The Future of Real-Time Communication

Trend Report 2012/2013

CENTER FOR DIGITAL TECHNOLOGY & MANAGEMENT

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The Future of Real-Time Communication

Trend Report 2012 /2013

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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.

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.

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ISBN 978-3-9808842-3-5. 2005.
VII, 338 p.

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ISBN 978-3-9808842-4-2. 2005.
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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.

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ISBN 978-3-9808842-7-3. 2007.
VI, 150 p.

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ISBN 978-3-9812203-0-8. 2008.
260 p.

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ISBN 978-3-9812203-1-5. 2009.
XX, 320 p.

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ISBN 978-3-9812203-4-6. 2009.
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ISBN 978-3-9812203-5-3. 2009.
XXVIII, 382 p.

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Developer Platforms and Communities in the Telecom Industry
ISBN 978-3-9812203-6-0. 2010.
XXVI, 356 p.

B. Römer, J. Sußmann, C. Menkens, M.-L. Lorenz, P. Mayrhofer (Eds.)
Smart Grid Infrastructures
ISBN 978-3-9812203-7-7. 2011.
XXVI, 333 p.

J. Sußmann, B. Römer (Eds.)
Urban Mobility Concepts
ISBN 978-3-9812203-8-4. 2011.
XXII, 382 p.

J. Sußmann, B. Römer (Eds.)
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ISBN 978-3-9812203-9-1. 2011.
XXIII, 307 p.

B. Römer, J. Sußmann (Eds.)
The Open-Closed Spectrum
ISBN 978-3-9815538-0-2. 2012.
XXI, 330p.

Michael Schadhauser · Julian Sußmann · Benedikt Römer (Editors)

The Future of Real-Time Communication

Trend Report 2012/2013

Class 2012 Fall

Center for Digital Technology and Management

The Future of Real-Time Communication. Trend Report 2012/2013

Edited by: Michael Schadhauser, Julian Sußmann, Benedikt Römer
ISBN: 978-3-9815538-1-9

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 part of a project cooperation with SIEMENS Corporate Technology. 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 of the Editors

"Everybody can learn from the past. Today it is important to learn from the future."

As Herman Kahn – one of the founding fathers of modern scenario planning – states it is tremendously important for strategy and policy makers to get a deep understanding of and to prepare for possible future developments.

In this preface we give an overview of the approach for the creation of future scenarios and the development of innovative product and service ideas, which was used to create this Trend Report. This approach was developed at the Center for Digital Technology and Management (CDTM) and was refined during the last ten years in more than 20 projects. The methodology aims on creating foresight studies related to information and communication technologies (ICT). It relies on a tight cooperation between industry partners and academia. Combining the creativity and impartiality of interdisciplinary participants from academia with the knowledge of corporations it provides long-term foresights and innovative ideas on how to expand the participating company's business and how to prepare for emerging challenges. Recent industry partners have been large corporations as, for instance, Siemens AG, Telekom Innovation Laboratories and BMW AG for topics ranging from Smart Grid Infrastructures and Ambient Assisted Living Technologies to Urban Mobility Concepts.

At the core of the futures study approach is the CDTM Trend Seminar. The Trend Seminar is a course with around 20 selected students of various disciplines, such as business administration, economics, computer science or electrical engineering that work on a relevant topic related to ICT. Before the seminar starts the topic is defined, broken down to smaller modules and structured together with the industry partner.

The seminar itself is an intense university course format. During this course the participating students dive deep into the new topic, apply knowledge they bring from their main studies, extend it in extensive research, learn and apply new methodologies, conduct trend analyses, design future scenarios and develop business ideas for new products or services. The seminar is structured into three phases: Basic Phase, Scenario Phase and Ideation Phase.

In the Basic Phase the class is split into five teams that look at different aspects of the overall topic. Following the PESTLE approach the status quo and trends in the fields of technology, society, economy, politics, law, environment and business are analyzed. The literature research is complemented by a series of input talks of experts from the project partner or other organizations. In addition, teams present the key findings to each other to provide a holistic knowledge base to build upon in the following phases.

