DT4RE: Design Thinking for Requirements Engineering

A tutorial on human-centered and structured requirements elicitation

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I. Motivation and Objectives

Today's software-intensive development projects increasingly demand for agile and human-centered approaches to discover and satisfy the too often fuzzy needs of the various stakeholders involved. Design Thinking has emerged as one of the most prominent methods to address especially problems that are considered to be "wicked" by nature [6]. Instead of concentrating on technology solutions prematurely, Design Thinking is a means to support a deep immersion into the problem domain and understanding of the real-world problem. It provides a structured problem-solving approach that strongly builds upon the exploration of human needs, rapid (non-technical) prototyping, iterative improvement cycles, and interdisciplinary team work [1]–[5]. Design Thinking thus promises to enhance existing Requirements Engineering approaches by (1) adding a strong focus on the needs of users and customers, and (2) integrating an agile and flexible procedure for solving wicked and ill-defined problems, while (3) providing a guiding blueprint to foster creativity for development teams [3], [4]. The objective of this tutorial is to create an understanding about what Design Thinking is and how it can be integrated with existing Requirements Engineering practices. In tune with the conference's theme on crossing boundaries and increasing the impact, we will put emphasis on creating practical hands-on experiences for the participants to apply selected methods out of the interdisciplinary Design Thinking toolbox. Our aim is to focus on the practical and pragmatic use of the methods by showing concrete examples and practices from industry projects.

Academics (researchers and educators) and practitioners both equally benefit from the tutorial as we plan to introduce a balanced mix of basic concepts and practical hands-on examples to foster lively discussions on the potential and challenges in applying Design Thinking in the participants' own settings. In particular, real case studies from large, (mostly) European enterprises will showcase practices on how to utilize Design Thinking for Requirements Engineering and to integrate it with agile approaches like Scrum on a day-to-day basis

II. Format and Services

The tutorial is framed as a 3.5 hour hands-on exercise combined with a follow-up discussion. The tutorial format and agenda is as follows:

Time min	Program item	Description
15	Welcome and Introduction	Setting the frame for the tutorial and getting to know each other with a short Warm-Up
75	Foundations of Design Thinking & Reflection	Exercise to understand the full cycle of Design Thinking including a reflection on the learnings and takeaways.
30	***Break (with sufficient time for an exchange)***	
60	Integration of Design Thinking and RE - Case studies	Presentation and discussion of cases from large enterprises. Here, we will specifically focus on the integration of Design Thinking and Requirements Engineering based on practical examples and lessons learnt.
30	Final discussion	Summary of all learnings and Q&A
3.5h	**Total**	

In the first part of the tutorial, we address the basic steps of Design Thinking according to Stanford University's Design Thinking approach [8], adapted specifically for the

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Requirements Engineering community. There, we will conduct a short run-through of all steps of the Design Thinking process, including Problem Definition (understanding the problem statement as a team), Needfinding (collecting data through qualitative research), Synthesis (making sense of the collected data and defining opportunity areas), Ideation (generating ideas via creativity techniques), Prototyping (creating non-technical prototypes to make ideas tangible), and Testing (getting early feedback from users and stakeholders). Additionally, we teach selected tools and methods that are of high relevance for eliciting needs and requirements. In the second part, we show several project examples from different industries. Finally, we conclude with a Q&A session to provide enough space for individual questions and a fruitful joint discussion on the future of an integrated approach of Design Thinking and Requirements Engineering.

Complementary Material. For each methodological step in the tutorial, we will introduce actionable templates and worksheets that can be reused in later projects and that can be accessed online under https://www.dt4re.org [9].

III. Target Audience

This tutorial is focused on practical learnings, but also on discussing theoretical insights for the Requirements Engineering community; it is therefore suitable for academics and practitioners alike. Expected learnings are:

- to understand the philosophy and basic principles of Design Thinking (to think user-centric and deduct user needs, to accept failure to get to innovation, to think outside the box, to prototype products and services rapidly)
- to understand the relation to Requirements Engineering approaches typically aligned with the artefacts and activities dictated by the surrounding software development processes

IV. Presenters' Bios

The presenters combine practical experiences with academic background in Information Management, Design Thinking, and Requirements Engineering.

Jennifer Hehn is a researcher and PhD student at the University of St.Gallen (HSG). Her research addresses the area of digital innovation with a special focus on the intersection between Design Thinking and Requirements Engineering. Beforehand, from 2012 to 2017, she worked as Executive Director for Design Thinking at the Institute of Information Management at the University of St.Gallen (HSG) and lead the SUGAR program - a global Design Thinking alliance of around 20 universities around the globe with strong focus on Asia, North America, and Europe. In addition, she works as a project manager for ITMP, a spin-off of HSG, where she conducts Design Thinking projects and workshops (often combined with agile software development approaches), e.g., together with E.ON, Allianz SE, Merck, and Deutsche Bank.

Falk Uebernickel is professor at the University of St.Gallen for Business Administration and Business Innovation as well as founding partner of ITMP AG. He started his professional Design Thinking career with projects at Deutsche Bank in 2008. Furthermore, he teaches Design Thinking at masters level together with Stanford University and conducts executive lectures on Design Thinking. Until now, he worked on over 60 projects for companies like FIFA, Audi, Clariant, SAP, UBS, Deutsche Bank, RBS, Allianz, Merck, Telekom Austria Group, Swisscom, ThyssenKrupp, Airbus and many more.

Daniel Mendez is a senior lecturer for software & systems engineering at TUM (Germany) and director of the interdisciplinary junior research groups at the Centre Digitisation.Bavaria, Germany. His research is on empirical software engineering with a particular focus on interdisciplinary, qualitative research in Requirements Engineering and quality management. He has occupied several key positions in conferences of the empirical software engineering community. Currently, he serves as co-chair of the RE@Next! track at the International Requirements Engineering conference and as PC co-chair of the 12th International Symposium on Empirical Software Engineering and Measurement. He is further a member of the ACM, the IEEE Computer Society, and the German association of university professors and lecturers, and he serves as the University representative to ISERN, the International Empirical Software Engineering Research Network.

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