Communications of the Association
for Information Systems

ICIS 2008 Panel Report: Design Science in Information Systems: Hegemony, Bandwagon, or New Wave?

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Abstract

In the past few years, design science has become a topic of increasing importance, especially in the North American academic IS community. Some observers see a new hegemony forming. Others dispute that but suggest that design science is merely the latest bandwagon rolling through the IS domain. A panel at the 2008 International Conference on Information Systems debated views of design science prevalent in the IS community. This paper reports on the panel discussion and attempts to position design science from various perspectives, including North American and European views, the latter with a long tradition of design-based IS scholarship.

KEYWORDS: design science, IS community, multiple perspectives, and experiences

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Abstract:

In the past few years, design science has become a topic of increasing importance, especially in the North American academic IS community. Some observers see a new hegemony in the process of forming. Others dispute that but suggest that design science is merely the latest bandwagon rolling through the IS domain. A panel held at the 2008 International Conference on Information Systems (ICIS) debated the many different views of design science prevalent in the IS community. This paper reports on the panel discussions. It will attempt to position design science from a variety of perspectives, including the North American and the European views, the latter with a long tradition of design-based IS scholarship.

Keywords: design science, IS community, multiple perspectives, and experiences

I. INTRODUCTION: THE NEW DESIGN SCIENCE WAVE

In recognition of the crucial role played by innovative design in meeting the aims of Information and Communications Technology (ICT) users both in the private and public sphere, design is regarded as an important and relevant theme for academic research. Indeed, the Information Systems (IS) Community in North America has appropriated the theme of design science (DS) as a counterpoint to the prevailing orthodoxy of research into behavioral issues. In less than five years, the view promoted by Alan Hevner, Sal March, Jinsoo Park, and Sudha Ram in *MISQ* [Hevner et al. 2004] appears to have become a 'design science hegemony' in at least some segments of the IS community; other segments remain interested in performance issues, human factors issues, or economic and strategic issues.

This may be contrasted with a somewhat different tradition prevalent in other parts of the world, and in particular, Europe, where rather more diverse notions of what IS embraces prevail, and where the importance of design has long been accepted but expressed in many different forms.

Academic careers in Continental Europe have for many years been built not only on scientific publication, but also on success in attracting funding based on the quality of design exemplified by getting the designed system into effective use. In line with that understanding, typical EU research projects require prototyped systems as deliverables and place much less emphasis on the quantity of peer-reviewed publications, as valued by key journals and funding organizations in North America. In the European research tradition, design has been pursued as the touchstone of relevant IS research. In the UK, for example, the focus has been on the development of design methodologies ranging from Mumford's ETHICS [Mumford 1995; Mumford 2003], Checkland's Soft Systems Methodology [Checkland 1999], to more engineering-based methodologies derived from software engineering [Somerville 2006]. In some countries—Germany in particular—the academic IS community is to a great extent concerned with practice: the engineering-oriented approach of design and bringing IS into use on behalf of the organizations which help to fund the research.

Nevertheless, because of the preponderance, weight, and sheer assurance of the North American view, the understanding of design science as postulated in the seminal Hevner et al. [2004] paper may have become accepted as the new orthodoxy, while the long-standing European view is being redefined in its context. However, it is possible to find advocates of all views, and indeed, many favor plurality. The notion of a pluralistic approach has a long tradition and goes back to Simon [1996] and underlies the methodologies espoused, for example, by Avison and Wood-Harper [1990]. Mingers [2001] further provided a philosophical rationale for the pluralistic approach.

II. GOALS AND ORGANIZATION OF THE PANEL

In a panel presented at the 2008 International Conference on Information Systems (ICIS), we tried to challenge and debate the recently popular and constantly growing emphasis on design science in the information systems field, as mainly advocated in North American-based publications. We noted that other traditions in IS research recognized and practiced worldwide have not lost importance.

The number of recent design science publications [e.g., Gregor and Jones 2007; Hevner 2007; Iivari 2007; Peffers et al. 2008; MISQ Special Issue on Design Science Research] and the number of conferences (e.g., DESRIST www.desrist2008.cis.gsu.edu; WITS www.citi.uconn.edu/wits2008) and conference tracks (e.g., ICIS 2008 "Design Theory and Research"; AMCIS 2008   "Philosophical Underpinnings of IS Development and Design Science Research") have left no doubt about the impact the movement has had.

But is it a bandwagon, as we have seen before in the IS field, or is it a genuine and valuable new wave? Is this new approach to design science revolutionary, evolutionary, or merely a re-labeling of research practices that have been around for years and which have produced outstanding results? Has it indeed achieved hegemony and become overbearing within the American tradition of doing IS research, or is it merely another addition to the many themes studied by IS researchers?

