Sensor-based Authentication

Trend Report 2014

CENTER FOR DIGITAL TECHNOLOGY & MANAGEMENT

CDTM

Sensor-based Authentication

Trend Report 2014

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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 T-Labs. The CDTM is part of the Elitenetzwerk Bayern.

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Preface of the Editors

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

As the statement by Herman Kahn, one of the founding fathers of modern scenario planning, nicely states, it is tremendously important for strategy and policy makers to get a deep understanding of possible future developments in order to be prepared for them.

We will give a brief overview on the approach behind the creation of this trend report, which involved the creation of future scenarios and the development of innovative product and service ideas. This approach has been developed and refined over the last thirteen years in over twenty projects. The goal is to create trend studies and business ideas in the field of information and communication technologies (ICT). Thereby, we rely on a tight cooperation between industry partners and academia. Combining the creativity and external view of interdisciplinary participants from academia with the knowledge of larger corporations, the outcome are long-term foresights and innovative ideas on how to prepare for emerging challenges in a certain field and product and service ideas that may solve future needs. Recent industry partners were large corporations, for instance Siemens AG, Telekom Innovation Laboratories and BMW AG. Topics were diverse, ranging from Smart Grid Infrastructures and Ambient Assisted Living Technologies to Urban Mobility Concepts.

The Trend Seminar at CDTM is a university course with around 20-25 selected students of various disciplines, such as business administration, economics, computer science or electrical engineering that work on a relevant topic related to ICT. After the topic has been defined, it is broken down into smaller modules, that are then worked on by smaller, interdisciplinary teams.

The course stretches over seven intense weeks, fulltime, during which the participating students dive deeply into the new topic. Thereby, they apply the knowledge they bring along from their main studies and extend it by extensive research. They learn and apply new methodologies, conduct trend analyses, design future scenarios and develop business ideas for innovative products or services.

The Trend Seminar is structured into three phases: The Basic Phase, the Scenario Phase and the Ideation Phase.

In the Basic Phase, the class is split into five teams that look at different aspects of the overall topic. Following the STEP approach, the status quo and trends in the fields of technology, society, economy, politics, law, environment and business are analyzed. Knowledge is gathered by literature research, preceded by a series of input presentations by industry experts, held by our project partner or other organizations. At the end of the Basic Phase, teams present their key findings to each other in order for everyone to get a holistic view on the topic to build upon in the following phases.

The following Scenario Phase starts with a two-day workshop. Participants work in four teams, newly formed in order to have experts from every subtopic of the Basic phase in each new Scenario team. Within the workshop driving forces for the overall topic are identified and structured. Two key drivers are identified, which span a matrix of four different future scenarios of approx. fifteen years ahead. The scenarios as well as possible timelines to these diverse futures are sketched out within the workshop. After the workshop, each team elaborates a vivid view of the life in one of the four scenarios.

In the third phase, the Ideation Phase, participants are again regrouped into new teams. The goal of this phase is to develop innovative business concepts, which are then tested against the previously developed scenarios. The phase starts with a two-day workshop on ideation methods. Based on the work by Jacob Goldenberg, Roni Horowitz, Amnon Levav and David Mazursky, the applied ideation methods are a structured way to develop new products or services. At the end of the workshop each team is equipped with a broad set of ideas. Out of these, the most promising five ideas are selected and further developed into detailed business concepts. The business model canvas, developed by Alexander Osterwalder and Yves Pigneur, serves as base structure. At the end of the seminar, the business model concepts are presented to the project partner and guests.

We would like to take the opportunity to thank several people who made this CDTM Trend Report possible: We want to thank Dennis Gotta, Florian Reuter and Dr. Marc Wagener at our project partner Siemens Novel Businesses, who helped to define the topic and scope of the project and, together with their colleagues, provided great insight into current trends and future developments in the field. In addition, we would like to thank all lecturers for providing valuable input and contributing the Trend Seminar's success. Their expertise and motivation always result in a great lecture atmosphere and excellent outcomes. Finally, we want to say special thanks to the CDTM students of the class of Spring 2014. They put an enormous amount of energy and enthusiasm into this project, which made it a pleasure for us to supervise the course and coach the individual teams.

