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Presentation of Design Science Research in Information Systems and Engineering Disciplines - Empirical Investigation of Common Structures and Differences

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Abstract

Design Science Research is a research paradigm suitable for application-oriented disciplines that develop (construct) artifacts as solutions to practical problems. Design Science Research is known to be a mainstream research paradigm in engineering and other disciplines. In recent years, Design Science Research (DSR) has become an established research approach in the field of Information Systems (IS). Nevertheless, there is an ongoing debate about the methodology and guidelines for Design Science Research in Information Systems (IS-DSR). This paper proposes to gather and leverage insights from other design disciplines, such as engineering, to provide clarity and inspiration for IS-DSR and to work towards a common understanding of design science research across disciplines.

This paper presents results of an initial empirical analysis of research literature from engineering disciplines. It adopts the V-model of DSR as a research lens for the analysis. It has found that disciplines differ in what they consider as most important to report in a DSR paper, and that other disciplines can provide input for the further development of IS-DSR. In addition, the paper examines whether and to what extent DSR papers share a common underlying publication scheme, analogous to the standard IMRaD scheme for empirical research.

Keywords: Design Science Research, Scientific Writing, V-model, Research Guidelines, Design Science Research in Information Systems

1. Introduction

Design Science Research is a research paradigm suitable for application-oriented disciplines that develop (construct) artifacts as solutions for practical problems. It has become an established research approach in the field of Information Systems (IS). Its value is that it promotes both relevance and scientific rigor in constructive research and helps ensure that papers on constructive IS research are accepted for publication in journals and at conferences (Gregor & Hevner, 2013).

Concepts and methods of DSR have been and continue to be intensively studied and discussed in information systems. Literature reviews have shown that in samples of publications on Design Science Research in Information Systems (IS-DSR), almost 50% of the contributions are concerned with the methodology, while in the other half of the contributions the methodology was applied (Dwivedi et al., 2014). At HICSS55, a quarter of the papers titled Design Science Research dealt with methodology[1]. The research, discussions, and their results are labeled "Design Science Research in Information Systems" (IS-DSR), making it clear that they originate from that discipline.

Disciplines such as Software Engineering (Engström et al., 2020; Knauss, 2021), Operations Management and Industrial Engineering (Dresch et al., 2015; Goecks et al., 2021; Holmström et al., 2009; van Aken et al., 2016) also adopt the methodology of DSR. Education Sciences term the approach as Design Based Research (DBR) (Herzberg, 2022; Reinmann, 2017). Yet, there is less discussion of DSR as a methodology in these fields (Engström et al., 2020; Oppl et al., 2022) than within Information Systems.

The research and discussions on IS-DSR have resulted in a body of guidelines and recommendations on how to conduct DSR and how to present and publish

[1] `scholarspace.manoa.hawaii.edu/browse/subject?scope=32d42543-f8b4-45fb-8c50-11a42cb8fe9a&value=design%20science%20research`

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it, e.g., (Gregor & Hevner, 2013; Hevner et al., 2004; Peffers et al., 2007). As Engel et al. (2019) show, (Hevner et al., 2004; Peffers et al., 2007) are dominant as methodological foundation of IS publications.

The guidelines and recommendations have proven valuable and useful in promoting and advancing DSR in Informations Systems and related fields. However, there is also some debate regarding the status of these guidelines (Dwivedi et al., 2014; Holtkamp et al., 2019; Järvinen, 2021). Are these necessary conditions, without which valid research cannot succeed, or should they rather be seen as recommendations that researchers can use as they see fit (leaving aside the practical, but not scientific, question of whether they are required and checked for by journal editors or peer reviewers)? Some parts of guidelines and recommendations are contradictory, e.g., (van Aken et al., 2016) and (Hevner et al., 2004) differ on the significance of the development process for the validity of a Design Science Research project. Furthermore, empirical research has found that the presentation of actual IS-DSR in publications can differ from what the guidelines prescribe (Dwivedi et al., 2014). Nonetheless, we can assume that the continuing discussion on and definition of guidelines for DSR methodology and presentation in IS has influenced and shaped the body of IS-DSR publications (Tremblay et al., 2018).