March and Smith [1995] identify four possible design outputs: constructs, models, methods, and instantiations, providing a framework for understanding design science. Based on that classification, many excellent IS papers, including some theory development papers, and others stressing the need for rigor and proof, could also be claimed as design science contributions.

As format for the ICIS 2008 panel, the panel chairs briefly introduced the topic and the panelists and guided the panelists through several short rounds of controversial views and opinions. Subsequently, they moderated the audience discussion for questions and answers. The panelists briefly outlined their rather different experiences with design science projects and elaborated on their experience with having (or not) pursued design science activities as cornerstones of their academic activities/portfolio. Later, panelists abstracted from their own experience and discussed the different design science opportunities in different academic systems and the pros and cons of different understandings of "doing design (science)." One of the issues raised was whether 'design science' per se is an oxymoron.

The audience included many distinguished scholars from many parts of the world, and they participated vigorously in the discussions with panel members.

III. THE VIEWS

Following are the viewpoints of each panelist. During the panel discussion, Frank Land and Claudia Loebbecke, who served as panel moderators, did not share their respective views, as this would have interfered with their role as moderators; however, their views are included in this paper.

Alan A. Hevner

Experiences with Design Science in the Field of IS

Alan Hevner presented a North American view of design science that emphasized the need for both a "relevance cycle" and a "rigor cycle" in the research. As co-author of one of the seminal IS design science papers [Hevner et al. 2004], he stood for the rather recent, but already quite dominating, view of design science in the IS field which characterizes design as a 'wicked' problem. He stated why he believes a "rethinking" of design science in the IS community was and is needed to elevate design research to an equal footing with other research paradigms in IS research projects. At the same time, he expressed regret at the way many researchers accept the guidelines proposed in the *MISQ* paper without subjecting them to critical appraisal in the context of the design problem under consideration.

Design Science Opportunities in Different Academic Systems

Alan Hevner shared his experiences and views on several key questions concerning design science research in IS. He believed that the new rethinking of design science complements existing design traditions in ways that will lead to greater visibility of outstanding design research in the leading IS journals. As a senior editor of *MISQ*, Alan discussed criteria for publishing design research in the top international journals. Based on his recent assignment at the National Science Foundation, he addressed how design research attracts external funding in the United States. Finally, from a North American perspective, he reflected on how design research can become more valued in the academic IS community, for example, in promotion and tenure decisions.

Eric K. Clemons

Experiences with Design Science in the Field of IS

Eric Clemons found the idea that design science has achieved hegemony in IS research seems at best vaguely amusing, like arguing that dynamic programming had hegemony in operations research or that Parisian cooking had achieved hegemony in fine cuisine; there is more to optimization than dynamic programming and more to operations research than optimization, and there is more to fine cuisine than Paris or even all of France. Survey data demonstrate that in entire IS disciplines (and in his in particular—business strategy), design science is neither extensively cited nor considered salient to their own research by authors or referees; other disciplines, particularly economics, decision theory, game theory, and competitive strategy are seen as more important and are more widely cited.

Design Science Opportunities in Different Academic Systems

Eric Clemons pointed out that even if one were to accept that design science is dominant at the moment, that still says very little about how one would do or judge research. Research needs "relevance" (Why should anyone care about the work?), "rigor" (Why should anyone trust the work?), and passion (Why did the authors care enough to do the work?). Following an apparently dominant paradigm produces irrelevant work, usually with pseudo-rigor, and demonstrably lacking in passion or conviction. Instead, regardless of the label, Clemons argued that one should do what one believes to be significant and accept what is rigorous and relevant regardless of its ideological framework.

While Clemons has never conceded "hegemony" to design science nor has claimed it for any other reference discipline, he enthusiastically embraced the idea that good design is important and a topic both worthy of and amenable to research.

Albert A. Angehrn

Experiences with Design Science in the Field of IS

Albert Angehrn built on his extensive experience of designing systems for companies, research project sponsors, and his own "product line" —globally used simulation software for management education. He hoped to never have considered designing anything that did not aim at relevance—real world problems or—even better—real world demand. Having been successful on a top business school with his approach, he saw publications mainly as ex-post bi-product which should never take precedence over the actual design needs.

Design Science Opportunities in Different Academic Systems

Albert Angehrn discovered from experience that the key to acceptable—good—design is cooperation with partners who very often come from practice. He found this to be much more rewarding than aiming at a publication which, at its best, can serve one's own promotion and tenure ambitions or a school's research reputation. He also noticed that such activities got a lot of recognition not only in and from practice, but also from academic audiences when he and his design colleagues mixed and mingled during purely academic events. While he admitted that it was tough to combine such design and development focus with regular publication requirements, he was amused that now writing about activities similar to his are counted as design science and find increased entry into scientific journals.

