Discipline: Design Science (cross-domain)

1 Language

English

2 Title

Design Science

3 Lecturer

Prof. Dr. Jan vom Brocke, University of Liechtenstein,
https://www.uni.li/jan.vom.brocke?set_language=de
https://www.researchgate.net/profile/Jan_vom_Brocke

Prof. Dr. Robert Winter, University of St. Gallen,
https://www.alexandria.unisg.ch/persons/621
https://www.researchgate.net/profile/Robert_Winter

4 Date and Location

DIGITAL COURSE:

- OFFLINE: ca. ten days for reading, preparation, decentral group work
- ONLINE: two full days and three half days between April 26 – May 7, 2021

5 Course Description

5.1 Abstract and Learning Objectives

Design Science Research (DSR) is a promising research paradigm that intends to generate knowledge on the design of innovative solutions to real-world problems. As such, DSR is specifically useful in contributing to the solution of societally and practically relevant challenges. At the same time, matured methodological foundations are available today, specifically supporting publishing DSR research both at conferences and top-tier journals.

This course gives an introduction to Design Science Research (DSR). It focuses on planning and conducting design science research on Ph.D. level. It is intended to provide state-of-the art methodological competences for all Ph.D. students in business whose research is not solely descriptive/explanatory, but also comprises components where artefacts are purposefully designed and evaluated.

While Design Science Research is very common in Information Systems research, purposeful artefact design and evaluation are found in many other business research fields like, e.g., General Management, Operations Management/Management Science, Accounting/Controlling, Business Education, or Marketing. Although Design Science is often conducted implicitly, the methodological discourse in the

Information Systems has led to a high level of reflection and to the availability of a large number of reference publications and cases, so that examples and cases will often originate from this domain. It should however be noted that Design Science as a paradigm is applicable and is used in nearly all fields of business research. As a consequence, this class is not only part of the Information Systems ProDok curriculum, but intentionally being positioned as cross-domain class.

The goal of the course is to provide Ph.D. students with insights and capabilities that enable them to plan and conduct independent Design Science research. To achieve this goal, students will engage in a number of activities in preparation and during this four-day course, including preparatory readings, lectures, presentations, project work, and in-class discussions. The course format offers an interactive learning experience and the unique opportunity to obtain individualized feedback from leading IS researchers as well as develop preliminary research designs for their own Ph.D. projects.

5.2 Content

Offline pre-class preparation:

Preparatory study of essential Design Science methodology papers by students. Core topics are Design Science as a paradigm (vs. other research paradigms), design process, design theory, problem analysis and requirements specification, artefact evaluation, and particularities of specific artefact types such as reference processes and methods.

Online course components:

(1) Introduction by faculty

(2) Presentation of reading assignments by students, discussion of methodological insights and implications

(3) Faculty-coached definition of individual (or group) design projects, design of research plans, presentation and discussion of research plans. Depending on the maturity level of Ph.D. students dissertation projects, design projects could be the design component of their dissertation or a specific sub-project/paper of their dissertation.

Between the in-class online components, individual (or group) design projects are developed and extended / revised in offline course components.

5.3 Schedule / Course format

Online Schedule

25. Apr – Sunday	- Finishing and uploading preparatory work	**Self-Study**
26. Apr – Monday **FULL DAY**	- Welcome session (2 hrs) - Introduction to DSR (2 hrs) - Reading assignment presentations I (2 hrs) - Cases market place (1 hr)	**ONLINE**
27. April – Tuesday	- Group work round I (cases)	
28. Apr – Wednesday **HALF DAY** (afternoon)	- Morning: group work round I (cases) - Cases discussion and feedback round I (1.5 hrs) - Reading assignment presentations II (2 hrs)	**Self-Study** **ONLINE**
29. Apr. – Thursday	- Group work round II (cases)	**Self-Study**
3. May – Monday **FULL DAY**	- Reading assignment presentations III (2 hrs) - Cases discussions and feedback round II (4 hrs) - Reading assignment presentations IV (1 hr)	**ONLINE**
4. May – Tuesday	- Group work round III	**Self-Study**
5. May – Wednesday **HALF DAY** (morning)	- Cases discussions and feedback round III (4 hrs)	**ONLINE**
6. May – Thursday	- Group work round IV	**Self-Study**
7. May – Friday **HALF DAY** (afternoon)	- Final Presentations (2 hrs) - Follow-ups/publications (1 hr)	**ONLINE**