It is widely accepted that DSR is mainstream research in engineering disciplines (Dresch et al., 2015, p. 5; Peffers et al., 2007, p. 47). Obviously, these disciplines produce results that are extremely successful in practice. This paper reviews publications in engineering disciplines in order to answer the following research questions:

- How do engineering disciplines present Design Science Research in publications?
- Where do they adhere to or differ from IS-DSR publications and guidelines?
- What can we learn from them for IS-DSR?

Design Science Research is a research paradigm, as is empirical research. While IMRaD (Wu, 2011) is the standard scheme for papers presenting empirical research, a corresponding standard scheme for DSR has not yet been established. The review also addresses the research question

- Can we observe a common scheme analoguous to IMRaD for Design Science Research?

To this end, publications from engineering conferences are reviewed. This study does not seek to discuss or comment on whether publications or the research and results contained therein can be considered ”real science.” The study merely observes and reports on what other disciplines consider worthy of publication.

The study uses the V-model of DSR as an analytical framework. Originally inspired by efforts to help students apply the DSR approach to thesis writing (Weber, 2022), the DSR V-model has iteratively evolved into a finely structured and operational framework for writing and analyzing DSR publications.

The paper is organized as follows. The following Section 2 presents the V-model of DSR and explains how publications from engineering conferences were sampled and reviewed. Subsection 2.3 places results from IS-DSR literature studies into the V-model, for further clarification of the V-model and for comparison with the results obtained in this study. Section 3 presents results of the reviews that were conducted in this study. Section 4 discusses the contributions of this work and Section 5 concludes.

2. Method

2.1. Design Science Research V-model as an analytical framework of the research

The core of DSR is to develop a useful artifact that provides a solution to a practical problem, thereby contributing to scientific knowledge. Design Science Research thus comprises activities on three levels, the scientific level, domain level, and technical level. These levels of DSR and corresponding activities are depicted as a V-model of DSR in figure 1.

The V-model of DSR gives a fine-grained overview over typical research activities of a DSR project that may be elaborated on in a DSR publication. The V-model of DSR extends and refines the activities of DSR projects as in (Gregor & Hevner, 2013; Peffers et al., 2007). Similar to the process model of (Peffers et al., 2007), the V-model does not intend to visualize the actual, cyclic process of a DSR project in chronological order, but its underlying logic as follows.

The domain poses the practical problem and the objectives from which the specific criteria of usefulness in the given context derive. Activities on the domain level are describing problem and its context (D1), defining the concept of usefulness in the given problem context by quantitative and/or qualitative criteria (D2), and evaluating the usefulness of the artifact against these criteria (D3).

The technical level deals with the design of the artifact. The term ”technical level” is to be broadly understood, encompassing techniques, skills, methods, prior knowledge, etc., required to develop and/or