The following Scenario Phase starts with a two-day workshop. The partic-

ipants work in four new teams to spread the gathered knowledge of the first phase throughout the teams. Within the workshop driving forces for the overall topic are identified and structured. Two key drivers are used to span a matrix of four different future scenarios, which are envisioned for around 15 years in the future. The scenarios as well as the possible timelines to these futures are already sketched within the workshop. Afterwards each team describes and writes down a vivid view of the life in one of the four scenarios in detail.

In the third phase, the Ideation Phase, participants are once more regrouped in new teams. Each team's topic is a different perspective of the overall topic. The goal is to develop possible business concepts, which are then tested against the previously developed scenarios. The phase starts with a two-day workshop to learn and apply ideation methods. This approach, which is based on patterns described by Jacob Goldenberg, Roni Horowitz, Amnon Levav and David Mazursky, is a very structured way to develop ideas for new products or services. A selection of these ideas are then combined and further developed into detailed business concepts. The concepts are described using the approach of business model generation, which was developed by Osterwalder and Pigneur. At the end of the seminar, the concepts are presented to the project partner and guests.

After this short introduction we want to thank several persons, who made this CDTM Trend Report possible: We thank Ernst-Joachim Steffens and Joachim Schonowski of our project partner Deutsche Telekom Innovation Laboratories, who helped to define the topic and scope of the project, gave interesting kickoff talks and coordinated the contact to experts within their organization throughout the whole project. We thank Felix von Held, Felix Werle and Julia Butter for their support in the Ideation Phase. Their experience and motivation is always leading to an enjoyable workshop atmosphere and excellent workshop results. Especially, we want to thank all students of the CDTM class of fall 2012, who put a lot of energy and enthusiasm in this project and by that made it a pleasure for us to supervise the course and coach the individual teams. We wish all readers exciting light bulb moments and inspiring thoughts about the future of real-time communication.

Michael Schadhauser, Julian Sußmann and Benedikt Römer
Center for Digital Technology and Management

Preface of the Project Partner

Technical evolutions have changed the landscape of telecommunication services, service providers and business models within the last decades dramatically. While initially telephony was the core telecommunication service, hardware and device evolutions, invention of the Internet leading to the global network and newest Internet technologies boosted the communication service landscape. New IP-based service providers, using a variety of business models, challenge the communication market, once the traditional network operator domain using subscription as central revenue model. Studies reveal that IP-based communication giants like Google and especially Facebook, form information and communication ecosystems, leading to a lock-in effect on these sites. Regarding the shift in people's, society and business communication and interaction behavior & demands, the "IP-ation" of communication services, the introduction of new technologies, services & business models and new market entrants, Deutsche Telekom needs to identify and react on upcoming trends in the communication space. From a consumer and business perspective new real time services and technologies could enable enhanced and especially more efficient interaction for instance in the customer service space

Modern digital mass communication in the private and business segment follow some key trends: mobility, presence, social networks and real-time. Based on these key trends society and the business adapted new communication and other interaction possibilities, e.g. video telephony - conferencing, personal - mobile communication, 24x7 availability and multiple communication channels. The service variety leads to a replacement of formal communication like email by quick informal communication like SMS, bi-directional communication by multi-directional communication and to rich collaboration introduced by real time technologies. In combination with society transformation based on globalization and urbanization, they enable new life-style concepts like the "gigabyte society" or "connected live and work" and change the way people, organizations, local and global society interact. Social interaction / communication radically change inter-personal communication and interaction within the private and business sphere. Social network usage has surpassed email usage in November 2007! Traditional bi-directional and more intimate digital communication means like telephony, SMS or email are exchanged by multi-directional or broadcast communication means. A study amongst teens in the US (2006-2009) revealed that instant messaging (chat) and other messaging formats like SMS, email get absorbed by social networks and their interaction and communication means. In social networks people leave postings on a personal wall or simply use status updates to keep constantly updated while on the move. Twitter enables broadcasting and following of short text fragments. Both examples show a trend towards short form messaging and informal communication which is instantly available. In the business segment, the transfer towards mass market

