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Pragmatizing the Normative Artifact: Design Science Research in Scandinavia and Beyond

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Abstract:

In this panel report, we analyze the discussion that unfolded during the “Design Science Research: A Scandinavian Approach?” panel held at the third Scandinavian Conference on Information Systems in Sigtuna, Sweden, in August, 2012. The second author of this paper chaired the panel, which also included Tone Bratteteig, Shirley Gregor, Ola Henfridsson, Alan Hevner, Jan Pries-Heje, and Tuure Tuunanen as panelists. Three themes that highlight how the design of artifacts contributes to knowledge production emerged during the panel. The first theme addresses our responsibility, as a research community, to come up not only with descriptions of the world but also to try to change things into preferable states. The second theme emphasizes that knowledge production also happens through the design of artifacts. The third theme identifies an apparent pragmatic turn in our discipline.

Keywords: Design, Design Science, Participatory Design, Scandinavian Approach, Action Research.

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1 Introduction

Design science research (DSR) has had quite a significant impact on information systems research since Hevner, March, Park, and Ram's (2004) paper appeared in *MIS Quarterly*, which has attracted more than 2,300 citations (as of October, 2017) in Thomson Reuters' Web of Science and over 9,500 citations in Google Scholar. This seminal work draws significantly on earlier work by March and Smith (1995), which, in turn, was highly influenced by Simon's (1996) sciences of the artificial.

Acknowledging the popularity of DSR and the centrality of design to Scandinavian information systems (IS) research (Langefors, 1995; Dahlbom, 1995; livari & Lyytinen, 1998; livari, 2007a), we explore in what sense and to what extent DSR is or could be seen as a Scandinavian approach in this paper. In short, is it fair to say that DSR belongs to, or is at least strongly influenced by, the Scandinavian approach to IS research? To pursue such an inquiry, we adopt a dialectic approach to synthesize two opposing positions. The first position (our thesis) is that DSR, in essence, only repackages established Scandinavian wisdom. The second position (our antithesis) is that the Scandinavian tradition fades in comparison with the power of DSR. The thesis would imply that DSR researchers worldwide should have a lot to gain from better understanding the Scandinavian IS research tradition. The antithesis would suggest that Scandinavian IS researchers need to follow suit and learn to appreciate how to perform proper DSR in the contemporary global IS research arena.

We empirically base our analysis on the conversation that unfolded during a panel on "Design Science Research: A Scandinavian Approach?" at the third Scandinavian Conference on Information Systems in August, 2012 (which we henceforth refer to as "the panel"). The panel, which the second author of this paper chaired, included the following panelists (in alphabetical order): Tone Bratteteig, Shirley Gregor, Ola Henfridsson, Alan Hevner, Jan Pries-Heje, and Tuure Tuunanen. The conference chairs invited these panelists to serve as active voices in the panel and to represent the four Nordic countries and the crème de la crème of DSR research internationally. Most importantly, however, they also represented different perspectives related to the exploration of in what sense and to what extent DSR is or could be seen as a Scandinavian approach. All the panelists have published work in which they advance different methodological views on how to work with a normative account in IS research. These works range from participatory design (PD) (Bratteteig, Bødker, Dittrich, Mogensen, & Simonsen, 2012) via action research (Lindgren, Henfridsson, & Schultze, 2004) to action design research (ADR) (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011) and DSR (Peppers, Tuunanen, Rothenberger, & Chatterjee, 2007; Gregor & Hevner, 2013).

We recorded the panel and analyzed it independently with a focus on open and axial coding (Strauss & Corbin, 1998). We then compared the results and conducted a joint analysis focused on points of consensus and negotiation of diverging interpretations. As a final step, we sent the outcome of the analysis (in the form of a draft version of this paper) to the panelists for member checking (Creswell & Miller, 2000). The response from the panelists was overall very positive except one panelist who pointed out that our analysis had not adequately captured an essential distinction between participatory design in the Scandinavian tradition and mainstream DSR. In this final version, we have incorporated the feedback to acknowledge this dimension of the panel correctly.

