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IS RESEARCH RELEVANCE: A PERSPECTIVE FROM THE DESIGN SCIENCE AND THE PHILOSOPHY OF TECHNOLOGY

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Abstract

In recent times the relevance of IS research to practice has been identified as an important issue. IS research has been criticized for a lack of cumulative tradition and proliferation of research themes that do not build upon each other. The problem of fragmentation also leads to the problem of relevance as unless a cumulative body of knowledge is built it cannot be applied in practice. We propose that a unified approach that combines both design science and natural science perspectives would bring greater relevance to IS research. Moreover, we emphasize the need to draw upon philosophy of technology to gain insights into the nature of Information Technology so that inquiry in IS research can be focused more upon the fundamental aspect of Information Technology rather than the latest technology considered to be hot. If the inquiry in IS is focused more upon new technologies in its specific aspects, it is difficult to build cumulative knowledge and in that way, IS research would always lag behind the practice.

Keywords: Design science, information systems, IS research relevance, philosophy of technology

Introduction

Over the past quarter of a century as the discipline of Information Systems has grown, it has witnessed a number of debates. These can be classified into ontological and epistemological debates. The ontological debates have been about delineating the bounds of the discipline1 i.e. about the focus of inquiry and the epistemological debates have been concerned with the appropriate nature of inquiry within these bounds2 (Jani, 2000). In the past few years a new debate regarding the relevance of IS research has surfaced.3 Critics have argued that much of IS research lacks relevance for the practitioners and have called upon to take measures to rectify the gap between research and practice (Benbasat and Zmud, 1999; Robey and Markus, 1998; Westfall, 1999; Davenport and Markus, 1999; Lyytinen, 1999).

We begin with the issue of relevance in IS research. We argue for the role of design science from two perspectives: first from the view point of the goals and mission of a professional school and second from the perspective of contribution of design science towards development of tools and artifacts that aid the natural science approaches to research. Further, we argue that integrating the design science perspective with the natural science approach would lead to greater relevance of IS research as compared to the natural science approach alone. Like March and Smith (1995), we do not propose the primacy of either of the approaches over the other.

Fragmentation of research is another problem that leads to lack of relevance as unless a cumulative body of knowledge is built it cannot be applied. One of the causes of fragmentation is related to the subject matter of inquiry. Focusing upon specific aspects of emerging technologies proves to be a moving target for research leading to the situation in which research always lags practice.

1See, for example, Alavi and Carlson (1992); Ein-Dor and Segev (1993); Gory and Scott Morton (1971); Ives, Hamilton and Davis (1980); Mason and Mitroff (1973)
2See, for example, Antill (1985); Jenkins (1985); Klein and Lyytinen (1985); Orlikowski and Baroudi (1991).
3In recent years both MIS Quarterly (1999) and Information Resources Management Journal (1998) have carried several articles pertaining to the issue of research relevance. The ISWorld mailing list, comprising of more than 2000 IS academics from around the world, has generated interesting discussions on this issue in the past.
Design Science – An Enabler of Measurement

Design is about development of technology. If natural science is about studying the natural phenomenon, design is the science of the artificial (Simon, 1981). Technology in the form of artifacts is an outcome of design and also serves as a tool enabling the process of naturalistic inquiry. Philosophers and historians of science have debated the relation between science and technology.

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In fact, design is a fundamental human endeavour. As Simon (1981) argued “engineers are not the only professional designers. Everyone designs who devises courses of action aimed at changing existing situations into preferred ones”.

Berniker’s (1987, as quoted in Weick, 1990) definition of technology takes a broad view as “the body of knowledge about the means by which we work on the world, our arts and our methods. Essentially, it is knowledge about the cause and effect relations of our actions…Technology is knowledge that can be studied, codified, and taught to others”. Thus technology is not just about the physical artifacts but also the means that achieve the ends. Fundamentally, design is a process of devising means to achieving the ends.
Some philosophers of technology have challenged the notions of technology as just “applied science” but have emphasized that many scientific breakthroughs were possible only after better instruments (an embodiment of technology) were available (Ihde, 1991). Advances in technology, whether it was the invention of telescope, microscope or the voltaic cell led to new understandings about the natural world; at the same time advances in sciences, when later applied gave rise to new technologies (Shapere, 1998). Ackermann (1985, quoted in Ihde, 1991) makes a bold claim that all the progress of science can be linked to progress of instrumentation. Thus design science can be an important contributor towards natural science approaches through the development of instruments that aid the naturalistic inquiry. Development of good measuring instruments is vital for any scientific inquiry and building good measures is an activity of design science. In IS the need for good measures cannot be less emphasized esp. in the domain of new and emerging technologies.

**IS Research – The Problem of Fragmentation**

Shapere (1998) points out that although for many centuries technology and science developed independently, often technology preceeding scientific understanding, in the past century and half the relationship between science and technology has been mutual. Shapere (1998) argues that only after science became more unified in its approach, it lead to greater impact in development of technology. In his words “Science before the latter part of the nineteenth century was piecemeal in its inquiries, often groping to develop previously unheard of concepts. In two respects which are relevant to the present inquiry, this situation has changed radically in the twentieth century, resulting in a transformation of science, and with it, its relations to technology. First, the piecemeal approach of earlier science – that is the study of specific subject matters, like the motion of bodies, the nature of salts, the nature of gases, each studied in isolation from other domains – increasingly was succeeded by a new form of inquiry, in terms of increasingly broad and detailed unifications of each isolated subject-matters” (Shapere, 1998).