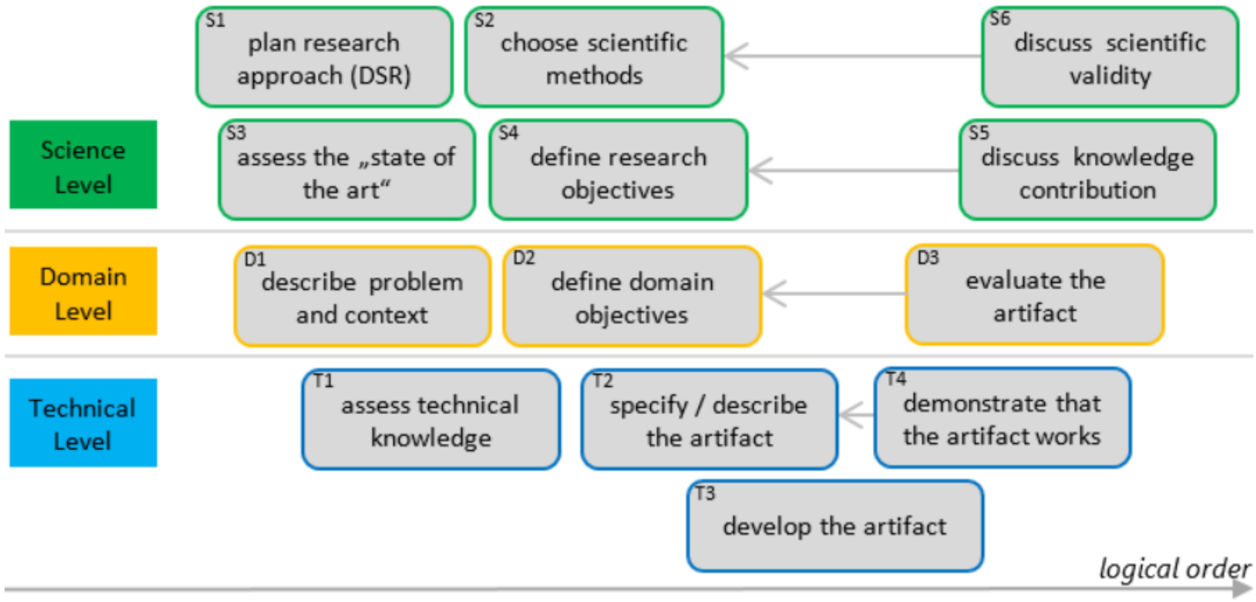

Figure 1. V-model of Design Science Research
(by the author)

implement the artifact. The artifact may have a tangible or intangible abstract form. Technical-level activities are the explication of prior knowledge used in the development of the artifact (T1), the specification/description of the artifact (T2), the development of the artifact (T3), and a demonstration that the described artifact actually works (T4) (Gregor & Hevner, 2013; Peffers et al., 2007).

The contribution of valid and novel knowledge is situated on the scientific level. Activities on the scientific level are assessing the current state of knowledge in the field of the research (S3), explicating scientific objectives, e.g., in the form of research questions (S4), and elaborating and discussing the scientific contributions of the research (S5). The scientific level is also concerned with scientific rigor. The research approach, which here is Design Science Research (S1), and the scientific methods can be explicated (S2) and the scientific validity, limitations and weaknesses of the research can be discussed (S6).

The left-hand branch of the V-model holds activities that provide information and define objectives. The right-hand branch holds evaluating activities. The process of development of the artifact is depicted at the bottom of the V-model.

Typically, a DSR publication will provide explicit information only on some of these activities or their outcomes. This will be investigated in this study.

2.2. Results from empirical analyses of IS-DSR publications

Various authors report results from empirical analyses of IS-DSR publications that provide insights into IS-DSR methodology as reflected in publications.

Hoang Thuan et al. (2019) tackle research questions in IS-DSR. Analysis of 104 different types of publications (Conference papers, MISQ papers, and Dissertations) revealed that less than two thirds of the publications declared as DSR had formulated one or more explicit research questions . This result falls into the activity "define research objectives" (S4) of the V-model.

Sturm and Sunyaev (2019) have analyzed the use of prior knowledge reported in DSR publications. They found that most often, knowledge informs the design of artifacts, and to a lesser extend it informs the definition of meta requirements, design principles or theory building . Their result falls into the activity "assess technical knowledge" (T1) of the V-model.

The study of zur Heiden (2020) analyzes the specification of context and design implications in DSR papers from leading IS journals. It concludes that both are generally underspecified, which limits the potential for generalizing findings in IS-DSR. In terms of the V-model, this study concerns the activity "describing problem and its context" (D1).

Larsen et al. (2020) have analyzed how IS-DSR papers assess the validity of their research. They found that 85% use criterion measures while 10% explain internal design validity , that is “The extent to which the internal components of an IT artifact are consistent, transparent, and explainable” (Larsen et al., 2020). Their results concern the activity ”evaluate the artifact” (D3) of the V-model.

A less recent study by Dwivedi et al. (2014) found that more than half (57%) of the papers reporting application of DSR do not explicate their knowledge contributions . Their results concern the activity ”discuss knowledge contribution” (S5) of the V-model. They also observed a lack of validation on the scientific level, that is, in activity ”discuss scientific validity” (S6) of the V-model.