This paper documents part of a significant scholarly discourse. An international audience can perhaps perceive the Scandinavian angle as limiting. However, we intended this framing to be provocative, and the outcome of the discussions is not restricted to the Scandinavian context. Instead, what we found was a unifying interest in how the design of artifacts contributes to knowledge production and the improvement of practice.

The paper proceeds as follows. In Section 2, we briefly review the panel to establish some preliminaries. In Section 3, we analyze the panel and elaborate on the central themes that emerged. Finally, in Section 4, we summarize the main points and revisit the dialectics introduced above.

2 Preliminaries

As we note above, design has been at the core of Scandinavian IS research since its inception in the 1960s (Langefors, 1995; Iivari, 2007a). For example, the first formalized information systems development method, ISAC, embodies an explicit focus on the design of socio-technical systems that acknowledges the influence of various stakeholders (Lundeberg, Goldkuhl, & Nilsson, 1978, 1979)—described by these authors as client-oriented development of information systems. The design orientation is perhaps even more apparent in the work of Kristen Nygaard, Pelle Ehn, Susanne Bødker and others who, in the 1970s, pioneered what was to become known as participatory design (Floyd, Mehl, Reisin, Schmidt, & Wolf, 1989). In the 1990s, when the information systems discipline (at the time called administrative data processing) transformed into informatics in many places throughout Scandinavia, Dahlbom (1995, p. 42) emphasized the discipline's interest in information technology use and that "this interest is design oriented. We are interested in the use of technology because we are interested in changing and improving that use." Scandinavian IS and human-computer interaction (HCI) researchers picked up this research agenda—the new informatics—and used different levels of analysis that ranged from change and design-oriented research on individuals' IT use to large-scale change projects in organizations. Mathiassen (2002) captured this tradition and its interrelationship with action research in his collaborative practice research approach, which has been widely adopted throughout Scandinavia. Sein et al. (2011) developed and explored these ideas further in light of the revitalized interest in DSR.

With this background, the panel chair, who pushed the thesis and antithesis that we describe above, began the panel. Alan Hevner addressed the audience first. His first point related to the fundamental questions: "How do I know that I am doing good design science research?" and "How do I know if I'm doing design science research at all?". At his keynote the day before, Hevner had introduced the DSR knowledge contribution matrix (see Figure 1) that had emerged out of joint work between him and Shirley Gregor (at the time under review for publication). Hevner argued that, if researchers have trouble locating their work in the DSR knowledge contribution matrix, they may not be doing DSR. Hevner said: "You should be able to clearly identify the level of the maturity of the problem you're working on and the level of the maturity of the artifact". As for how to move DSR thinking forward, he then turned to the argument that Gill and Hevner (2011) offer and suggested that "we need to move beyond just thinking about usefulness as the nature of utility of the artifact" and ask ourselves "How can I make that artifact sustainable? How can it adapt to change in an environment?". This ambition echoes the Scandinavian participatory design tradition's emphasis on "change and development, not only technological change and systems development, but change and development of people, organizations, and practices, occurring in changing socio-historical contexts" (Gregory, 2003, p. 63), which typically emphasizes the "different perspectives and interests concerned with defining what the problem is and how it can be solved" (Bratteteig, 2007, p. 66).

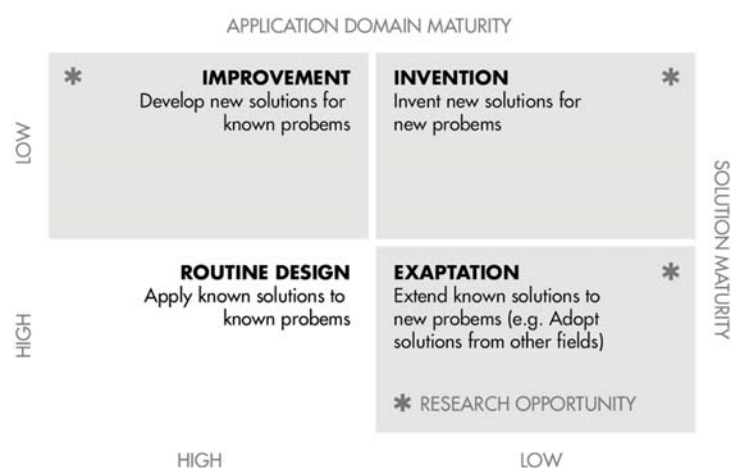


Figure 1. The DSR Knowledge Contribution Matrix (Gregor & Hevner, 2013)