adopted communication services into so called Unified Communication and Collaboration (UCC) relying fully on the IP space is ongoing. While today email and telephony are still the dominant communication and interaction means, instant and real time collaboration enabling technologies move in the focus to foster work efficiency and reduce costs. Which impact could or will real time exchange formats or technologies like Web RTC have on interaction and communication for the mass and business market? How could real time communication services improve customer services? Which service scenarios exist? How could a business model look like? Is real time communication an essential evolution for connected live and work? Within this trend student teams analyzed new trends in the topic "The Future of real time communication" with Deutsche Telekom as their industrial partner and sponsor. The first part of this report consists of a basic analysis of communication trends regarding technology, market, society and customer needs, the political and legal framework as well as emerging business models. In the second part, the students selected two core boundary conditions and based on these, developed five service scenarios. Finally they further developed these five scenarios into pre-product concepts, explaining the core idea, use cases and business model. Especially this final step is crucial for innovative service development and makes the partnership with CDTM so attractive. Throughout the seminar the student groups were guided and coached by the CDTM program coordinators Julian Sussmann and Benedikt Römer. On Deutsche Telekom side the project was coordinated by Joachim Steffens and Joachim Schonowski (both from Deutsche Telekom Innovation Laboratories). On behalf of Telekom Innovation Laboratories we would like to thank the students for their enthusiasm and interest to explore the modern communication landscape. They have done a tremendous work to investigate deeply the difficult subtopic of real time communication from an operators' perspective resulting in this trend report. It was a real pleasure to feel the energy and creativity within the work groups and the overall team spirit. We were impressed by the highly professional presentations of the final core service ideas, which we will use to integrate into upcoming services. In addition we would like to thank the program coordinators Julian Sußmann, Benedikt Römer and Michael Schadhauser for the organization, high professional and also very pleasant atmosphere throughout the seminar.

With best regards,

Heinrich Arnold,
SVP Research & Innovation,
Leiter Deutsche Telekom Innovation Laboratories

Joachim Steffens,
Program Coordinator CDTM

Joachim Stegmann,
Leiter Projektfeld Future Communication

Joachim Schonowski,
Senior Innovation Expert Future Communication & UCC

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 under the close guidance of research assistants in 2012. 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 real-time communication context.

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Nomenclature

AR	Augmented Reality
BYOD	Bring Your Own Device
FTTH	Fiber to the Home
IaaS	Infrastructure as a Service
IANA	Internet Assigned Number Authority
ICT	Information and Communication Technology
IETF	Internet Engineering Task Force
IM	Instant Messaging
IMI	Internal Market Information System
IP	Internet Protocol
IPv4/6	IP version 4/6
LTE	Long Term Evolution
NGN	Next Generation Network
OSS	One-Stop Shop
PaaS	Platform as a Service
PMU	Phasor Measurement Unit
PSP	Payment Service Providers
PSTN	Public Switched Telephone Network
QoS	Quality of Service
R&D	Research and Development
RTC	Real-Time Communication
SaaS	Software as a Service
SCF	SEPA Cards Framework
SDK	Software Development Kit
SEPA	Single Euro Payments Area

SME	Small and Medium Enterprise
SMS	Short Message Service
UCC	Unified Communications and Collaboration
UMTS	Universal Mobile Telecommunications System
VA	Veterans Association
VAT	Value Added Tax
WebRTC	Web Real-Time Communication
WLAN	Wireless Local Area Network
WSN	Wireless Sensor Network

Part I

Trends

Chapter 1

1 Information and Communication Technology Trends

Bendeguz Gati, Pawel Kwiecien, Alexander Machado, Maria Meier, Milos Rusic

Executive Summary

Numerous information and communication technology (ICT) trends are currently emerging that will be able to change communication behavior. The developing technologies and increasing hardware computing capabilities make it possible to develop new services, standards and solutions for human or machine interaction.