2.3. Sampling and review of DSR papers from engineering disciplines

In order to address the research questions, a systematic literature review (vom Brocke et al., 2015) of papers from conference proceedings is conducted. The conferences are

- 2020 IEEE International Conference on Robotics and Automation (ICRA)
- 2020 IEEE/ACM 42nd International Conference on Software Engineering (ICSE)
- 2020 IEEE International Symposium on Systems Engineering (ISSE)

These are IEEE conferences in technical and engineering disciplines with contributions from international authors. The 25 papers with the highest citation frequency were selected from each conference volume. All papers presenting any type of artifact were considered DSR. The other papers were excluded from the sample. Table1 gives an overview over the samples. The detailed lists of sample papers are available on `github.com/weberi/hicss56`.

The reviews aimed to determine whether selected components of the DSR V-model were present in the papers. All reviews were conducted by the author who is not an expert in any of the fields of these conferences. Each paper was read as intensively as necessary to determine the components or lack thereof. The selected components are:

- explicit research questions (S4)
- explicitely stated knowledge contributions (S5)
- description of the artifact (T2)
- description of how the artifact was developed (T3)
- development process presented as search (T3)
- demonstration that the artifact works (T4)
- evaluation of how good the artifact serves its purpose (D3)
- evaluation of scientific validity (S6)

Table 1. Samples (as on 2022, Jun 12 - 14)

	ICRA	ICSE	ISSE
DSR papers out of 25	24	14	18
with authors from industry	11	2	4
min. author count	2	2	1
max. author count	12	10	8
max. citation frequency	65	13	5
min. citation frequency	18	0	0

Designing artifacts as solutions for practical problems is recursive. Consider a research paper that describes a method and an artifact that it has developed by applying this method, e.g., an algorithm for constructing a neural network and the neural network it constructs to serve a given purpose. Such a research paper permits two distinct interpretations. One interpretation considers the neural network as the contributed artifact and the algorithm as its development process, which in essence is a precise theory of how to develop this kind of artifact. A second interpretation sees the algorithm as the artifact, and the work may not contain any information about how the algorithm was developed. The analysis performed here follows the logic of the second interpretation.

3. Results

The results of the reviews are summarized in table 2. The remainder of this section discusses selected aspects of the results in more detail, in particular, the activities ”develop the artifact” (T3) and ”discuss scientific validity” (S6) of the V-model of DSR in figure 1.

3.1. Concern for scientific validity

An interesting finding is, that the reviewed paper from the ICSE sample show strong concern for scientific validity. All of the DSR papers in the sample evaluate the artifact on the domain level (D3) and discuss the validity of the evaluation results on the scientific level (S6), often in a dedicated section ”Threats to Validity”.

According to Broniatowski and Tucker (2017), it is common in engineering to think of a design as a causal theory that expresses the expectation that a designed artifact will produce an intended effect. The purpose

Table 2. Summary of results

	ICRA	ICSE	ISSE
DSR papers in total	24	14	18
explicit research questions (S4)	2	8	1
explicitely stated knowledge contributions (S5)	17	13	7
description of the artifact (T2)	24	14	18
description of how the artifact was developed (T3)	3	6	5
development process presented as search (T3)	9	2	5
demonstration that the artifact works (T4)	19	6	7
evaluation of the artifact (D3)	23	14	9
evaluation of scientific validity (S6)	8	11	2

of the evaluation is gathering evidence on whether the causal relationship holds. Papers discuss up to three types of validity separately: construct validity, internal validity, and external validity.

Construct validity refers to the validity of evaluation methods. It is high if it measures the intended criteria. While measuring, for example, the execution time of a program is straightforward, measuring effects in complex contexts with "wicked problems" (Hevner & Chatterjee, 2010) is more prone to error, and therefore, attention should be paid to construct validity. *External validity* addresses generalizability. It questions whether the effects measured in the evaluation environment carry over to other environments. *Internal validity* is about whether the evaluation method is able to capture effects caused by the design being evaluated or whether it is susceptible to reflecting other, unnoticed factors or biases.

