

Walter Brenner · Falk Uebernickel
Editors

Design Thinking for Innovation

Research and Practice

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Design Thinking at University of St.Gallen



Design Thinking Course with Students from the MOK Master in the Design Thinking Loft at the University of St.Gallen



Annual Paper bike Rally at Stanford University



Marshmallow Tower—A Classic Warm-Up Exercise in Design Thinking



Students conducting a brainstorming outside of classic lecture halls

Preface

Decision Makers

Whether customers, managers, politicians, or judges, all face an increasingly complex world. This complexity is driven by fast technological development and dramatically increasing diversity in culture and lifestyles, which impacts policies and regulations. With an abundance of information and the human brain's limited capacities to digest this information, or even cope with the challenges of social networks, innovative forms of analytical thinking, strategy and product development, as well as teaching and learning are necessary.

Tangible forms of interactions and idea generation allow for creative and analytically sound solutions; this is the basic philosophy of Design Thinking. The University of St.Gallen is proud that this innovative form of teaching and learning was recognized and accepted by—among others—Prof. Dr. Walter Brenner and our Master of Business Innovation program. Because our university has a strong emphasis on new forms of teaching and learning, Design Thinking (and the establishment of a related) can be seen as one of different pilot initiatives in teaching innovation.

A basic element of universities is the combination of teaching and research. The design lab—like a behavioral lab or a trading room—is part of a modern university's infrastructure for economics, social sciences, law, and political science. These infrastructures can be intelligently used, not only in teaching programs but also for services like development work for industries. We see many perspectives for Design Thinking as an important element in our vision for 2020, in which our university wants to contribute to modern economic and social challenges by

becoming a center of thought leadership. We would like to thank the pioneers in Design Thinking at the University of St.Gallen, Prof. Dr. Walter Brenner and Falk Uebernickel.

January 2016

Thomas Bieger

Foreword

Design Thinking is one of the most fascinating concepts currently under discussion in management discourse: human-centered and based on new facilitation methods and spatial concepts. It is not surprising that Design Thinking emerged from Stanford University, in the heart of Silicon Valley; the success of many technology enterprises, as well as Internet giants, is rooted in the combination of technology and human-centeredness.

For us, the best example is Apple. The success of this company is—according to the biography of Steven Jobs by Isaacson¹—based on the combination of advanced information and communication technology (iPhone and iPad), new business models (iTunes), human-centeredness (minimalistic approach to design), and beauty (iMac G) demanded by Steve Jobs. With the combination of these four elements, Apple managed both to dispel the prejudice that information and communication technology is ugly and hard to use and to be a very successful and, at times, the most valued company of the world. Design Thinking has been utilized, to our knowledge, continuously for many years at Apple. The first Apple computer mouse was developed together with engineers from IDEO, a spin-off of Stanford University specialized in Design Thinking. With this background, it is now almost unanimously agreed that Design Thinking belongs in the curriculum of every leading technical university. Every engineer graduating from one of these leading universities will need to be proficient in Design Thinking. It would seem that contemporary, innovative product and service development is hardly conceivable now without some knowledge of Design Thinking.

In software development, Design Thinking is also increasingly used. Hasso Plattner, one of the founders of SAP, acknowledged the potential 10 years ago. He then initiated and financed the d.School at Stanford University and built a large area for Design Thinking at the Hasso-Plattner-Institute at the University of

¹ Isaacson, W (2011) *Steve Jobs*. Simon & Schuster, New York.

Potsdam. Based on concepts, knowledge, and experience from these ventures, he anchored Design Thinking as the central innovation method within SAP.

