

Evaluation of the Information Systems Research Framework: Empirical Evidence from a Design Science Research Project

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Abstract: The purpose of this paper is to provide empirical evidence that the design science framework Information System Research (ISR) works in practice. More than ten years has passed since ISR was published in the well-cited article 'Design Science in Information Systems Research'. However, there is no thoroughly documented evaluation of ISR based on primary data. That is, existing evaluations are based on reconstructions of prior studies conducted for other purposes. To use an existing data set to answer new or extended research questions means to conduct a secondary analysis. We point to several risks related to secondary analyses and claim that popular design science research frameworks should be based on primary data. In this paper, we present an evaluation consisting of empirical experiences based on primary data. We have systematically collected experiences from a three-year research project and we present findings of both strengths and weaknesses are presented. The main strengths are: the bridging of the contextual environment with the design science activities and the rigorously testing of IT artefacts. The main weaknesses are: imbalance in support for making contributions to both theory and practice, and ambiguity concerning the practitioners' role in design and evaluation of artefacts. We claim that the identified weaknesses can be used for further development of frameworks or methods concerning design science research.

Keywords: design science, design science research, evaluation, empirical validation, secondary analysis, primary data.

1. Introduction

Design science research (DSR) is widespread and often viewed as the dominant paradigm in the discipline of information systems (IS) (e.g. Iivari, 2007; Baskerville et al., 2009; Gregor and Hevner, 2013). One reason for this popularity is that there has been a growing interest in IS research as design research (e.g. March and Smith, 1995; Markus et al., 2002; Hevner, 2007; Peffers et al., 2008; Sein et al., 2011; Gregor and Hevner, 2013). DSR has roots in the science of the artificial and constitutes a problem-solving paradigm that seeks to create innovations (Simon, 1996). The DSR approach emphasises IT as the core of IS and challenges the managerial and organisational issues that have been in focus within the IS discipline for many years (Orlikowski et al., 2001). One purpose of DSR is to guide design and evaluation of IT artefacts (Hevner et al., 2004; Sein et al., 2011). Another purpose is to reduce the gap between responding to the need of practitioners and research rigor (Gallupe, 2007). According to Iivari (2007), DSR has been practiced in the IS discipline for decades and many scholars have contributed to the development of DSR (e.g. Walls et al., 1992; March and Smith, 1995; Markus et al., 2002; Hevner et al., 2004; Hevner, 2007; Iivari, 2007; Gregor and Jones, 2007; Vaishnavi and Kuechler, 2007; Peffers et al., 2008; Sein et al., 2011; Gregor and Hevner, 2013).

The purpose of this paper is to empirically evaluate the DSR framework Information System Research (ISR) (Hevner et al. 2004; Hevner 2007) based on primary data. With more than 7 000 citations ISR is the most well cited DSR publication in the IS discipline. No doubt, ISR has had a huge impact on DSR, not only in terms of usage, but also in terms of suggestions for improvements and extensions (e.g. Vaishnavi and Kuechler, 2007; Peffers et al., 2008; Sein et al. 2011). Despite the popularity of ISR, it lacks empirical evidence based on primary data. The empirical evidence of ISR provided by Hevner et al. (2004) is based on reconstructions of three prior studies conducted for other purposes. Our criticism is supported by the authors' own words "To illustrate the application of the design-science guidelines to IS research, we have selected three exemplar articles for analysis from three different IS journals, one from Decision Support Systems, one from Information Systems Research, and one from MIS Quarterly." (Hevner et al., 2004, p. 90). We view this way of evaluating ISR as pragmatic since to include a full empirical evaluation based on primary data would probably not be possible due to the formal restrictions such as page limit. However, a rigorous evaluation of ISR based on primary data is not conducted.

To draw conclusions based on data collected for other purposes requires a number of methodological considerations. To use an existing data set, such as previous studies, to answer new or extended research

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Evaluation of diagnostic systems John Swets,2012-12-02 *Evaluation of Diagnostic Systems Methods from Signal Detection Theory* addresses the many issues that arise in evaluating the performance of a diagnostic system across the wide range of settings in which such systems are used These settings include clinical medicine industrial quality control environmental monitoring and investigation machine and metals inspection military monitoring information retrieval and crime investigation The book is divided into three parts encompassing 11 chapters that emphasize the interpretation of diagnostic visual images by human observers The first part of the book describes quantitative methods for measuring the accuracy of a system and the statistical techniques for drawing inferences from performance tests The subsequent part covers study design and includes a detailed description of the form and conduct of an image interpretation test The concluding part examines the case study of a medical imaging system that serves as an example of both simple and complex applications In this part three mammographic modalities are used industrial film radiography low dose film radiography and

xeroradiography The case study focuses on the overall reliability of accuracy indices made by its main components that is the variabilities across cases across readers and within individual readers The supplementary texts provide study protocols a computer program for processing test results and an extensive list of references that will assist the reader in applying those evaluative methods to diagnostic systems in any setting This book is of value to scientists and engineers as well as to applied quantitative or experimental psychologists who are engaged in the study of the human processes of discrimination and decision making in either perceptual or cognitive tasks *Publications of the National Bureau of Standards ... Catalog* United States. National Bureau of Standards,1979 *Cyberspace Security and Defense: Research Issues* Janusz S. Kowalik,Janusz Gorski,Anatoly Sachenko,2005-08-26 Cyberspace security is a critical subject of our times On one hand the development of Internet mobile communications distributed computing computer software and databases storing essential enterprise information has helped to conduct business and personal communication between individual people On the other hand it has created many opportunities for abuse fraud and expensive damage This book is a selection of the best papers presented at the NATO Advanced Research Workshop dealing with the Subject of Cyberspace Security and Defense The level of the individual contributions in the volume is advanced and suitable for senior and graduate students researchers and technologists who wish to get some feeling of the state of the art in several sub disciplines of Cyberspace security Several papers provide a broad brush description of national security issues and brief summaries of technology states These papers can be read and appreciated by technically enlightened managers and executives who want to understand security issues and approaches to technical solutions An important question of our times is not Should we do something for enhancing our digital assets security the question is How to do it Publications United States. National Bureau of Standards,1980 Building Technology Publications Center for Building Technology,1978 Resources in Education ,2001 **NBS Special Publication** ,1968

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