Eight of the eleven DSR papers in the ICSE sample discuss construct validity, internal validity, and external validity, three papers discuss internal and external validity, and two papers discuss external validity only. Three papers give no discussion of scientific validity . Two papers from the ICRA sample and two papers from the ISSE sample address the issue of generalizability, with the latter two merely pointing to future research. Compared to ICSE, current IS-DSR pays less attention to the scientific validity of its evaluation activities. While van Aken et al. (2016) and Venable (2013) emphasize that evaluation is crucial in design research, its lack in publications is noted by Dwivedi et al. (2014) and it remains outside the scope of recent research on design science validities (Larsen et al., 2020).

3.2. Describing the development process and design as search

Guidelines on conducting and publishing DSR in Information Systems typically advise presenting the development of the design as a search (Gregor & Hevner, 2013; Hevner et al., 2004; Peffers et al., 2007).

As some authors make clear (van Aken et al., 2016), a certain procedure of designing cannot guarantee that the design thus derived will be superior in terms of utility and problem-solving quality than competing solutions. Nevertheless, presenting the design process as iterating improvements may help instill confidence in the quality of the design (Gregor & Hevner, 2013).

Similarly, Gregor and Hevner (2013) advise explaining the research approach (S1 of the DSR V-model). As Design Science is mainstream in Engineering disciplines, there should be no need for explaining the approach. Just one paper, from the ISSE sample, stated its research approach and methods, namely, Design Research Methodology as in (Blessing & Chakrabarti, 2009).

As the line "description of how the artifact was developed (T3)" in table 2 shows, a quarter of the papers studied provide a description of their development process. A few more papers signal that the development process is iterative or involves searching by indicating design options (6, 1, and 3 papers in the ICRA, ICSE, and ISSE samples, respectively) or plans to improve a design through further research (3, 0, and 3 papers in the ICRA, ICSE, and ISSE samples, respectively). One ISSE paper and one ICSE paper explicate an iterative design process. Two of the ICRA papers report conducting ablation studies, which are a systematic search for an optimal network architecture in the context of machine learning.

3.3. Structure of DSR Papers

IMRaD is the standard scheme for publishing empirical research (Wu, 2011). IMRaD stands for Introduction-Method-Results-and-Discussion. Many papers on empirical research adhere strictly to this scheme and even choose their section titles accordingly. Other publications divide their content into more sections or vary the order of their sections, but still provide the information required by the IMRaD scheme of (Wu, 2011). A uniform scheme for DSR publications has not yet been established. Even some of the DSR papers examined adhere to IMRaD and present their artifact as a method for answering their research questions. This paper investigates whether and to what extent DSR papers share a common underlying publication scheme.

Introductory and Discussion parts of DSR publications correspond in content to those of IMRaD papers. Typically, a DSR paper describes an artifact and may report on development, demonstration, and evaluation of this artifact.

To answer the research question regarding a common scheme for DSR publications, the review assessed which of the development, description, demonstration, evaluation parts were present in the reviewed papers, and the order of these parts. Table 3 summarizes the results over all samples.

Table 3. Occurences of schemes in papers

scheme	frequency	
Demo-Desc-Eval	2	4%
Desc	2	4%
Desc-Demo	6	11%
Desc-Demo-Eval	1	2%
Desc-Eval	39	70%
Devel-Desc	1	2%
Devel-Desc-Demo	1	2%
Devel-Desc-Eval	2	4%
Devel-Eval-Desc	1	2%
Eval-Desc	1	2%
	56	100%

Several papers include images or in one case a link to a video showing that the artifact actually works. Other papers apply their artifact to real or simulated data or environments for the purpose of evaluation, thereby demonstrating that it works. In these papers, the demonstration part is often very short and intermingled with the evaluation part, making it difficult to discern any particular order. In table 3, these papers are counted as Desc-Eval, while table 2 counts these papers as having a demonstration. One paper that provides a data set for experiments and one very short paper contain neither a demonstration nor an evaluation of their artifact. Two papers that have the Demo-Desc-Eval pattern use the demonstration as a motivating example. Note that the criteria for meeting T3 in table 2 are different and less strict than qualifying for one of the ”Devel-. . . ” schemes in table 3, which count only papers with a more detailed description of the development process.