For years, Design Thinking has steadily gained influence in management. We at the Institute of Information Management at the University of St.Gallen believe ourselves to be, along with Roger Martin² from Rotman School of Management, pioneers in the application of Design Thinking in management. Since summer 2005, we have worked in close collaboration with Larry Leifer and Mark Cutkosky of the Center for Design Research³ at Stanford University's engineering department on the use of Design Thinking in innovation projects for new business models, processes, products, and services. Since then, we have conducted more than 40 projects and are part of a global network of universities applying Design Thinking. We have made Design Thinking an integral part of education at the University of St. Gallen⁴; as of January 2015, it seems that this success will continue. The rectorate of the university has decided to build a new lab dedicated to Design Thinking education, a decision hard to imagine when we started with Design Thinking almost 10 years ago. It is extraordinary how influential Design Thinking has become in research and management education. Through many discussions, we (at the Institute of Information Management) realized that we are not the only unit at the University of St.Gallen working with Design Thinking, which led us to organize this book. Our aim was to gather Design Thinking friends at the university and to invite colleagues from our partner universities (also working together with us on Design Thinking projects) to contribute to this book. We are delighted that most of the colleagues accepted our invitation and contributed. We would like to especially thank the president of our university, Thomas Bieger, who wrote the preface.

For us, it was clear from the beginning that we would not write a book about Design Thinking and innovation in information systems, although we both have a strong background in this field. When we planned this book, our idea—or goal—was to write a book about Design Thinking as a tool for innovation management. The astonishing result is that the final result is a management book with a focus on innovation management. This proves to us that Design Thinking, with its effective method and tool orientation,⁵ will play an important role in corporate management, innovation, and management education in the future.

The book is organized into three parts. **Part I** of this book contains an introduction from the editors, Walter Brenner and Falk Uebernickel. In this first contribution, with Thomas Abrell, we—as editors—describe our views on Design Thinking

² Martin, R (2009) *The Design of Business: Why Design Thinking is the next competitive advantage*. Harvard Business Press, Cambridge (MA).

³ <http://me.stanford.edu/research/labs-and-centers/center-design-research>

⁴ <http://dthsg.com/>

⁵ There is a second book from us about Design Thinking available with a strong focus on project management, methods, and tools in design thinking: Uebernickel, F., e.a., *Design Thinking: Das Handbuch* (2015): Frankfurter Allgemeine Buch.

and our experiences at the Institute of Information Management with Design Thinking in research and practices over the last 10 years.

Part II of this book presents contributions from research and teaching. We have been able to motivate essential “players” in Design Thinking at the University of St. Gallen and recruited partners—from other universities that have worked together with us for many years in Design Thinking—to submit a contribution.

Thomas Abrell, one of our doctoral candidates at the Institute of Information Management, works at Airbus. He was educated in Design Thinking at Aalto University in Helsinki and is researching Design Thinking and Corporate Entrepreneurship. In his contribution, he points out four promising areas of future research to connect Corporate Entrepreneurship (or Intrapreneurship) and Design Thinking. The first theme he depicts is Design Thinking and opportunity recognition/creation, a concept at the heart of Corporate Entrepreneurship, from which Corporate Entrepreneurship emerges. Secondly, Design Thinking and Effectuation are analyzed; clues emerge that the logic of entrepreneurial expertise—effectuation—and Design Thinking may have strong overlaps in Corporate Entrepreneurship. The third theme elaborates on the intersections of Design Thinking and Corporate Entrepreneurship strategy. The connections are, thus, in strategy-making and a design-influenced Corporate Entrepreneurship strategy that aims at refining elements of Design Thinking to help corporate entrepreneurs. The fourth theme is entrepreneurial design management, with a shift of perspective—instead of ways to support corporate entrepreneurs through Design Thinking, this chapter elaborates on entrepreneurial management principles to manage the design function within corporations.

In their contribution, **Pekka Berg and Jussi Pihlajamaa** from Aalto University, **Poul Kyvsgaard Hansen** from Aalborg University, and **Ade Mabogunje** from Stanford University concentrate on the front-end phase of innovation processes. In this early phase, central attributes of the final product are defined. The authors propose a balanced design front-end model (BDEFM) to help measure radical innovation processes. The model analyzes the early phase of innovation processes from five viewpoints: input, process, output (including impacts), social environment, and structural environment. With the help of three case studies from equipment manufacturing, metal industry, and the animal feed industry, the authors verify their model.