Guenter Mueller

Experiences with Design Science in the Field of IS

Guenter Mueller argued that in universities and science there is room for everything. However, a topic to be included must have at least three characteristics: contribution—it must add to the knowledge base of man-kind; vision—it must serve some purpose lifting it beyond existing practice; impact—it must provide actual solutions to perceived or real problems. Most IS designs rely on existing technology, they may be practically valid, but often lack the visionary element that allows for real progress and that begs the question of where design science can lead us.

Design Science Opportunities in Different Academic Systems

Guenter Mueller noted that IS design is successful when it applies a range of methods, is guided by vision, and has a positive impact on society. The design science approach with its dependence on the IT artifact and approved methods and models lacks the vision to recognize potential winners. Reliance on single methodologies such as those provided by design science would not have given us the World Wide Web or the explosion in new applications. Examples include the rise of Google, open source systems like Linux, SAP and many others. According to Mueller, design science has of course taken its place among the many approaches to IS research, but the methodological focus can only be the "means to the end."

Frank Land

Experiences with Design Science in the Field of IS

Frank Land has been involved with business computing for much of his career, first as a practitioner designing and implementing MIS, and subsequently as an academic establishing information systems as an academic topic for research and teaching. All his early work had design at its center. As a practitioner, design was the primary task; principles of design were derived from previous experience, often based on tacit knowledge embedded in the culture of the company he worked for. As an academic, his task was to try to understand and systematize what had been learned from practice as well as to learn from theorists such as Simon, and in particular from fellow academics, the most influential of whom were Stafford Beer with his guidelines for the design of viable systems, Enid Mumford, with her value laden socio-technical ETHICS approach, and Peter Checkland, who, like Hevner, developed a methodology based on the understanding that design was a wicked problem.

Design Science Opportunities in Different Academic Systems

The notions of design science espoused elegantly by Hevner and his collaborators in the *MISQ* paper and repeated on the platform of panel no. 9 at ICIS 2008, revisit many of the ideas promulgated by academics and consultants and put into practice to transform the way we work over the past 50 years. But, the emphasis put onto design does act as a valued corrective to the trend found primarily in North America to concentrate academic research on studies —some times called behaviorist research—which emphasize trying to find explanations for IS phenomena. As such,

design science has relevance in all academic systems. The danger is that design science has achieved a hegemonic status and has become an orthodoxy instead of a constantly evolving set of precepts taking its legitimate place amongst the panoply of concerns the IS community needs to deal with.

Claudia Loebbecke

Experiences with Design Science in the Field of IS

Claudia Loebbecke has suggested that many IS researchers who have "done a lot of design science kind of work" —possibly under a variety of labels—have never called their work design science. Some may even barely know what design science stands for and how it is discussed in the IS literature. Others have "done" DS throughout their careers and indeed used the term *design science* to define their work, but they nevertheless rarely wrote it up in scientific outlets. Many continental Europeans (and practitioners worldwide) have been involved in IS design for decades. They never published it because what they valued was a working artifact (system), not a text. Or in other words: For many years, continental Europeans have studied serious, scientific literature and cook books to learn how to build a specific, special systems (e.g., eAuction platforms, conditional access systems, or logistic support systems); they built them (tested and refined ...) until somebody (a company, a hospital, and so on) could use them in real life. Actual use in real life was the test of success. Then the Americans came and have taken over within less than five years and have now defined (via *MISQ, IRS* and so on) the term design science in IS and the field.

Design Science Opportunities in Different Academic Systems

More recently, many continental Europeans, especially those who wanted to develop an often international academic career, have changed or tried to adopt something closer to the U.S. model. The move is easy to understand but possibly hard to implement: In order to develop an academic career, i.e., to publish in *MISQ* and other leading journals, and therefore get the plaudits from their academic peers, they switched the focus of the work to be much less on the building of the system (say a mousetrap), to reflect and theorize about the actual building process aiming at some generalizations, and relying on a study of the relevant literature to help validate the argument. This move has several implications in different academic systems and leaves many open questions. But one point seems clear to me: The North Americans won the game when it came to positioning DS in the academic IS community and when it comes to making the rules for developing an international academic IS career. To be recognized as a reputable scholar, it is necessary to comply with international standards—and the U.S. tends to define and in the case of DS has defined these standards.

