

## Syllabus

### Doctoral Course: Design Science Research

### Winter Semester 2023/2024

Lecturer: Alexander Maedche & Ulrich Gnewuch

#### Course Description

Information and communication technologies (ICT) have transformative impact on businesses and society. Organizations, individuals, and the entire society are challenged with the effective design, delivery, use, and impact of ICT. The information systems (IS) discipline addresses these challenges and investigates the phenomena that emerge when the technological and the social system interact (Lee, 2001).

Design science research (DSR) is a research paradigm that received growing attention in the last decade in the IS field. Design science research provides answers to questions relevant for real-world problems via scientifically grounded creation of innovative solutions. Design knowledge is about means-end relationships between problem- and solution spaces (Venable, 2006). DSR contributions can appear in very different forms, such as as the situated implementation of an artifact in the form of software instantiations, constructs, models, methods (Hevner et al., 2004) or a design theory (Gregor & Hevner, 2013).

#### Course Objectives

The course intends to introduce PhD students to the field of DSR in IS. It wants to provide insights into multiple perspectives of DSR, e.g., the theoretical foundation of DSR, the different contributions of DSR as well as methodologies and activities to conduct DSR. With this knowledge, students will be enabled to assess the rigor and relevance of DSR in general, but also be prepared to plan and execute their own DSR projects successfully.

#### Learning Objectives

- Understand DSR as a research paradigm and its positioning in the IS field
- Explore different types of knowledge and contributions delivered by DSR
- Understand generic and specific DSR processes
- Setup a small DSR project in a team effort and get hands-on method know-how in the major DSR activities of problem analysis, artifact creation and evaluation
- Know selected templates & tools that can support executing DSR projects
- Learn best practices for publishing DSR

The course will be complemented with group work. Specifically, the goal of the exercises is to analyze the problem, deliver a solution, and propose an evaluation concept for the UN Sustainable Development Goal 12 (<https://sustainabledevelopment.un.org/sdg12>) of responsible consumption and production. Specifically, we will focus on designing an artefact to support individuals in reducing food waste on the consumer side.

#### Course Requirements

The course is offered by the Institute of Information Systems and Marketing (IISM) at the Department of Economics and Management of KIT. It is primarily designed for doctoral students in the IS field. However, doctoral students from other disciplines (e.g., management, marketing, computer science) are also welcome.

#### Grading

Karlsruhe Institute of Technology (KIT)  
Kaiserstr. 12  
76131 Karlsruhe, Germany

President: Prof. Dr.-Ing. Holger Hanselka  
Vice Presidents: Prof. Dr. Oliver Kraft, Prof. Dr. Alexander Wanner,  
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IBAN: DE18 6005 0101 7495 5012 96

Each participating student is required to read a set of assigned papers in advance and watch the recorded lectures in advance. It is expected that a 1-page document is delivered in advance as a pre-assignment. Phd students are expected to contribute actively in the three sessions in the group work and the discussions of the content. Phd students work in randomly assignment teams, deliver three group deliverables for a joint DSR project and present their results to the class. Overall, the grading is composed of the individual pre-assignment (10%), the three group deliverables (80%), and individual participation (10%). Pls. upload the 1-page document by **November 21st 7 PM** and the three group presentations by **November 24th 7 PM** the latest on ILIAS.

### Registration and Organization

Please register via sending an email to Sabine Schneider ([sabine.schneider@kit.edu](mailto:sabine.schneider@kit.edu)) by **October 30th the latest**. All questions regarding content, organization, and certificates are answered by the lecturer Alexander Maedche ([alexander.maedche@kit.edu](mailto:alexander.maedche@kit.edu)).

### Course Materials

Course material is provided in the form of a recorded foundational lecture with the presentation slides and a list of pre-reading papers. Furthermore, each session is accompanied with a dedicated slide presentation that is shared with the students. The design research books by Hevner and Chatterjee (2010), Vaishnavi and Kuechler (2007) as well as the paper of vom Brocke, Hevner and Maedche (2020) represent a valuable addition to the class.