Amir Bonakdar and **Oliver Gassmann**, from the Institute of Technology Management at the University of St. Gallen, present the innovation of business models. Their most important assumptions are as follows: 90 % of all business models can be traced back to 55 core patterns; with the help of these core patterns, the innovation process for business models can be systematized. In their contribution, they define how the business model navigator process can be supported through the strengths of Design Thinking. They explain how, in the three steps “Design,” “Ideation,” and “Integration”, thinking styles and specific methods and tools from Design Thinking can be applied. With their contribution, Bonakdar and Gassmann show how specific methods and models that have been developed in Design Thinking can be selected and applied in different innovation contexts.

In their contribution, **Mateusz Dolata** and **Gerhard Schwabe**, from the University of Zurich, apply Design Thinking in information research projects. Their contribution arises from a perennial collaboration of the Institute of Information Management and the University of Zurich in Design Thinking education. The authors start with the assumption that Design Thinking and scientific work are not initially well connected and then prove the opposite. They show that Design Thinking—as overall mind-set as well as its specific methods—can make a significant contribution to strengthening research in information systems. Central focus is the creation of radical innovations to solve wicked problems. In addition, they show that Design Thinking makes an essential contribution to strengthen user orientation, for example, through applying ethnographic methods. In the second part, the two authors illustrate that Design Thinking is a practice-driven method often in conflict with established methods of research in information systems. An important insight from the contribution of Dolata and Schwabe is a very careful definition of the statement that “Design Thinking is a research method,” a topic repeatedly debated in discussions about Design Thinking.

Martin Eppler and **Sebastian Kernbach**, from the MCM Institute at the University of St.Gallen, deal with the visualization of results during a Design Thinking project. They describe dynagrams, which they define as dynamic graphic interactive thinking tools that can be used by members of a working group and result in a joint (often digital) solution space that takes the contributions of all participants into account. They specifically research three dynagrams: the Roper Dynagram, Confluence Dynagram, and Sankey Dynagram. Eppler and Kernbach show that the digital world and application of new methods like Design Thinking require new methods and tools. Within information management (a field where we belong as editors) and other disciplines we will face great challenges in the coming years; we must expand our “toolbox” (a topic we will further explain in our own contribution). Eppler and Kernbach go one step further by introducing concrete and partly digitally supported methods and tools.

Simon Grand, from the Institute for Systemic Management and Public Governance at the University of St.Gallen, connects Design Thinking with management and strategy. His basic assumption is derived from Peter Drucker: “. . .the best way to predict the future is to create it.” He sees Design Thinking as an essential component in an entrepreneurial understanding of strategy and summarizes his ideas in 10 practices: projecting, prototyping, evaluating, experimenting, routinizing, mobilizing, realizing, connecting, scaling, and curating. In the second part of his contribution, Grand demonstrates how these practices can be applied to the strategy process. He succeeds in showing that, through the consistent use of ideas and concepts from Design Thinking, new understanding of the strategy process and innovative processes of strategizing emerge.

Dietmar Grichnik, **Ronny Baierl**, and **Michael Faschingbauer**, from the Institute of Technology Management at the University of St.Gallen, illustrate the connection between entrepreneurship and Design Thinking. They draw from the

field of effectuation, concluding that there are comprehensible, documentable methods for entrepreneurship. Effectuation departs from the traditional understanding that entrepreneurs are unique personalities and entrepreneurship results from that. In their contribution, they depict, in fascinating detail, how uncertainty is confronted. They summarize principles of entrepreneurial action: future orientation, means orientation, affordable loss, contingencies, and partnership. Grichnik et al., Grand, and Abrell think in the same direction; they demonstrate that Design Thinking supports entrepreneurial thinking and action.

Claus D. Jacobs, from Berne University of Applied Sciences and the University of St.Gallen, introduces another principle of Design Thinking: the connection of head and hand that he describes as cultural-materialist approach. He aligns his thoughts closely with craftsmanship, which he defines as the “skill of making things right.” Like Grand, Jacobs builds a bridge between strategy and Design Thinking, but with different emphasis. Jacobs develops a strategy process using research from the field of design. He distinguishes between the following steps: formulating, representing, moving, bringing problems and solutions together, evaluating, and reflecting. He shows systematically how, in each of the seven steps, Design or Design Thinking can overcome limitations of traditional strategy-making processes and lead to a new strategy-making process.