The reviews show the majority of the papers are structured according to the scheme introduction-description-evaluation-discussion.
The reviews also show that only a small part of contributions explicate their development process and that and that when they do, they present it before the description of the developed artifact (in contrast to the recommendations of (Knauss, 2021; Weber, 2022) for writing DSR theses). It has to be said that ICSE and ICRA contributions often provide a sophisticated formal basis for their artifacts or provide evidence for their assumptions underlying development via empirical methods. ISSE contributions tend to rely on formalized development methods, such as Model-based Systems Engineering (MBSE) (Shortell, 2015).

4. Discussion

4.1. Contributions of this work

The objective of this work is to contribute to the discussion on the methodology of DSR in Information Systems by reviewing DSR in Engineering disciplines. To this end, samples of recent conference papers from three international technical conferences are systematically reviewed. The reviews provide purely descriptive, empirical information on how engineering disciplines publish results of their DSR. The study successfuly applies the V-model of DSR (Weber, 2022) as an analytical framework, which in turn demonstrates, that the V-model is applicable and useful for structuring the presentation of DSR projects.

This work contributes to the discussions on guidelines and recommendations for conducting and presentation IS-DSR. One key finding is that the majority of the reviewed papers from Engineering disciplines do not match some of the guidelines defined for IS-DSR (Gregor & Hevner, 2013; Hevner et al., 2004). In particular, the majority of papers neither explicate their development process nor present it as a search. Rather, they present the developed design as the result of deliberate and systematic work, often basing it on formal theory or empirically verified assumptions. It can be assumed, that in many of their design projects experimentation and search was involved. Yet, the papers often omit these details, which may lead to a shorter and more concise presentation of their results (Knauss, 2021). Moreover, in disciplines with a long engineering tradition, it may be common experience and understanding that design and development involve search and iteration. Thus, there might be no need to explicate this or explain their research approach as being Design Science, unlike for DSR work in disciplines with other roots. Some papers from the ICRA (Robotics and Automation) and from ISSE (Systems Engineering) mention the use of design methods (ablation studies for Machine Learning and Model-based Systems Engineering resp.) without further explaining them, showing that these fields are as mature as to have yielded and established working design theories. These findings may contribute to the discussion on certain aspects of IS-DSR guidelines being recommendations versus prescriptions.

A further interesting finding is that papers in the field of software engineering tend to place considerable emphasis on the scientific validation of their research, discussing its external, internal, and construct validity. The papers show that Software Engineering is similar to Information Systems in that the developed solutions often involve human activity, i.e., are socio-technical artifacts. Contributors to the Robotics conference typically develop purely technical soluations and can rely on standard benchmark problems for evaluation, making evaluation of their artifacts comparatively easy and straighthforward. In contrast, rigorous evaluation requires and gets more effort and deliberation in Software Engineering. This finding could motivate IS-DSR to further improve its scientific rigor, as some authors note a deficiency in this regard (Dwivedi et al., 2014).

In addition, this work has investigated whether DSR publications adhere to a common publication scheme, analogous to IMRaD for empirical research. On this question, it was found that the introduction-description-evaluation-discussion scheme was the most common in the sample (70%), followed by introduction-description-demonstration-discussion (11%). If we count demonstration as a weak or preliminary form of evaluation (by showing that the artifact works), more than 80% of the papers were structured as introduction-description-evaluation-discussion. This result could be useful for teaching DSR, as it provides empirical support for recommendations on how to structure a DSR paper.

4.2. Threats to validity

Construct validity. All reviews of the papers were made by the author. As a non-expert in software engineering, systems engineering, and robotics and automation, they may have misunderstood some content and mislabeled some papers. However, since the papers were classified at a fairly superficial level according to their structure rather than their domain-specific content, misclassifications should be rare.