Shirley Gregor, the second panelist, picked up on Hevner's first point and asserted: "When we're doing design research it is very important to contribute to practice, but if that is all you are doing, that's not enough". There also has to be:

Some abstraction so that people can see how what you've done can be used elsewhere you're going to be telling a case story, you are not doing research at all really, you are doing design. And there would be people who would ask how are you doing this better than consulting?

Continuing Gregor's line of argumentation and in keeping with the three cycles of relevance, design, and rigor that Hevner (2007) describes, Jan Pries-Heje emphasized the importance of viewing DSR research as a series of cycles of abstraction and de-abstraction (see Figure 2). Pries-Heje said: "I believe the abstraction is really the characteristic of research. You have to show that the abstract solution can be de-abstracted and can actually go into practice and help solve a problem."



Figure 2. Abstraction and De-abstraction in DSR (Lee, Pries-Heje, & Baskerville, 2011)

These three opening statements came to form a basis on which much of the conversation during the Panel unfolded. In Section 3, we draw on these preliminaries and address the main themes that emerged.

3 Themes

During the panel, three distinct themes emerged. Although the panelists represented divergent views on how to conduct design-oriented IS research, they also agreed on some critical aspects. Regarding the above-introduced dialectics, we consider these three themes as the synthesis that emerged in response to the thesis and antithesis.

For each theme that we present, we illustrate the synthesis not only through arguments but also with quotes from the panelists that demonstrate the theme as it emerged during the panel.

3.1 The Pushing of a Normative Agenda

The first theme concerned our responsibility as a research community to come up not only with descriptions of the world but also to try to change things into preferable states. Arguably, this is taking us back to the roots of our profession as envisaged by Simon's (1996) sciences of the artificial and Schön's (1984) theory of design that treats all professionals as designers doing design work (Aakhus, Ågerfalk, & Lennmyr, 2018). Hevner's emphasis on improvement, invention, and exaptation as the three research opportunities for DSR (see Figure 1) clearly embodies this view. However, as Tone Bratteteig pointed out, we cannot solely focus on improving IT because "[the artifact] has to be understood as part of a context" and understanding that context requires engagement with the (potential) users of the artifact. As we note above, the idea of user participation has been central to Scandinavian IS research since its inception and is closely related to the frequent use of action research in Scandinavian IS studies that sometimes but not always involve the design of new artifacts. Design is essentially deliberate change brought about by conscious action and participation in a design discourse. Researching such a discourse may well include participating in actual design activities. However, researchers have (often heatedly) discussed the similarities and dissimilarities between action research and design science research (e.g., livari, 2007a; Järvinen, 2007; livari & Venable, 2009; Sein et al., 2011). This discussion suggests that DSR does not have to include the political or emancipatory component that often characterizes action research. However, Ola Henfridsson noted that "even the PD tradition has become more mainstream. Even when we do action research, we don't so much have that kind of political focus anymore. The client is becoming,

more and more, whoever wants to pay our research funding” and added that “of course it is everybody’s responsibility to do something that addresses important problems”. We interpret Henfridsson’s comments as indicating that, although emancipatory ethics is an important foundation of the Scandinavian tradition, contemporary IS research may be less concerned with pushing a political agenda but is still highly engaged in pushing a normative one. DSR seems suitable to that mode of inquiry as Shirley Gregor pointed out in noting that: “To do design science research, you could adopt any ethical position you want to”. In the words of Tuure Tuunanen, “the outcome can be used in different ways”. Alan Hevner emphasized this point by encouraging the audience to “Just do it, go build something”. Thus, the DSR researcher’s responsibility seems to be to contribute to better IT solutions and not necessarily to engage in discussions about what is a better IT solution and for whom (i.e., the political account). However, as we note above, Hevner also called for moving beyond the utility of the artifact to consider also how the artifact can be made sustainable and adapt to changes in the environment. For the emancipatory and critically oriented design researcher, such an ambition requires dealing with political and ethical issues (Iivari & Lyytinen, 1998; Myers & Klein, 2011).