The notion of distance will diminish with emerging trends, such as teleoperation and teleimmersion. The latter will allow people located at different geographic sites to collaborate in a shared, virtual environment. In addition, real-time speech translation will enable people to communicate with each other, even when they do not share a common language.

More natural human-computer interaction technologies using video and speech recognition are enabling faster and easier communication between humans and machines.

The use of sensors opens new opportunities for the communication between machines. Combined with wireless technologies and intelligent software applications, they will be able to deliver solutions to future problems in the context of energy systems and healthcare. The Internet of Things is going to become reality by using wireless networks and will have an impact on day to day life.

Chapter 2

2 Society Trends and Consumer Needs

Miguel Cabrera, Lorenz Haubner, Nele Koestler, Gregor Schneider

Executive Summary

In the near future, changes in society and consumer needs will trigger the development of enhanced RTC solutions. Presently, the different usage patterns of RTC are apparent across generations. The young Digital Natives will grow up and become even more of a key driver for a better connected society and further digitalization of services. Their technical expertise and demand for a better work-life balance will ultimately shape the way business works in the future. Furthermore, the older generations will increasingly be forced to adopt new technology solutions, especially in RTC. This will be a challenge and an opportunity for vendors as they represent a solvent market. Also, women will finally grow to their full potential in business. In addition, as consumers, they will demand technology products customized to their needs. Regarding social life, consumers will feel more and more confused about their virtual privacy. The environment people work in will be subject to radical transformation. RTC will alter traditional paradigms of employment, with telecommuting being the norm rather than the exception. Living will be even more urbanized and connected to public administration and the city infrastructure as intelligent cities emerge. With RTC being cheap and always available, cultural and national borders will blur, paving the way for better global connectivity and the establishment of a global mainstream culture.

Chapter 3

3 Political And Legal Trends

Annabelle Bockwoldt, Ermal Guni, Simone Lederer, Christian Maier

Executive Summary

The European Union and Germany invest in the RTC sector. They do not aim in particular to benefit RTC but heavily engage in branch-related projects such as broad band roll out, Information and Communication (ICT) industry and e-energy. One recent example are the subsidies of e-energy projects (e.g. "Leuchtturm Projekt"). They aggregated to 60m € and the whole amout was spent in smart grid projects, which were based on RTC technologies. Hence, the state investments in RTC increased heavily.

At the same time, challenges arise for the German legislator: Traditional laws such as „Telemediengesetz" and „Bundesdatenschutzgesetz" are increasingly set under pressure by the developing communication industry, especially by the RTC sector. Therefore, telemedia law, copyright law and also trade laws draw more and more attention. Additionally, legislators worldwide introduce new laws due to rising concerns about health risks caused by radiation of wireless devices used for RTC.

However, there are also new chances in the health sector through the approaches of telemedicine. Indicators show increasing interest of states to adapt their laws and to take further investments into the RTC sector.

Chapter 4

4 Trends in Corporations and Business Eco Systems

Florentine Blaseio, Raza Gill, Roman Tikhonov, Bernd Waschneck

Executive Summary

As collaboration becomes more important in the business world, the significance of communication processes increases.

The employed tools such as email, telephone, chat and faxes have been used widely. Now they are beaten by modern solutions such as videoconferencing, virtual assistants, social media and more comprehensive solutions like Unified Communication and Collaboration suites for enterprise requirements. However, the adaption process is slow due to several transition difficulties.

Looking at the trends, the communication and feedback processes between businesses and customers as well as within businesses will become more focused and organized. Customers are getting more demanding about not just the quality of customer support but also the means of delivery. Because of the trend in social networking people are less patient with companies regarding the response time. The communication within businesses have become more dynamic leading to a change in even the very core business processes of enterprises. Modern RTC technologies enable the facilitation of Unified Communications and Collaboration solutions within enterprises. Employees will engage more in the processes, as the workspace becomes open and unified.

Chapter 5

5 Emerging Business Models

Friderike Bruchmann, Jonas Diezun, Patrick Hiesel, Benjamin Schaule, Manuel Thurner

Executive Summary

Technology for real-time communication has enabled many new business models and on the other hand new businesses have changed the way humans and machines communicate. Real-time communication has become ubiquitous and services have become more important as the key to communication is no longer the network infrastructure, but rather the solutions and services provided to the consumer. Hence, real-time communication delivered as a service is becoming increasingly important and has been implemented in many business models.