6 Preparation and Literature

6.1 Prerequisites

The course is intended for Ph.D. students in business whose dissertation project includes to purposefully design and evaluate an artefact – such as a conceptual model, a taxonomy/classification, a procedure/process, metrics, an information model, guidelines/principles, a reference architectures, etc.

Students should have a preliminary idea about their design research problem and research questions, about who the stakeholders of their artefact(s) are and what requirements they have, and about their sources of data.

6.2 Essential or Recommended Reading Material

All participants are expected to get familiar with the following articles:

- Hevner AR, March ST, Park J, Ram S. (2004) Design Science in Information Systems Research. MIS Quarterly 28(1):75–105.
- Peffers K, Tuunanen T, Rothenberger MA, Chatterjee S. (2007) A Design Science Research Methodology for Information Systems Research. Journal of Management Information Systems 24(3):45–77.
- vom Brocke J and Maedche A (2019), The DSR Grid: Six Core Dimensions for Effectively Planning and Communicating Design Science Research Projects, in: Electronic Markets, forthcoming (open access: https://www.researchgate.net/publication/334207863_The_DSR_Grid_Six_Core_Dimensions_for_Effectively_Planning_and_Communicating_Design_Science_Research_Projects).
- vom Brocke J, Winter R, Hevner A and Maedche A. (2020), Accumulation and Evolution of Design Knowledge in Design Science Research – A Journey Through Time and Space, in: Journals of the Association for Information Systems (JAIS), forthcoming (open access: https://www.researchgate.net/publication/336568065_Accumulation_and_Evolution_of_Design_Knowledge_in_Design_Science_Research_-_A_Journey_Through_Time_and_Space).
- Winter R (2008) Design science research in Europe. European Journal of Information Systems. 17:470–5.
- Winter R and Aier S (2016) Design Science Research in Business Innovation. In: Business Innovation: Das St. Galler Modell, Editors: Hoffmann C, Lennerts S, Schmitz C, Stölzle W, Uebernickel F, Wiesbaden: 475-498.

From the following list of methodological papers, one paper (and two additional “applied” design papers) will be assigned to each participant to read, discuss and present:

- Avdiji, H. and R. Winter (2019). Knowledge Gaps in Design Science Research. Proceedings of the 40th International Conference on Information Systems, Munich, Germany.
- Baskerville RL and Pries-Heje J (2010) Explanatory Design Theory. Business & Information Systems Engineering 2(5), 271-282.
- Braun C, Wortmann F, Hafner M and Winter R (2005) Method Construction – A Core Approach to Organizational Engineering. in Applied Computing - Proceedings of the 2005 ACM Symposium on Applied Computing, (New York, NY, USA, 2005), ACM Press, 1295-1299.
- Brinkkemper S (1996) Method engineering: engineering of information systems development methods and tools. Information and Software Technology 38, 275-280.
- Gregor S, Chandra Kruse L and Seidel S (2020): The Anatomy of a Design Principle. Journal of the Association for Information Systems, Forthcoming.
- Gregor S and Hevner AR (2013) Positioning and Presenting Design Science Research for Maximum Impact. MIS Quarterly 37, (2013) 337-355.

