ABSTRACT

This essay investigates the ontology question in design science research. Writings on the philosophy of science do not fully address this concern for design science research because of the traditional emphasis on discovering truthful laws. In contrast, design science research dares to create novel IT artifacts with a view to realizing alternative futures. Taking this into account, the author articulates fundamental world-views for the canonical form of design science research, which involves instantiation of the outcomes as a software artifact. These world-views include an ontological basis and an epistemological stance that are the foundation of design science research practice. The author’s derivation of these world-views reflects shifts in the researcher’s stance through the research process, and the interconnectedness of the problem and the artifact. The author discusses implications of these proposed world-views including comparisons against other research traditions, greater clarity for design research practice, and the potential for extending the analysis to other strands of design science research.

Keywords: Design Science Research, Epistemology, Ontology, Philosophy of Science, World-Views

INTRODUCTION

In spite of recent statements about design science\(^1\) (Hevner et al., 2004), the establishment of new funding programs (e.g. NSF, 2006), and focused conferences (DESRIST, 2009), the scientific foundations underlying design science research in IS remain largely under-developed. Recent investigations are beginning to clarify the ideas underlying the contribution and generation of theory (Jones & Gregor, 2007; Walls et al., 1992) and theory-nexus (Pries-Heje & Baskerville, 2008; Carroll & Kellogg, 1989) as it relates to design science. Deeper investigations of the world-views – such as ontology and epistemology – underlying design science research, however, still remain scarce.

For design science researchers, these world-views are important because of the inevitable comparisons to established research paradigms. For more established research paradigms such as positivism and interpretive research, statements of ontological assumptions and epistemological perspectives are readily available, and they are traceable to fundamental concepts in sociology and organizational sciences (Burrell &
Morgan, 1979). In contrast, researchers in the design science research community have not yet articulated or described these fundamental world-views. Instead, much writing related to design science research is prescriptive with a focus on specific domains such as engineering (Suh, 2001), product design (Norman, 1990), software (Blum 1996), and information systems (Hevner et al., 2004). Although investigations of world-views are beginning to appear for design science (see, e.g. Niehaves, 2007 based on Iivari, 2007), the community of design science researchers has yet to produce clear definitions or positions about these. In spite of clarifications about what constitutes design science research (e.g. March & Smith, 1995; Hevner et al., 2004), the fundamental world-views – ontology and epistemology – underlying design science research efforts have rarely been explored. This is the problem I am concerned with in this paper. I argue that without such scientific foundations, design science research in Information Systems, therefore, continues to be a lost child searching for its scientific home. I argue that without the articulation of the world-views underlying design science research, the perception of hegemony across research paradigms persists. 

My central thesis in this paper is that the ontology question for design science requires formulating an innovative response because design science research creates artifacts that, effectively, change the world. Design science researchers believe that the proverbial ‘truth’ is not ‘out there’ (Orlikowski & Iacono, 2000); instead, they ‘dare’ to create artifacts intended to change the world. I develop an alternative ontological position that recognizes this distinction by drawing on writings in the philosophy of science and technology, the IS discipline, and other design disciplines. The essay builds the argument by first showing the lack of clear world-views in recently published design science research. Following this, I propose a new, cohesive position that articulates the fundamental world-views for design science research. This proposal includes a recognition of how these positions are likely to evolve during the design science research process, and an appreciation of the interconnectedness of the artifact and the problem it is intended to solve. The essay concludes by demonstrating the usefulness of the world-views, how they will provide a fundamental foundation for design science research that has been lacking so far, and how they might help design science researchers engage in dialog with established research traditions.

The remainder of the paper is, therefore, organized as follows. The next section lays out the motivation by comparing design science research against conventional research approaches. Following that, I propose the fundamental world-views for design science research. These are illustrated next with the help of multiple examples. The final section discusses implications of the proposed world-views, and concludes by acknowledging limitations and pointing to future explorations.

**MOTIVATION**

World-views – ontology and epistemology – refer to a set of fundamental beliefs about the phenomenon of interest to the researcher, and how s/he will investigate this phenomenon (cf. Burrell & Morgan, 1985). Clear statements of world-views are important because they can legitimize and communicate how knowledge may be created following a mode of research. The consequences of such legitimation (or lack of it) for researchers are the impact on publication outcomes and the choice to practice certain modes of research following the implied sanction of the scientific community (Banville & Landry, 1989). Consider, for example, the argument from Applegate (1996), where she forcefully demonstrates how researchers in the IS discipline have adopted certain methodological paradigms in search of such legitimacy. She contends that as the IS discipline became part
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