IV. CLOSING COMMENTS

The ICIS 2008 panel discussions and the contributions from the floor consolidated our understanding of design science's place in the IS firmament. At the same time, it indicated some unresolved issues. For example, is it legitimate or helpful to label design as a science? What is the place of values and ethics in design practice and design research? How does the IS community resolve the dilemma posed by the conflict between the need to further individual careers provided by academic structures and the hope that as academics we can make innovative and valued contributions?

It is our hope that the panel at ICIS 2008 and this commentary will lead to a discussion in the IS field on the future role of design science, and, indeed, continuing discussions about appropriate reference disciplines for our emerging science.

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ABOUT THE AUTHORS

Frank Land (chair and moderator) is Emeritus Professor in the Information Systems and Innovation Group, Department of Management, London School of Economics. After a career in the computer industry with LEO computers dating back to 1953, he joined the London School of Economics in 1967 on a grant to establish teaching and research in the then new topic of Systems Analysis for Information Systems. In 1986, he became Professor of Information Management at the London Business School. He has been a Visiting Professor at the Wharton School, Sidney University, Cairo University, Bond University, Bath University and Leeds Metropolitan University. He is a Senior Editor of JAIS. He has received the AIS LEO Award, AIS Fellowship and an Hon. Doctor of Science from the University of East London.

Claudia Loebbecke (chair and moderator) holds the chair for Business Administration, Media and Technology Management at the University of Cologne. In 2005-2006, she was President of the Association for Information Systems; from 2001 to 2007, she was an AIS Council member. With a Ph.D. in Business from the University of Cologne and an MBA from Indiana University, Bloomington, she previously held the KRAK Chair of Electronic Commerce at Copenhagen Business School. She also worked and researched at McKinsey & Co., Erasmus University, INSEAD, HKUST, UNSW, University of Paris Dauphine, Bentley College, and the LSE. She has more than 100 peer-reviewed publications and has consulted for a variety of multinational companies and public institutions.

Albert A. Angehrn is Swiss, grew up in Italy, and spends most of his time in France. He holds a doctoral degree in mathematics, has been on the faculty of INSEAD, France, since 1989 and is currently Professor of Information Technology and Entrepreneurship. He also directs CALT, INSEAD's Centre for Advanced Learning Technologies. One of his passions is the design of games and simulations, as he strongly believes in learning by doing. His current focus is on games providing rich learning experiences by allowing users to interact with realistically behaving virtual characters operating within realistic contexts and situations. His research has been published in several international academic journals. His projects have been awarded large research funds from the European community, and bring him regularly in touch with interesting organizations such as IKEA or Ferrari, a number of banks and car manufacturers, and several innovative start-ups.

Eric K. Clemons is Professor of Operations and Information Management at The Wharton School of the University of Pennsylvania. He has been a pioneer in the systematic study of the transformational impacts of information on the strategy and practice of business. His interests include strategic uses of information systems, transformation of distribution channels and channel conflict, online social networks and other uses of online content to influence consumer behavior, and the risks and benefits of outsourcing and strategic alliances. He has an S.B. from MIT and M.S. and Ph.D. degrees from Cornell University. He has more than 30 years experience at the Wharton School and at Cornell University, the Harvard Business School, Hong Kong University of Science and Technology, and the Indian School of Business.

Alan R. Hevner is an Eminent Scholar and Professor in the Information Systems and Decision Sciences Department in the College of Business at the University of South Florida. He holds the Citigroup/Hidden River Chair of Distributed Technology. His areas of research interest include information systems development, software engineering, distributed database systems, healthcare information systems, and service-oriented computing. He has published numerous research papers on these topics and has consulted for a number of Fortune 500 companies. He received a Ph.D. in Computer Science from Purdue University. He has held faculty positions at the University of Maryland and the University of Minnesota. Dr. Hevner is a member of ACM, IEEE, AIS, and INFORMS. He recently completed a two-year assignment at the National Science Foundation as a program manager in the Computer and Information Science and Engineering (CISE) Directorate.

Guenter Mueller was founding director of the Institute of Computer Science and Social Studies in 1990, and holds the chair in telematics at the University of Freiburg, Germany. Previously, he was a director of IBM Europe and in 1985 he was founding manager of IBM's European Networking Research Centre in Heidelberg, Germany, to work on OSI and Internet. He has served on several parliamentary enquiry commissions and also on scientific advisory councils in Germany and Japan. In 1995, he was a guest scientist at Harvard University and in 1998 at ICSI in Berkeley. He has acted as a consultant to SAP in Germany, and to NTT and Hitachi, both in Japan, on work in security and human interface technology. Since 2000, he has led the focus program security of the German Research Foundation (DFN). His main research interests are security and privacy and compliance, as well as electronic commerce and risk management and compliance.