3.2 Knowledge Production through the Design of Artifacts

Regardless if one does action design research, participatory design, or DSR, the panelists agreed that knowledge production also happens through the design of artifacts. Thus, knowledge production and artifact generation are not two separable activities but are, on the contrary, highly intertwined (Wiberg, 2003; Stolterman & Wiberg, 2010). In a sense, design theory and instantiated artifacts are different sides of the same coin; one cannot be without the other—artifacts are, essentially, what Ågerfalk (2004) describes as “tangible theory”. Shirley Gregor said: “An artifact can be an instrument, I think, in the sense that it can actually convey knowledge itself”. Henfridsson agreed and added that “a design help us to explore research questions which we could otherwise never seek answers to, it serves as a way for us to test ideas through design”. Further, Alan Hevner added to Henfridsson’s remark in saying: “in doing this, ideas can be manifested at different levels of artifact abstraction”.

During the panel, the panelists agreed that design is essential for knowledge production but also more specifically that knowledge production happens through the design of IT artifacts. Still, our panelists pointed out several times that the design itself does not equal knowledge. As Gregor said: “If you only build something you are probably not doing design research at all, you are doing design!”. To ensure a proper design science agenda, Hevner pointed to the importance of making design abstractions while not losing sight of the problem that the design is supposed to address: “think about if the design really solves the problem..., design is key, and knowledge production can then happen through artifact abstraction”. In keeping with this sentiment, Henfridsson asserted that: “The instantiation is not knowledge production, but the abstraction of it [is]”. In the discussion about the relationship between knowledge production on the one hand and design of artifacts on the other, the central topic was how these two could be interlinked in DSR. The panelists agreed that artifact abstraction appears to be at the core of this issue. To count as research in this context, the panelists also agreed on the importance of theorizing the design.

Hirschheim, Klein, and Lyytinen (1996) argue that information systems development is at the core of the IS discipline. With its emphasis on knowledge production through the design of artifacts (e.g., information systems and information systems development methods), DSR holds the promise to nurture strong ties between IS research and IS practice. Indeed, reflective practitioners who do design work and researchers who do design work differ. Similarly, one should not confuse design science research with scientific design (Bratteteig, 2007; Iivari, 2007b) because the latter imposes a scientific approach to design practice also outside the research context. However, DSR seems to promote engaged scholarship in which knowledge production centers on design as an instance of knowledge (the rigor cycle) and design as a way to help formulate relevant research questions (the relevance cycle)—that is, rigor and relevance rather than rigor or relevance (Niehaves, 2007).

3.3 A Pragmatic Turn

The third and final theme we identified when analyzing the panel was the apparent pragmatic turn in our discipline. While the discipline has had change on its agenda for a long time, the panelists clearly indicated that our design orientation is not only about making (things) or changing (things). Instead, this change agenda is anchored in some responsibilities. DSR is about practice—about contributing to it, committing to it, and accepting a liability toward it. To view practice only as a lab “out there” as typically understood in action research is not sufficient. The panelists strongly argued that we cannot only do

interventions and change things but that we also have a responsibility as researchers to contribute towards a better world—to improve rather than merely change situations. A basic tenet of the philosophical school of pragmatism (Peirce, 1931; Dewey, 1938) is that practical usefulness is more important than truth (Goles & Hirschheim, 2001; Ågerfalk, 2010). The panel also addressed this tenet: for instance, Hevner said: “When you do this you need to make sure you build something that someone wants”.

