability and Support. URL http://www.novell.com/news/press/\microsoft_and_novell_announce_broad_collaboration_on_windows_and_linux_interoperability_and_support. Last accessed 07.01.2008.

[408] P. Rinnen. File System Innovations Growing in Importance. Gartner.

[409] H. Scholz. Report: Global Entertainment and Media Outlook 2007-2011, 06 2007. URL http://www.heike-scholz.de/2007/06/23/report-global-entertainment-and-media-outlook-2007-2011/. Last accessed 20.01.2008.

[410] H. Scholz. Studie: Rückgang von mobile Voice ARPU hält an, 09 2007. URL http://www.heike-scholz.de/2007/09/10/1358/. Last accessed 21.01.2008.

[411] silicon.de. Deutsche Telekom plädiert für VDSL-Monopol, January 2006. URL http://www.silicon.de/enid/b2b/16964. Last accessed 21.01.2008.

[412] L. Stone, C. Tornbohm, B. Pring, M. Goldman, T.J. Singh, and R.H. Brown. Predicts 2007: BPO Market Shifts Focus to Automation, Standardization and Profit Margins.

[413] W. Strauss. Mobil in die Internet-Zukunft. URL http://www.tell-it.net/artikel/431-0-umts-mobiles-internet.html. Last accessed 21.01.2008.

[414] SUN. Sun ZFS Filesystem. URL http://www.sun.com/2004-0914/feature/. Last accessed 07.01.2008.

[415] TecChannel.de. Telekom: Flächendeckende DSL Versorgung zu teuer. URL http://www.tecchannel.de/news/themen/business/418306/. Last accessed 21.01.2008.

[416] topagrar.com. Bund verspricht DSL Versorgung auf dem Land, December 2007. URL http://www.topagrar.com/index.php?option=com_content&task=view&id=1510&Itemid=390. Last accessed 21.01.2008.

[417] UC Berkeley. OceanStore Project. URL http://oceanstore.cs.berkeley.edu. Last accessed 25.12.2007.

[418] Business Week. Jeff Bezos' Risky Bet. URL http://www.businessweek.com/magazine/content/06_46/b4009001.htm. Last accessed 11.01.2008.

[419] B.W. Wirtz, H. Burda, and W. Raizner. Deutschland Online - Zukunft des Breitband Internets. URL http://www.studie-deutschland-online.de/do4/DO4-Berichtsband_d.pdf. Last accessed 20.11.2007.

[420] www.internetfernsehen.ch. Allgemeine Informationen über IPTV. URL http://www.internetfernsehen.ch/IPTV-iptv_informationen.html. Last accessed 21.01.2008.

[421] www.webreaders.de. Strategy Analytics: Trends bei drahtlosen Unternehmenstechnologien im Jahr 2008, December 2007. URL http://www.webreaders.de/2007/12/20/strategy-analytics-trends-bei-drahtlosen-/unternehmenstechnologien-im-jahr-2008/. Last accessed 21.01.2008.

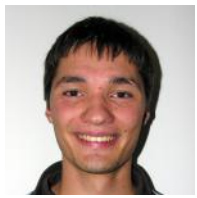
[422] www.winehq.org. Wine HQ Project. URL http://www.winehq.org/. Last accessed 15.01.2008.

[423] zdnet.de. Mobiles Internet: Die Zukunft heisst HSPA. URL http://www.dslweb.de/dsl-news-aktuell/dsl-fakten/hspa-ueberholt-wimax-070815.html. Last accessed 21.01.2008.

List of Contributors

Baumeister, Christoph
Business Administration
Technische Universität München

Filonik, Daniel
Computer Science
Ludwig-Maximilians-Universität München



Gross, Michael
Computer Science
Ludwig-Maximilians-Universität München

Guo, Yang
Media Informatics
Ludwig-Maximilians-Universität München

Hackel, Andreas
Business Administration
Ludwig-Maximilians-Universität München

Jablonka, Claudius
Business Administration
Technische Universität München

Kirca, Berk
Communication Engineering
Technische Universität München

Koyadan Chathoth, Anup
Electrical Engineering
Technische Universität München

Mangesius, Herbert
Mechatronics
Technische Universität München

Markova, Nelly
Computer Science
Technische Universität München

Najafi, Faraz
Physics
Technische Universität München

Petru, Sona
Political Science
Ludwig-Maximilians-Universität München

Reinartz, Sebastian
Business Administration
Technische Universität München

Reuter, Christiane
Business Administration
Ludwig-Maximilians-Universität München