We hope you enjoy reading up on the results of this trend report and maybe get some inspirations on the future development of sensor-based authentication.

Veronika Gamper and Stefan Nothelfer
Center for Digital Technology and Management

Preface

As abstract as it may sound as a concept, authentication is one of the main activities in our daily life. Be it swiping a finger in a certain pattern across the smartphone's touch screen, wiring money or merely opening the door to our flat. Preventing unauthorized access to one's bank account is critical. And the same holds true for online accounts in order to protect our identity, just to name a few examples. It all starts with successful identification, but in order to also authenticate, a reliable verification is required. The most common tool to verify one's identity is using a password.

Yet, in all these increasingly digital and internet-based interactions, the balance between security and convenience is hard to find. How many passwords can we be expected to remember? How complex should they be? Should we use unique physical items to increase security? How can we avoid spending more energy on the log-in than on the actual activity? Such questions represent a growing customer pain – which should ultimately result in opportunities for profitable business models. And this growing customer pain is not necessarily limited to our private life – reliable authentication is at least as critical in business transactions and at industrial sites.

This is where we come in: our team at Siemens Novel Businesses founds start-ups in business areas of potential interest for Siemens, a global engineering powerhouse. "Sensor-based authentication" is one of these areas of potential interest, where a promising development seems to start in the consumer space and could spread to industrial applications later.

We picked this topic building upon two big trends: the spread of sensors and the growing need for security, identity management and reliable authentication. The main challenge in this field was and will be finding viable business models – which is why we deliberately chose the CDTM trend study as a tool to explore future solutions beyond our company's current scope and applications in a rapidly developing field.

The report at hand is the result of two intense months of work. It combines individual contributions from a unique group of students and the thorough methodology framework which channeled the creativity towards actual business models. We particularly valued the multiple perspectives provided and the fresh thoughts developed in the course of the program.

A big thank you to every single participant for your contributions and the inspiring conversations based upon them. Last but not least we want to thank Stefan and Veronika for managing the project, the pleasant collaboration, flawless organization and shaping the results.

All of us tremendously enjoyed working with such a unique, bright, motivated and creative group of students. We are looking forward to crossing parts again in the future - and will hopefully identify each other the old school way...

Marc Wagener, Florian Reuter and Dennis Gotta

Siemens Novel Businesses GmbH

The entire trend report was written by CDTM students under the close guidance of research assistants in 2014. 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 context of Sensor-based Authentication.

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

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Building on the strengths of both universities, CDTM provides highly qualified and ambitious students with an academic education in the field of emerging digital technologies.
CDTM closely cooperates with industry partners, thereby focusing on the Telecommunication, Information Technology, Media, Entertainment, Health and Energy sectors.

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Veronika Gamper • Stefan Nothelfer (Eds.)
Sensor-based Authentication

Numerous authentications take place in our everyday lives: From the use of passwords to access an email account, fingerprint scans to grant access to buildings to the confirmation of a product's origin to prevent counterfeits. Sensor technology at the same time has advanced tremendously over the last decades. Not only are sensors making things increasingly smart (e.g. smart homes, smart cars), sensors are also increasingly included in consumer products, such as cell phones or digital cameras.
The balance between security and convenience, however, is hard to find. This represents a huge business opportunity for new business models.
This report analyzes how sensor-based authentication may look like in the future, describes future scenarios and potential business ideas.

This report consists of three parts, one analyzing trends, one describing scenarios and one elaborating business ideas. First, the authors analyze trends regarding sensor-based authentication. Building upon these findings, four scenarios are described, vividly depicting possible futures. In the final Ideation part five business concepts are elaborated and tested against the scenarios.

The developed business concepts range from a product authentication solution against counterfeits, continuous multi-factor biometric authentication, a platform for the digital transfer of rights and permissions, a device detecting harmful food constituents to a solution for fragmenting traditional authentication.

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