If we compare this to the proliferation of themes in IS research without a cumulative approach, the need to have a more focused approach is evident. IS research is still in its nascency. It has been criticized for a lack of cumulative tradition (Keen, 1980, Lyytinen, 1987) and has also been described as a fragmented adhocracy (Banville and Landry, 1989). Weber (1987) criticizes some of the IS research that has shifted from examinations of one technology to another without building any cumulative research. As Weber (1987) pointed out the themes of doctoral dissertations could be mapped with the latest technological developments in the field at that time.

Information Technology certainly forms the core of IS discipline. The nature of IS is to integrate perspectives of the various reference displines and not just position itself by excluding the social or technological aspects of IS. However, technology per se, from the perspective of design science, has not been payed its due attention in IS research (Nunamaker et al., 1990; March and Smith, 1995) As Nunamaker et al. (1990) pointed out, the nature of technology is ignored in many studies and all technologies are considered equivalent. Thus we have the situation that on one hand, studies have been made upon specific technologies that cannot be linked together and on the other hand technology is considered as given and the nature of technology itself is ignored.

**IS Research and the Philosophy of Technology**

Some IS researchers have emphasized the need to consider philosophy as a reference discipline for IS (Hodges, 1995 quoted in Courtney and Pora, 2000). IS research in the past has drawn upon many references displines in the social and behavioral sciences. Philosophy is a natural ally of any discipline that is still not mature since it

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6The developments like gun powder, paper, mariner’s compass and printing machine in China, the iron pillar in India that has resisted rust for many centuries, or Hero’s fountain developed by the Greek mathematician were technologies that were developed before any understanding of the underlying developed.

helps understand the fundamental questions that the discipline needs to focus upon. Courtney and Pora (2000) argue that drawing upon the discipline of philosophy can provide a basis for well-reasoned and cumulative research in IS and also towards the development of a philosophy of Information Technology. A lot of research has been done to understand the technology itself and the role it plays. Information technology would share many of the attributes of the other technologies and at the same time it would have its own unique features not shared by other technologies. To understand the nature of Information Technology and its impact on individuals, groups, organizations and society in general, it would be a good idea to look into the philosophical aspects of Information Technology drawing upon the research work on philosophy of technology, which deals with the fundamental question of the nature of technology. We propose the following framework as an architecture of IS research.

Just as a building needs strong foundations, IS research needs to build upon solid foundations of philosophy of technology, philosophy of science, design sciences and natural sciences. Philosophy of science provides guidelines for the nature of inquiry to be conducted within IS research. In the past IS research has benefited from the insights from philosophy of science (e.g. the debates on the need for a paradigm for IS). If design science focusses upon the first order questions of building and evaluation of the artifacts built (efficiency, effectiveness, cost/benefit analysis), philosophy of technology focusses upon the second order questions about the nature and meaning of technology. Philosophy of technology as a reference discipline in our context is concerned with the nature of information technology, its intended and unintended consequences, the utilitarian and ethical aspects that need to be focused upon. Design science and natural science represent the reference disciplines of computer science, management science, and other social and behavioral sciences e.g. economics, psychology, sociology. The focus of IS research is upon development of artifacts and to study its impact in the contexts of usage by individuals, groups, firms, markets and society. A design science led inquiry also needs to be supported by the natural science approach (March and Smith, 1995). Theories derived from social and behavioral sciences can guide the building of actual artifacts. e.g. a computer mediated communication technology that is built guided by the insights from social and behavioral theories would have better chances of acceptance.

**Conclusion**

We argue that being a professional discipline, IS should give due emphasis to design science approaches. Further we argue that until a more unified approach is taken between design sciences and natural sciences, perhaps it would be difficult for IS research to have an impact on practice. As it happened with natural sciences in the earlier years, technological developments are leading the scientific inquiries in IS rather than having a mutually influencing relationship that exists today in the natural sciences. Since the technological developments, especially in case of Internet technologies, are occurring so rapidly, if the focus is on specific elements of technology then IS research would end up following the technological developments rather than influencing it concurrently. IS needs to focus more on the fundamental aspects of information technology to guide the research process.

**References**


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8 Refraining from technological determinism, that considers technology to be driving all changes, we consider technology to be neutral, as offering “potentialities”. The potentialities are realized upon use. We take the structurational approach that technology shapes and is shaped by its users.

9Unlike the early days, when very little was known about the processes of design itself and design was considered more as a craft or art, today a good amount of knowledge exists about it. It is possible to systematically study design as an activity and also to judge the outcomes of design in terms of its intended and unintended consequences. The process of design itself can be studied through natural science approach. The knowledge gained through the study of design process can illuminate the activity of design.
Theoretical Foundations and Research Methods