Larry Leifer, from the Center for Design Research, one of the inventors of Design Thinking at Stanford University and **Alexander Neff** from the Institute of Information Management at the University of St.Gallen work with context dependency in Design Thinking and design research. The starting point for their contribution is a wave of research at Stanford University dealing with autonomous driving and driver experience. Leifer and Neff discuss “complex adaptive machine systems” in this context. Through six examples at the beginning of the article, they show how important context is for interpretation. Based on this, Leifer and Neff distinguish between three distinct forms of dialogue between robot (autonomous car) and driver: information dialogue, emotion dialogue, and knowledge dialogue. In the second part of their contribution, they define their research in the design research context.

Sven Reinecke, from the Institute of Marketing at the University of St.Gallen (who took a sabbatical at the Centre for Design Research at Stanford University), compares marketing and Design Thinking. In his introduction, he explains that marketing and Design Thinking cannot be reduced to one method; both approaches are more like overall (leadership) philosophies. With this argument, Reinecke is in line with many other contributors, including Brenner and Uebernickel and Abrell. The author works systematically through all steps of the Design Thinking process, depicting how it supports marketing management. During this process, he finds that traditional instruments of Design Thinking, like observation, prototyping, and testing with end customers, can expand the method and toolbox of marketing. However, Reinecke also shows that an orientation of marketing processes solely to the paradigms of Design Thinking may be an oversimplification. The author

concludes that an analysis of the competition should be institutionalized in the innovation process; that, in his opinion, is a weakness of Design Thinking.

Part III of this book contains three contributions showing Design Thinking from a practitioner's perspective. It was never the aim of this book to cover all facets of the application of Design Thinking in companies. Nevertheless, we would like to give a glimpse and build the bridge toward the application of Design Thinking—in practice—with these three contributions, which show how Design Thinking offers immediate practical value.

Xiao Ge and **Bettina Maisch**, from Siemens Corporate Technology in China, show how Siemens implemented Design Thinking in China. The i.DT program has two goals: it aims at educating future innovation leaders and strengthening innovation capability. This contribution shows how Design Thinking is adapted to Chinese culture, reflected, for example, in the naming of the project rooms for design teams “Tian Gong Guan,” which translates to “innovators’ heaven.” At the heart of this contribution are applications of Design Thinking in user-driven innovation. In their contribution, Ge and Maisch introduce the Design Thinking process applied at Siemens in China, as well as selected methods. They show that the Design Thinking process, as in the contributions of Brenner, Uebernickel, and Abrell, is applied at Siemens China with only minor changes. In conclusion, the authors show how important management support and a support ecosystem are for the successful implementation of Design Thinking in a large corporation.

Alexander Grots and **Isabel Creuznacher** discuss whether Design Thinking is a process, or leads toward a certain culture, from a practitioner's perspective. It should be noted that Alexander Grots was previously a partner at IDEO, one of the leading consultancy firms based on Design Thinking. Grots and Creuznacher, in line with other authors of this book, come to the conclusion that Design Thinking can be applied as both process and culture. In their contribution, they picture a Design Thinking innovation process compatible with other processes described in this book and describe elements of a Design Thinking culture.

Michael Shamiyeh, a well-known architect and generalist from the University of Linz, critically scrutinizes future orientation in innovation projects and Design Thinking. From a temporal perspective, Shamiyeh distinguishes three approaches to innovation: the past, present, and future as points of reference for innovation. The past is only briefly described. For the presence as point of reference, Shamiyeh chooses Nike + and the Apple sports kit as example. He shows (and this mirrors the experiences from many innovation projects) that, through discussions with real and potential customers, the potential for radical future-oriented solutions is limited. On the other hand, such solutions can actually be sold. For the future as a point of reference, he chooses the example of an engineer at Kodak, who invented the digital camera already in the mid-1970s. As history shows, Kodak did not profit from that. The author shows how important it is, on one hand, to look without restrictions into the future, and, on the other hand, he shows, realistically, that this is difficult and can be frustrating. The development phase of a dark-horse prototype, as described in the macro-process for Design Thinking by Brenner et al., can be seen as an attempt to sketch a “design from the future,” as Shamiyeh calls it.