### Course Outline

The course is executed in a hybrid format. It consists of a self-preparation online session and three interactive sessions with group work.

Self-Preparation Session	Session 1 Problem Space	Session 2 Solution Space	Session 3 Evaluation & Write Up
Pre-Readings (Papers)	Intro Lecture	Intro Lecture	Intro Lecture
Lecture Foundations of DSR (Recording)	Intro Group Work	Group Work	Group Work
Pre-Assignment (Document)	Group Work	Group presentations	Group presentations
	Group presentations	Reflection	Reflection
	Reflection		Course Reflection

Session	Time	Description	Deliverables
<b>Self-Preparation Session</b>	Nov 1st – Nov 20th	<ul style="list-style-type: none"> <li>- Pre-Readings</li> <li>- Recorded Lecture "Foundations of DSR"</li> </ul>	<ul style="list-style-type: none"> <li>- Pre-Assignment Deliverable (1 page document summarizing pre-readings and recorded lecture)</li> </ul>

<b>Session 1 – Problem Space</b>	Nov 21st, 9 – 12.30	<ul style="list-style-type: none"> <li>- Online Lecture</li> <li>- Introduction to Group Work</li> <li>- Group Work</li> <li>- Group Presentations</li> <li>- Reflection</li> </ul>	- Group Presentation Deliverable (pdf document)
<b>Session 2 – Solution Space</b>	Nov 23rd, 9 – 12.30	<ul style="list-style-type: none"> <li>- Online Lecture</li> <li>- Group Work</li> <li>- Group Presentations</li> <li>- Reflection</li> </ul>	- Group Presentation Deliverable (pdf document)
<b>Session 3 – Evaluation &amp; Write Up</b>	Nov 24th, 9 – 12.30	<ul style="list-style-type: none"> <li>- Online Lecture</li> <li>- Group Work</li> <li>- Group Presentations</li> <li>- Reflection</li> <li>- Summary &amp; Recap</li> </ul>	- Group Presentation Deliverable (pdf document)

### References

- vom Brocke, J., Hevner, A.R., and Maedche, A. (2020). Design Science Research. Cases. Springer International Publishing.
- Gregor, S., & Hevner, A. R. (2013). Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly*, 37(2).
- Hevner, A. and Chatterjee S. (2010). Design Research in Information Systems (Integrated Series in Information Systems), Springer, New York.
- Lee, A. S. (2001). Editorial, *MIS Quarterly*, 25(1), pp. iii–vii.
- Vaishnavi, V.K. and Kuechler, W. Jr. (2007). Design Science Research Methods and Patterns: Innovating Information and Communication Technology, Auerbach Pubn.
- Venable, J. R. (2006). The Role of Theory and Theorising in Design Science Research. In DESRIST 2006 Proceedings.

### Pre-Readings

1. Hevner, A R., March, S. T., Park, J., and Ram, S. (2004). Design Science in Information Systems Research. *MIS Quarterly*, 28(1), 75-105.
2. Gregor, S., & Jones, D. (2007). The anatomy of a design theory. *Journal of the Association for Information Systems*, 8(5), 1.
3. Kuechler, B., & Vaishnavi, V. (2008). On theory development in design science research: anatomy of a research project. *European Journal of Information Systems*, 17(5), 489-504.
4. Gregor, S., & Hevner, A. R. (2013). Positioning and presenting design science research for maximum impact. *MIS quarterly*, 337-355.
5. Venable, J., Pries-Heje, J., & Baskerville, R. (2016). FEDS: a framework for evaluation in design science research. *European journal of information systems*, 25(1), 77-89.
6. vom Brocke, J., Winter, R., Hevner, A., and Maedche, A. (2020). Special Issue Editorial – Accumulation and Evolution of Design Knowledge in Design Science Research: A Journey Through Time and Space. *Journal of the Association for Information Systems* (2020) 21(3), 520-544
7. vom Brocke, J., Hevner, A.R., and Maedche, A. (2020). Introduction to Design Science Research. In: Design Science Research. Cases. Springer International Publishing.