Design Science Research: The Road Traveled and the Road That Lies Ahead

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ABSTRACT

In this introductory piece to the special issue on design science research (DSR) in information systems, the authors probe the past research in DSR, introduce the papers in the special issue, discuss their contributions to the field, and conclude the paper by highlighting some potential directions for future research. To provide a good overview of the research domain, the authors review the key research approaches (or processes) that have been proposed and identify the concrete products of DSR that come in the form of artifacts. As the production of artifact is only part of the DSR process, the authors discuss the role of theorizing about these results and propose avenues for future design-oriented research. It is the authors’ strong belief that DSR should be at the heart of information systems discipline because it invites people to research the issues surrounding the development and organizational implementation of new systems.

INTRODUCTION

Design science research (DSR) or design research is a central pillar to information systems research since its inception as testified by works of scholars such as Langefors, Teichroew or Mumford. It has matured since its inauguration about 20 years ago (Nunamaker et al., 1991; Walls et al., 1992). After two decades, we have a more encompassing set of methods and approaches for conducting design-oriented information systems research (e.g. Hevner et al., 2004; Peffers et al., 2007). The maturation of DSR has also rendered it to a more viable and publishable approach, which can be seen in the growth of design-oriented tracks in conferences such as ICIS, ECIS, HICSS and the longevity of the DESRIST conference series. Design science is becoming, indeed, a part of the normal science. This should come naturally because the idea of design is central to the IS field. Building new artifacts that expand the
limits of possibility (Sein et al., 2011) is one of the dominant modes of valid knowledge generation in the IS discipline.

In the early days of the IS discipline, there were abundant information systems research papers on building new kinds of systems and observing them in organizational settings. At the same time, the growing field and institutional pressure called for intensified use of more ‘rigorous scientific approaches’ seeking to explain, and accordingly the construction-oriented inquiries in IS research had to yield to behavioral approaches. This does not suggest, however, that construction-oriented inquiries in IS research at that time were not rigorous or non-scientific. They just did not draw upon social science based methodology.

The key canon of dominant behavioral research was identifying and explaining effects or antecedents of using a ‘given’ IS. In this regard, behavioral research is different from construction-oriented inquiries in IS research that it does not take the use as ‘given’ - theorizing starts often before the artifact is built and not after to explain what are its effects. Accordingly, as these decisions are made there is an increased emphasis on whether the followed methodical approach is valid and sound, and whether the phenomena under study are indeed measurable and controllable. Due to the fact that the foundations of design science research were not widely recognized in the mainstream research and design science scholars had often a difficult time publishing in mainstream IS journals, many design-oriented scholars felt that they had diminished publication opportunities. A significant portion of research on IS had little to do with what the actual information system functioned, and how it was developed.

Concerned about the lack of deeper understanding of the nature of artifacts in IS research, (Orlikowski & Iacono 2001) a growing number of scholars have started to engage in research on how to build information systems in naturalistic settings. Earlier, Nunamaker called for solutions to the “last mile” problem, and proposed systems development as a research method (Nunamaker et al., 1991). Hevner et al., (2004) article in MISQ opened design science as a legitimate approach to IS mainstream. Since the publication of this article, a vast number of different DSR approaches have been proposed: some are calling for injecting more rigor and theory to DSR (Walls et al., 1992; Venable 2006; Gregor & Jones 2007) while others stress the need to engage with practice through action research (Sein et al., 2011). Recently, some have raised concerns about the continued expansion of papers that theorize design science: the focus of DSR should be on doing design science, not on theorizing about design science research. If the focus of DSR becomes just theorizing about DSR, we face a danger that design science will soon denote different things to different people. Therefore, there is a need for DSR scholars to balance the doing and thinking about DSR, and also to sharpen what DSR is and what it is not. When building up this issue, we fathom that we found a healthy balance: two articles are about doing DSR and one is about theorizing.

As Hevner and Chatterjee (2010) point out in their introduction to the book on design science research, the definition of design should dominate the discussion, especially whether it’s a process or a product. The second issue is whether DSR is research or science. We will discuss each of these issues shortly.

SPECIAL ISSUE CONTRIBUTIONS

We received 13 papers for this special issue. After two rounds of reviews, we accepted three papers that reflect well the quality and the nature of current DSR discourse. These papers contribute to a wide array of outcomes of design science research: the first one develops a method, the second one a prototype and a preliminary design theory, and the third one challenges and outlines ontological basis of design science research.

In the first paper, Rosenkranz and Holten develop a method for changing organizational structures using design science research approach. They call it the Variety Engineering
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