Although revenue models are a vital part of a business model, an increasing number of startups do not have any revenue streams at the beginning, but rather focus on product development and customers' needs. Albeit leading to highly disruptive products, the question arises whether these companies are able to find a sustainable revenue model in the long term. Furthermore, existing players have to adapt to new market entrants which use free, freemium or advertising based models, in order to stay competitive.

Another trend that is gaining importance is the integration of real-time communication technologies into multi-sided business models, generating the ability to connect different distinct groups in real-time while monetizing this connection.

Part II

Scenario Planning

Chapter 6

6 Introduction

The massive opportunities RTC offers for businesses, societies and governments easily lead to confusion regarding future developments in this field. The topic of RTC will shape our future and the world we will live in considerably. After the identification of the RTC status quo and deriving important trends for the next few years, the purpose of this following chapter is to provide a glimpse into possible futures for stakeholders to work with. This is achieved by using scenario planning methods, which try to account for the vast amount of unpredictable outcomes of the future until the year 2025.

Methodology

Scenario Planning is a strategic planning tool used to make flexible long-term plans. As so many other useful methods in business and technology, scenario planning was first used by the military in order to prepare commanders for all the possible various outcomes an operation might have. This enabled them to react faster, more calmly and overall, more efficiently. Nowadays scenario planning is well-established within successful companies such as Shell, General Electric and Accenture. It allows them to get an idea how the future may unfold and how some scenarios may affect them. Scenario planning is a group process that usually starts off with a discussion about possible changes in political, economical, social, technological, legal and environmental (PESTLE) issues that may have an impact on companies' futures. "To think the unthinkable" is the aim of this task which fosters knowledge exchange as well as a deeper understanding of future scenarios within the group. It is important to note that scenario planning, unlike forecasting, stresses multiple possible outcomes instead of one, most probable outcome. These alternative views of possible futures can then be used for strategy formulation and implementation of action plans.

Chapter 7

7 Driver Analysis

In order to create scenarios that depict how RTC will look like in 2025, an understanding of the drivers behind the upcoming changes is needed. A driver is defined as a force or impetus, which is essential for the future and has an extraordinary high impact on the development of RTC. In this chapter only bipolar drivers are presented, that is drivers can only develop in one of two possible directions. Therefore, the probability of the two ways does not have to be equal. Indeed, it is hard to predict at the moment. Moreover, the drivers are usually connected with each other resulting in the outcome of one driver pushing the other in a certain direction. In figure 7.1 the ten drivers shaping RTC until 2025 identified by the students are arranged according to their impact and uncertainty. The abscissa depicts whether the future direction of a driver can be easily predicted or not. For example demographic change can be anticipated on basis of todays population. So, the outcome that there will be more old people is already sure. Therefore, the uncertainty regarding the direction of the outcome - demographic change occurs or not - is low. The ordinate shows the degree of impact on RTC of the drivers. As net neutrality and privacy awareness have the highest importance and their evolution is very hard to predict, they are identified as key drivers (marked in the figure). Their outcome leads to totally different futures, which is why the four scenarios, presented in this chapter, are based on different outcomes of these two key drivers.

The other eight identified drivers provide the necessary background for the four scenarios. Although their influence on RTC is lower, sometimes even minor, compared to the two key drivers, they shape important aspects of the future. As a result the scenarios rely on them to provide a better more detailed picture.

8 Chapter 8
Scenarios

Having detected high privacy awareness and net neutrality as the key drivers, four scenarios are described in the following, giving high or low priority to either respectively. This is depicted in 8.1. Furthermore, each scenario also takes the additional drivers into account, depending on their impact on the specific situation.