Internal validity. The aim of the study is to investigate commonalities and differences of DSR contributions in technical disciplines. For this purpose, samples of conference papers were selected from a small number of different IEEE conferences belonging to different technical disciplines. All conferences fall in the same year and have international authors. This should eliminate historical and cultural bias as well as bias due to different publication types (journal vs. proceedings vs. books, etc.). Papers with the highest citation counts are selected from each sample. This may result in some bias, e.g., in favor of articles with popular topics, but it is not obvious that this is a drawback.

External validity. This study is limited to recent conference papers from three conferences. The study was able to reveal common structures and patterns in the papers of the same sample as well as differences between the different samples. This indicates that the size of the samples suffices for the purpose of this study. Analyses of more samples from other conferences, from journals or books, and from other engineering disciplines are necessary to obtain more representative results and further insights.

4.3. Related work

Literature reviews of IS-DSR publications. Many studies have gathered a large body of knowledge on Design Science Research in Informations Systems. Section 2.3 lists recent literature reviews that analyse various aspects of DSR publications in the Information Systems discipline. Recent work also includes a literature review of IS-DSR publications leading to a taxonomy of Design Knowledge in DSR (Dickhaut et al., 2022). Maedche et al. (2021) present a Classification Framework for Design Research Activities.

Frameworks for communication of DSR papers or projects. (vom Brocke & Maedche, 2019) have coined a DSR Grid with six core Dimensions for capturing the most relevant aspects of a DSR project. Its intended as a tool for describing, planning, and communicating DSR projects. Engel et al. (2019) derive a multidimensional analysis framework for characterizing DSR papers and utilize it to describe the status-quo of DSR publications in IS as derived by a systematic literature review. Cahenzli et al. (2021) propose a framework for the communication of DSR which is applicable for a broad range of communication situations, from early DSR project stages up to the presentation of DSR results. Their framework basically takes the form of a Morphological Box (Ritchey, 2018).

The V-model proposed in this paper differs from these frameworks. It is more fine-grained and draws attention in a novel way to the fact that Design Science Research operates at the three levels of technology, domain, and science.

Insights from practice and other disciplines. Werner (2019) explores how DSR projects are conducted in practice compared to how they are presented in DSR publications, moving beyond the confines of IS-DSR publications. To this end, he conducted expert interviews with practicing researchers from business, information systems, and computer science.

The master thesis of Bala (2021) analyzes DSR papers in the field of Purchasing and Supply Management. The work of Goecks et al. (2021) is a review of applications of DSR in Industrial Engineering.

Knauss (2021) and Engström et al. (2020) consider DSR in the field of Software Engineering. Engström et al. (2020) use their "Design Science Visual Abstract Template" as a framework for characterizing different types of design science contributions in the software engineering literature.

Education has a variant of Design Science Research termed Design-Based Research (DBR) (Reinmann, 2017). Fahd et al. (2021) present a research framework that integrates IS-DSR and DBR. Oppl et al., 2022 compare DBR and IS-DSR. They state that educational DBR lacks commonly accepted models and therefore aim to appropriate models developed in the context of IS-DSR to DBR.

Similarly, this work analyzes sources outside of the IS-DSR literature to gain insights into how DSR can be represented. Specifically, it investigates presentations from engineering disciplines where DSR is a mainstream research approach. As do Engström et al. (2020), this work views and analyzes research papers describing the design of artifacts as DSR, even though the papers do not use this term.

5. Conclusion and future work

Given the ongoing discussion on methodology and guidelines in IS-DSR (Holtkamp et al., 2019; Iivari, 2020; Järvinen, 2021; Venable, 2013), this paper suggests to collect and exploit insights from other design disciplines, e.g., engineering disciplines. An initial literature review of a sample of 56 relevant Engineering research papers has yielded interesting and stimulating results. The review and discussion in section 4 of this work have addressed only selected aspects of DSR presentations. Other aspects, as illustrated in the V-model of Design Science Research in Figure 1, should also be explored and discussed in more detail. Reviewing the examples from three conferences revealed the different scientific cultures and publication styles of the disciplines involved. It is worthwhile to take a look at the research publications of other disciplines to advance the methodology of Design Science Rresearch and hopefully work toward a common cross-disciplinary understanding of this research paradigm.

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