Ruiß, Martina
Economic Education
Ludwig-Maximilians-Universität München

Sager, Benedikt
Mechatronics
Technische Universität München

Seiler, Johannes
Electrical Engineering
Technische Universität München

Wenz, Steffen
Media Computer Science
Ludwig-Maximilians-Universität München

Zhang, Chao
Computer Science
Technische Universität München

CDTM Board

Broy, Manfred, Univ. Prof. Dr. Dr. h.c.
Lehrstuhl für Software & Systems Engineering
Technische Universität München
Boltzmannstr. 3, 85748 Garching, GERMANY
broy@cdtm.de

Brügge, Bernd, Univ.-Prof., Ph.D.
Chair for Applied Software Engineering
Technische Universität München
Boltzmannstr. 3, 85748 Garching, GERMANY
bruegge@cdtm.de

Diepold, Klaus, Univ.-Prof. Dr.-Ing.
Chair for Data Processing
Technische Universität München
Arcisstr. 21, 80333 München, GERMANY
diepold@cdtm.de

Eberspächer, Jörg, Univ.-Prof. Dr.-Ing.
Institute of Communication Networks
Technische Universität München
Arcisstr. 21, 80333 München, GERMANY
eberspaecher@cdtm.de

Harhoff, Dietmar, Univ.-Prof., Ph.D., M.P.A.
Institute for Information, Organization and Management
Ludwig-Maximilians-Universität München
Kaulbachstr. 45, 80539 München, GERMANY
harhoff@cdtm.de

Hegering, Heinz-Gerd, Univ.-Prof. Dr.
Munich Network Management Team
Ludwig-Maximilians-Universität München
and Leibniz Supercomputing Center of Munich
Boltzmannstr. 1, 85748 Garching, GERMANY
hegering@cdtm.de

Hess, Thomas, Univ.-Prof. Dr.
Institute für Information Systems and New Media
Ludwig-Maximilians-Universität München
Ludwigstr. 28, 80539 München, GERMANY
hess@cdtm.de

Kranzlmüller, Dieter, Univ.-Prof. Dr.
Munich Network Management Team
Ludwig-Maximilians-Universität München
and Leibniz Supercomputing Center of Munich
Boltzmannstr. 1, 85748 Garching, GERMANY
kranzlmueller@cdtm.de

Krcmar, Helmut, Univ.-Prof. Dr.
Chair for Information Systems
Technische Universität München
Boltzmannstr. 3, 85748 Garching, GERMANY
krcmar@cdtm.de

Kretschmer, Tobias, Univ.-Prof. Dr.
Institute for Communication Economics
Ludwig-Maximilians-Universität München
Schackstr. 4, 80539 München, GERMANY
kretschmer@cdtm.de

Picot, Arnold, Univ.-Prof. Dr. Dres h.c.
Institute for Information, Organization and Management
Ludwig-Maximilians-Universität München
Ludwigstr. 28, 80539 München, GERMANY
picot@cdtm.de

CDTM Management Team

Bilandzic, Mark, Dipl.-Medieninf.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
bilandzic@cdtm.de

Dany, Fabian, Dipl.-Kfm., M.Appl.Inf.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
dany@cdtm.de

Dörfler, Isabel, Dipl.-Kffr.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
doerfler@cdtm.de

Ermecke, Rebecca, Dipl.-Kffr.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
ermecke@cdtm.de

Konrad, Nikolaus, Dipl.-Kfm.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
konrad@cdtm.de

Lorenz, Marie-Luise, Dipl.-Kffr.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
lorenz@cdtm.de

Mayrhofer, Philip, Dipl.-Kfm., MBR
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
mayrhofer@cdtm.de

Menkens, Christian, Dipl.-Inf. (FH), MSc.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
menkens@cdtm.de

Nepper, Patrick, Dipl.-Inf.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
nepper@cdtm.de

Schmid, Andreas, Dipl.-Inf.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
schmid@cdtm.de