- Gregor S and Jones D (2007) The Anatomy of a Design Theory. Journal Of The Association For Information Systems 8(5), 312-335.
- Gregory RW and Muntermann J (2014). "Heuristic Theorizing: Proactively Generating Design Theories." Information Systems Research 25(3): 639-653.
- Nickerson R, Varshney U and Muntermann J (2013) A method for taxonomy development and its application in information systems, European Journal of Informatino Systems 22, 336.
- Niehaves B, Ortbach K (2016) The inner and the outer model in explanatory design theory: the case of designing electronic feedback systems, in: European Journal Of Information Systems 25, 303-316.
- Prat N, Comyn-Wattiau I, Akoka J (2015) Taxonomy of evaluation methods, Journal of Management Information Systems 32(3), 229-267.
- Recker J, Rosemann M, van der Aalst W, Jansen-Vullers M and Dreiling A (2007) Configurable Reference Modeling Languages. In: Reference Modeling for Business Systems Analysis. Editors: P. Fettke and P. Loos, Hershey PA: IDEA Group, 22-46.
- Sein MK, Henfridsson O, Purao S, Rossi M, Lindgren R (2011) Action design research, MIS quarterly 35(1), 37-56.Venable J, Pries-Heje J, Baskerville R. FEDS: A Framework for Evaluation in Design Science Research. European Journal of Information Systems. 2016;25(1):77–89.
- Sonnenberg C and vom Brocke J (2012) Evaluations in the Science of the Artificial - Reconsidering the Build-Evaluate Pattern in Design Science Research. In Peffers K, Rothenberger M & Kuechler B (Eds.), Design Science Research in Information Systems. Advances in Theory and Practice. Proceedings of the 7th DESRIST Conference, Springer LNCS Vol. 7286, 381-397.
- Templier, M. and G. Paré (2015). "A Framework for Guiding and Evaluating Literature Reviews." Communications Of The AIS 37: Article 6.
- van Aken JE (2004) Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules. Journal of Management Studies 41(2):219–46.
- Venable JR (2006) The Role of Theory and Theorising in Design Science Research. Proceedings of the First International Conference on Design Science Research in Information Systems and Technologies (DESRIST), Claremont, CA.
- Venable JR, Pries-Heje J and Baskerville RL (2016) FEDS: a framework for evaluation in design science research. European Journal of Information Systems 25(1), 77-89.
- vom Brocke J (2007): Design Principles for Reference Models. Reusing Information Models by Aggregation, Specialisation, Instantiation, and Analogy. In: Reference Modeling for Business Systems Analysis, Editors: P. Fettke and P. Loos, Hershey PA: 47-75.
- vom Brocke J, Simons A, Niehaves B, Riemer K, Plattfaut R and Cleven A (2009). Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. 17th European Conference on Information Systems (ECIS 2009), Verona, Italy. AIS electronic library.

6.3 To prepare

Each student is expected to read assigned methodological papers, prepare a 10-minute presentation of his/her reading assignment in class and analyze two artefact design papers.

Each student is expected to, usually in a group, actively elaborate a design research mini-project according to certain presented criteria. For this design project, several walkthrough and a final presentation (max 20 minutes, focus on motivation and problem analysis, research design including evaluation, and expected contributions to the scientific knowledge base) need to be prepared in class.

All students need to participate in all classroom discussions. Good participation includes asking insightful questions, raising original ideas, and making constructive comments.

7 Administration

7.1 Max. number of participants

Due to the interactive character and Ph.D. project work, not more than twenty students should attend.

7.2 Assignments

See section 6.

7.3 Exam

If grading is requested by a participant, grading will be based on

- performance of reading assignment presentation (25%)
- performance of design project (75%)
- active participation in class

Upon successful participation, an individual certification with or without grades will be produced by VHB according to participant preferences.

7.4 Credits

The class will create an estimated overall workload of 150-180 hours, corresponding to 6 ECTS.

8 Working hours

Working Hours	Hours
Preparatory assignments (general reading, specific reading assignment & preparation of presentation) Participation in class Preparation for final presentation topics Group & individual work for final presentation	100 30 15 35
Total	**180 h**
ECTS: 6	