Hevner’s call to move beyond usefulness and embrace the opportunity to use DSR as a vehicle to propose sustainable solutions that can adapt to changing environments signals a belief that DSR can indeed be used to create a better world but that produced artifacts need to be flexible enough to accommodate change. This idea resonates well with Goldkuhl’s (2004, p. 61) view that “design theories are aimed for and related to design activities and as such they are practical theories.... The value of practical theories lies in their usefulness for inquiry processes.”.

It became apparent during the panel that, although there are (at least historically) both philosophical and practical differences between the Scandinavian approach (with an emphasis on action research, participation, and emancipation) and DSR (with an epistemological grounding primarily in American pragmatism), the differences are typically possible to reconcile in practice. The panel seemed to support the view that pragmatism provides a useful epistemological foundation, but they also made clear that we should make sure actually to do design research and not only design (cf. Sjöström & Ågerfalk, 2009). This emphasis goes back to the question of proper abstraction and theorization of the artifact (cf. livari, 2015). As panel formulated it, the pragmatic way forward for generating design knowledge could be through formulating design principles. Henfridsson said: “In our projects, we try to arrive at some specific design principles. Hevner also acknowledged that: “Design principles can be the abstraction”. In other words, the panelists had not only pragmatism as a philosophical ideal, but this suggestion of formulating knowledge as design principles came across as a pragmatic method for communicating knowledge generated through design research—thus being pragmatic both in a philosophical and a pragmatic sense (Ågerfalk, 2010).

4 Conclusions and Implications

From the analysis above, we can conclude that the question and polarized positions that we posit in Section 1 are, although decisively immediate, perhaps not the most fruitful ones. Instead, the analysis shows how the panel refrained from an imposed and possibly detrimental dichotomy in pursuit of common ground and a generative synthesis of views. Clearly, DSR and the Scandinavian approach to IS research share common roots that go beyond geographically demarcated research traditions. The three identified themes point to a common ancestry traceable to Simon’s (1996) view of a science of the artificial coupled with the normative account of inquiry spearheaded by American pragmatists and spiced up with a healthy dose of critical social theory (livari & Lyytinen, 1998) and an understanding of design as iterative and reflective engagement with a situation (Schön, 1984). At the same time, the panelists made sure not to reorient the panel discussion towards this level of theorizing our agenda. Instead, they unified on a standpoint for pushing IS research forward both theoretically and practically and, in doing so, placed design in the foreground for practically advancing IS research. As the three themes capture, the panelists advocated our potentially normative position in IS research and highlighted how the design of artifacts contribute to knowledge production, and they consistently argued for a repertoire of approaches for improving practice. Ultimately, it was a call not for a tradition to come but for a tradition executed here and now in Scandinavia and elsewhere.

Our interpretation of the views that the invited panelists held can only paint a limited picture and does not allow for far-reaching conclusions. However, the constructive conversation at the panel signals a healthy and collegial spirit that acknowledges the contribution of the Scandinavian approach but also reinterprets and repositions it in the contemporary global research arena. Winter (2008) suggests that European research traditions are well suited to address both rigor and relevance in DSR research. Four decades of PD research proves it as a well-established tradition in Scandinavia and beyond. There are tensions between this tradition and the emerging mainstream DSR approach. Importantly, one should not see these tensions as problematic but as a potential for reflection on both PD and DSR in contemporary research practices. ADR is an outcome of such thought, as are recent elaborations that emphasize the participatory aspect of DSR even more strongly (Haj-Bolouri, Bernhardsson, & Rossi, 2016).

In returning to the thesis and anti-thesis of this paper, we notice that, while such dialectic designs typically aim at reaching consensus through formulating a synthesis, the panel demonstrated that it is instead the tensions in-between the positions taken that are of interest to move forward in this academic debate. In short, it is not about fading perspectives or the repackaging of one tradition into a new form. Instead, it is about upholding the similarities and differences between the perspectives that enable the discipline to move forward, and the debate will most certainly continue.

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