"Digital Enlightenment" describes a situation when full net neutrality exists and the public has a high interest in the protection of their private data. Net neutrality means that service providers cannot discriminate between different kinds of online content. "The Golden Cage" models high privacy awareness and no existing net neutrality. On the other hand, "The Transparent Society" simulates a situation where net neutrality exists and the interest in protection of private data is low. "Regulated Transparency" is a scenario where neither net neutrality nor privacy awareness exist.

8.1 Scenario I: Regulated Transparency

The following story will describe the world in 2025 with a scenario that is driven by low privacy awareness and no net neutrality within the field of RTC. The scenario relies on several events that define the way to this future. These events will be described in a timeline later in this chapter. Sabrina, a 17 year old girl grew up in a connected world that cares less about private data but enjoys the advantage of a transparent society.

8.1.1 Scenario Description

"... happy birthday dear Sabrina, happy birthday toooo ..." Sabrina hits the alarm clock. She hates this personalized wake up sequences. The display shows August, 21st 2025 - her birthday. She quickly gets up, puts her makeup on and

Part III

Ideation

Chapter 9

9 Social Mass Market Communication

Annabelle Bockwoldt, Lorenz Haubner, Benjamin Schaule, Manuel Thurner

Executive Summary

In 2025 Internet will have become the main communication tool used worldwide. Due to a better infrastructure and lower costs for providing the service to communicate with other people, mobile devices and over the top applications are strongly used to interact with the environment. One advantage of quicker or even Real-Time Communication is a higher possibility of matching people's needs when they are in search of something or somebody. Nonetheless communication is not necessarily appropriate or encouraged at any time and any place. What if two people pass by each other in a supermarket and would not know that one person is searching a job whereas the other person offers exactly the position the first person needs? It would be a great benefit to find a way of connecting people who can serve each other's needs in a symbiotic way. Nevertheless, one of the biggest issues service providers have to deal with is the question of data security and to whom data of their users should be provided in order to offer the best-fitting service. Users do not only want to connect, communicate and share data with other people but also be protected from fraud, stalking, supervision and data selling. Within this chapter, the mobile application Wavelength is introduced as a safe solution to this problem. Wavelength offers the service to connect people quickly and easily, dynamically adjusting their availability based on common interests, background, intention and location.

10 Chapter 10
Communication Access

Maria Meier, Milos Rusic, Gregor Schneider, Roman Tikhonov

Executive Summary

People use different channels and platforms for communicating with each other. Although there is a variety of communication applications tailored to solve specific problems, this leads to a segmentation of communication. Thus some efficiency problems arise when using a combination of several channels. AccessOne is a software solution designed to solve these problems. It is an application that merges existing communication channels behind one unified ID. Contacting somebody now means calling the ID. The application then takes care of choosing the right communication channel, e.g. voice call or text message. Using information from other applications like calendars, social network events or the location, smart agents determine how a person can be reached. The Contact Activity Feed is a feature that supports tracking of the entire communication history with another person, across different channels. It displays the history aggregated from all used communication channels in one thread, sorted by time.

The costs for setting up such an application mainly consist of salaries for developers and marketing personnel who plan campaigns for promoting AccessOne and who create a credible image to overcome privacy concerns. Revenues are set against these costs, generated through a subscription-based business model. Users can utilize AccessOne for free for the first year. After the first year, a yearly fee has to be paid for further profiting from AccessOne's advantages.

11 Chapter 11

Business Communication

Friederike Bruchmann, Bendeguz Gati, Ermal Guni, Patrick Hiesel, Alexander Machado

Executive Summary

With time passing by and new ICT opportunities providing new and innovative ways to businesses to manage their communication, customers have been more and more demanding in the utilization of these new technologies by companies. The business idea of AskAway addresses these higher customer demands and aims to provide an all-round Customer-to-Customer (C2C) solution to help companies improve upon their customer relationships. By exploiting the power of crowd-based knowledge, companies will end up with a cost reduction in their customer support divisions. With AskAway, online clients will engage in video or audio conversations and will help each other by providing solutions to different problems or giving advice on products. The impulse for people to help others will be fueled by different gamification techniques. After a conversation, the asker will rate the response given by the consultant, and by that determine the amount of bonus points the consultant receivess. Key activities are the establishment of business partners, creation of the platform and engagement of the users in the platform by different techniques. The scenario robustness test shows that AskAway's business model flourishes in the scenario of "Regulated Transparency" with low privacy awareness and no net neutrality.

