

What are the Siblings of Design Science Research (DSR)?

An idea paper

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Background

- It is no broad agreement on DSR terminology, theory, methodology, evaluation criteria, etc
- It is unclear how DSR should be characterized and positioned with respect to notions like research paradigms, research strategy, research methodology, and branches of science
- For example, is DSR a research paradigm, a research strategy, or something else, and what does that mean?

Problem

- This unclarity and disagreement on DSR makes it difficult to communicate DSR to students, young researchers, and researchers outside the DSR community

Solutions

- One solution could be to define what DSR is
- Another solution could be to identify what DSR is not (e.g. Baskerville)
- A third solution could be to identify a number of sibling groups (i.e. categories) which DSR can be part of, and for each sibling group (i.e. category) describe DSR and the siblings in that group (i.e. describe the examples/instances of the category including DSR)
- ...

Question

- “What are the siblings of design science research?”

Family resemblance

- Wittgenstein is the father behind the notion of family resemblance
- For the late Wittgenstein, examples are not just illustrations or the beginning of a generalisations – examples are the main thing, the end point
- In *Philosophical Investigations* (1953), he carries out a number of investigations based on very concrete examples

Family resemblance

- The idea behind Wittgensteins concept of **family resemblance** is that things that are grouped together into one category do not share any essential common feature, but are related only through a number of overlapping similarities
- Wittgenstein (1965) states: “if [...] you wish to give a definition [...], to draw a sharp boundary, then you are free to draw it as you like; and this boundary will never entirely coincide with the actual usage, as this usage has no sharp boundary”

Approach and Method

- Instead of giving a definition of DSR, we investigate the siblings to DSR in different sibling groups (i.e. in different categorisations), and, thereby, contribute to sense making in the DSR practice.
- We reviewed seminal papers in the area and textbooks that addressed design science in order to identify groups of siblings that may position DSR

Four sibling groups - and the siblings within the groups

1. **Branch of Science:** Natural Science, Social Science, Formal Science, Design Science
2. **Research Strategy:** Case Study, Action Research, Experiment, Design and Creation
3. **Practice Research:** Action Research, Evaluation Research, Design Research
4. **Overall Methodology:** The Scientific Method and Design Science

Group 1: DSR as Branch of Science

- DSR can be viewed as a sibling to *natural science, social science, formal science, etc.*
- These are sometimes called *branches of science*
- Several researchers contrast DSR with such branches of science:
 - March and Smith (1995) contrast design science with natural science
 - Hevner et al. (2004) contrast design science with behavioural science, claiming that these are the two major “paradigms” in IS research.
 - Peffers et al. (2007) contrast design science research with descriptive research

Group 1: DSR as Branch of Science

This is also our way to position DSR. We often contrast DSR with empirical science:

- **Empirical science (i.e. natural science and social science)** - aims at describing and explaining the actual world in the present and the past
- **DSR** - aims to change the world, to improve it and to create new worlds. Design science does this by developing artefacts that can help people fulfil their needs, overcome their problems, and grasp new opportunities
- **Formal science** - aims lays down mathematical structures that can be used to describe and explain any world irrespective of time, place, and existence

Group 2: DSR as Research Strategy

- DSR can be viewed as a sibling to *action research, case study, ethnography, experiment* and *survey*.
- These are often called *research strategies* or *research designs*.
- A *research strategy* is an overall approach to answering a research question, often including preferable data generation and analysis methods
- This view is claimed by Oates in *Researching Information Systems and Computing*, SAGE Publications, 2005 – a book about research methodology for university students in information system and computer science

Group 2: DSR as Research Strategy

- Oates' view may seem to be too restricted, as other research strategies can be used within design science.
- For example, within a design science project, surveys can be used to elicit requirements, and experiments can be used to evaluate artefacts, see Hevner et al (2004)

Group 3: DSR as Practice Research

- Design science research can be viewed as a sibling to *action research* and *evaluation research*
- The common is that they are viewed as different forms of *practice research*
- *Practice research* is research that addresses challenges in practices by collaborations between practitioners and researchers
- Goldkuhl (2011) states that practice research "can take different forms, as for example, evaluation research, action research and design research". These three forms of practice research all fit into an "anatomy" of practice research created by Goldkuhl.

Group 3: DSR as Practice Research

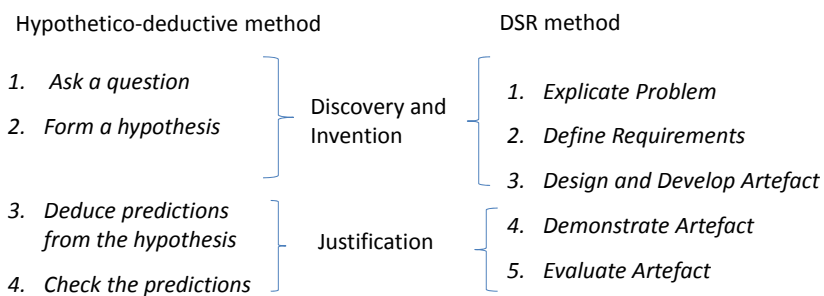
- Goldkuhl's (2011, 2012) analysis suggests a reinterpretation of action research and maybe also design science research, which can be a basis for contrasting and comparing them.
- The traditional view of *action research* is that it needs to contribute to both local practice and the research community, but not necessarily to general practice. Goldkuhl (2012), however, suggests an additional requirement that action research also should contribute to general practice.
- Similar, the traditional view of *DSR* is that it needs to contribute to both general practice and the research community. An open question, however, is whether DSR needs to contribute to local practice, and whether it needs to require collaboration with practitioners

Group 4: Overall Methodology

- Design science research can be seen as a sibling to the *scientific method*.
- *The scientific method*. A common version of the scientific method is the hypothetico-deductive method.
- *DSR*. There exist several methods for DSR in the literature, e.g. those proposed by Peffers et al. (2007), Vaishnavi and Kuechler (2004), and Sein et al, (2011).

Group 4: Overall Methodology

- It has been argued, e.g. by Fischer and Gregor (2011) as well as Eekels and Roozenburg (1991), that design science research methods are in several respects similar to the scientific method.



Main contributions of the paper

- To provide a fruitful starting point for a concrete and creative discussion on the key characteristics of DSR, as it will **invite discussions based on specific phenomena rather than abstract categories.**
- To **clarify in which way researchers differs** in their views on DSR

Back to Wittgenstein

- Wittgenstein would accept that there exist many different definitions for problematic concepts
- However, he would probably claim that looking for a final definition would be a waste of time, because it is not possible
- Instead, he would probably claim that the solution is to understand that it is not possible to define certain concepts because the examples/instances are so different from each other. The examples/instances are related only through a number of overlapping similarities

[von Wright, 1965]