12 Chapter 12
Educational Communication

Miguel Cabrera, Nele Köstler, Simone Lederer, Christian Maier, Bernd Waschneck

Executive Summary

Already today there are educational platforms offering universities the possibility to upload interactive lectures and give thereby students the chance to join the lectures online. EduHub is a service which enriches these platforms by offering a virtual space for group work and collaboration. The virtual room is enhanced by Smart Agents simplifying collaboration for example by proposing specialists in a certain topic, who are online and may help out with a certain problem. As EduHub is linked to the standard educational platforms, their content can be displayed in EduHub's learning environment that is based on augmented reality.

With its service, EduHub supports the universities to solve their problems of lack of room capacity, as lectures, tutorials and seminars can take place in virtual space. Students benefit from more flexibility, because they do not need to be physically present in seminars. Furthermore, they gain advantages due to the fact that the collaboration tools and virtual rooms enable them to work together on problems and they get one central place to get access to useful data, which is distributed on various platforms. Furthermore, EduHub's collaboration tools and virtual rooms enable place-independent group-work. Further, companies can use EduHub for target recruiting. As EduHub gathers information about each student's enrolled classes, contributed content etc., companies can rely on a lot of information when searching their target group.

13 Chapter 13

Smart Communication Agents

Florentine Blaseio, Jonas Diezun, Raza Gill, Pawel Kwiecien

Executive Summary

Planning a trip can be rather stressful, as people tend to be overwhelmed with the information overload that arises when planning their travels. Nowadays there are a lot of services, which purport to make travel planning as easy as possible. However, in reality they merely provide refined search results based on specific parameters.

Users demand more personalized content, which is relevant specifically to them. Wanderlust provides an approach to solve this problem by personalizing every aspect of travels. Wanderlust is a travel companion application that helps the user in planning and enjoying great trips with minimal effort. It does this by utilizing a plethora of information about the user that is gathered from various sources. Wanderlust filters this data and hence has exact knowledge of the users preferences and habits. Moreover, Wanderlust gathers data in real-time from others sources of information such as for instance possible travel activities or environmental data. Thus it can merge personal preferences with the external information to offer a comprehensive schedule for the trip. However, Wanderlust can not only plan a trip in advance, but rather goes with the user on that trip. Its real power hence is to reschedules the user's plan based on the events happening in real-time such as traffic jams, flight delays or weather changes. It reacts to the users action and offers personal guidance whenever needed. With

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

Butz, Andreas, Univ.-Prof. Dr.
Chair for Media Informatics
Ludwig-Maximilians-Universität München
Amalienstr. 17, 80333 München, GERMANY
butz@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 Strategy, Technology and Organization
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

Welpe, Isabell, Univ.-Prof. Dr.
Chair for Strategy and Organization
Technische Universität München
Leopoldstr. 139, 80804 München, GERMANY
welpe@cdtm.de

CDTM Management Team

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

Engelken, Maximilian, Dipl.-Wi.-Ing.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
engelken@cdtm.de

Gall, Florian, M.Sc.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
gall@cdtm.de

Jablonka, Claudius, Dipl.-Kfm.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
jablonka@cdtm.de

Menkens, Christian, Dipl.-Inf. (FH), M.Sc.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
menkens@cdtm.de

Moser, Kilian, Dipl.-Kfm.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
moser@cdtm.de

Römer, Benedikt, Dipl.-Wi.-Ing.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
roemer@cdtm.de

Schadhauser, Michael, Dipl.-Phys.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
schadhauser@cdtm.de

Schmid, Andreas, Dipl.-Inf.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
schmid@cdtm.de

Sußmann, Julian, Dipl.-Medieninf.
Center for Digital Technology and Management
Barer Str. 21, 80333 München, GERMANY
sussmann@cdtm.de