Robert D. Galliers and Frank F. Land

viewpoint

Choosing Appropriate Information Systems Research Methodologies

We believe we should draw attention to two disturbing tendencies in information systems (IS) research. The first relates to the primacy of traditional, empirical research more suited to the natural sciences, at the expense of less conventional approaches that nevertheless provide important contributions to our search for improved knowledge. Although the experimental design of such IS research may well be academically acceptable and internally consistent, all too often it leads to inconclusive or inapplicable results.

The second relates to the tendency of some of our most respected institutions to advocate a particular mode of IS research irrespective of the particular IS topic being studied. Evidence for both these contentions can be found in the results of a study undertaken by Vogel and Wetherbe [6]. For example, they suggest that as much as 85 percent of published IS research undertaken by leading U.S. institutions is of the traditional kind.

In order to gain some insight into what constitutes appropriate research in the field of IS, it is advisable first to consider the nature of information systems themselves and then to look at what we hope to gain from undertaking research in the area. Traditionally, the topic has often been viewed as residing, for the most part at least, within the province of technology. Increasingly, however, both IS academics and practitioners have begun to realize it is more appropriate to extend the focus of study to include behavioral and organizational considerations. This is explained by our wish to improve the effectiveness of IS implementations *in* organizations and to assess that impact *on* individuals or organizations.

This view of IS requires us to place computer-based information systems within the broader category of designed IS, which is itself just one component of our subject matter. Indeed, our field of study is much broader since it is concerned with IS and their relations with the organization and the people they serve [3]. This wider view brings with it added complexity, greater imprecision, the possibility of different interpretations of the same phenomena, and the need to take these issues into account when considering an appropriate research approach.

The problems inherent in IS research arising from this view of the subject matter and that call for new approaches are now well documented [4, 5]. Despite this, the focus remains for the most part on the scientific paradigm, the argument being that:

> the empirical-analytical method is the only valid approach to improve human knowledge. What cannot be investigated using this approach, cannot be investigated at all scientifically. Such research must be banned from the domain of science as "unresearchable." [1, p. 14]

Rather than be banned "from the domain of science" (or at least academic respectability!), the approach has been to treat IS research as a science, with as much as 50 percent of the effort being placed on laboratory-based experimentation or on field surveys [6]. In both cases, heavy emphasis is placed on the use of statistical analysis, with the consequent need for exact measurement of the factors being studied; for example, x percent of a measured variance is due to factor y. Two major limitations of this style of research immediately surface:

(1) There are only a limited number of factors that can be studied under laboratory conditions, and it is difficult to reproduce a "real-world" environment in these circumstances. For example, a study of decision-making aids on the decision-making behavior of a maner can only be properly studied in the real world decision-making environment (e.g., noisy, stressful, and lacking in complete information). Studies that do not reproduce that environment may select as "best" a technique that would be ineffective in the real world.

(2) The need to apply values to variables often leads to the elimination of factors that, although they may have relevance, are difficult to value: thus applying to them zero value—which is probably the one value they do not have!

There are also grave dangers that arise from these limitations: The use of statistical tests implies a preciseness of measurement that is often not sustainable and could actually be misleading. The need to limit the number of factors studied could also

Authors' Present Addresses: Robert D. Galliers, School of Computing and Quantitative Studies, Curtin University of Technology, Bentley, 6102, Western Australia; Frank F. Land, Information Management, London Business School, Sussex Place, Regent's Park, London, NW1 4SA, England.

lead to conclusions being drawn that again could mislead the unsuspecting. In this case, the problem is we are left not knowing whether different results could be obtained if other variables had been considered. Indeed, many researchers take pains to include caveats and disclaimers in papers arising from this kind of experimentation. And further research is invariably proposed with a view to discovering whether different results emerge from the study of different variables, thus compounding the fiasco.

Surely the measure of the success of research in an applied topic such as IS is whether our knowledge has been improved to the extent that this improved knowledge can be applied in practice. If, as a consequence of our experimentation, we mislead or produce conflicting or confusing results with little or no applicability, one is left wondering whether the experiment was worth undertaking in the first place and, more generally, whether much of this style of research is at all applicable to the IS field.

We would ask for greater diversity in the kind of IS research approach that is considered valid. IS is a meta-subject that spans many disciplines in the social sciences, in business, and, only occasionally, in the natural sciences. Consequently, research that is appropriate in the latter is likely to be inappropriate in the IS field. IS, as we have defined the term, is also an applied discipline, not a pure science. It follows, therefore, that if the fruits of our research fail to be applicable in the real world, then our endeavors are relegated to the point of being irrelevant. Our research methods must take account of the nature of the subject matter and the complexity of the real world. The simple transference of research suited to the science laboratory to the study of IS is almost always doomed to fail.

A range of approaches are available to us, not simply the more traditional ones. Each has its own strengths and weaknesses (cf. the paper by Galliers in [5]) and will be more or less applicable in different circumstances. If greater thought is given to the choice of approach to take into account contextual factors, there is a far greater chance our endeavors will not be in vain. The research itself is likely to be more complex and difficult to pursue as a consequence, but the results are likely to make the effort worthwhile.

Unfortunately, due to the tendency to publish research of a more traditional kind, there are few published accounts of the successful application of the newer approaches. One well documented exception to this rule relates to action research (i.e., the application of so-called "soft systems methodology" [2]).

To assist the IS researcher in making an appropriate choice, we propose a taxonomy of IS research methods (see Table I). The taxonomy is based on those previously proposed by Galliers [5] and Vogel and Wetherbe [6]. It differs from these earlier efforts, however, in that it does not suffer from the problem of overlapping categories by ensuring the *object* on which the research effort is focused and the *mode* by which the research is carried out are differentiated.

Most of the categories included in the proposed taxonomy require no introduction, given their common usage and the fact that detailed definitions have been provided in the literature already cited. However, two of the newer approaches, the subjective/argumentative and descriptive/interpretive categories, may require further explanation. The former is defined by Vogel and Wetherbe as capturing "creative MIS research based more on opinion and speculation than observation" [6] and may therefore include some future research. The latter is illustrated by a number of papers in [5], including one by Boland who classifies the approach as being in the tradition of phenomenology (i.e., concerned with description). In addition, he recognizes the bias of the researcher in his/her observations, or rather interpretations, and hence the approach falls within the hermeneutical tradition as well. The simulation, or game/role-playing category, has been placed on the boundary of the traditional and newer approaches. This is to indicate that these kinds of approaches range from the positivistic (simula-

TABLE I. A Taxonomy of IS Research Approaches

	Modes for traditional empirical approaches (observations)							Modes for newer approaches (interpretations)			
Object	Theorem proof	Laboratory experiment	Field experiment	Case study	Survey	Forecasting[a]	Simulation[a] and	Game/role playing[a]	Subjective/argumentative[a]	Descriptive/interpretive	Action research
Society	No	No	Possibly	Possibly	Yes	Yes	Possibly		Yes	Yes	Possibly
Organization group	No	Possibly (small groups)	Yes[b]	Yes[b]	Yes[b]	Yes	Yes		Yes	Yes[b]	Yes[b]
Individual	No	Yes	Yes	Possibly	Possibly	Possibly	Yes		Yes	Yes	Possibly
Technology	Yes	Yes	Yes	No	Possibly	Yes	Yes		Yes	Possibly	No
Methodology	No	No	Yes	Yes	Yes	No	Yes		Yes	Yes	Yes

[a] Includes future research.
[b] Includes longitudinal studies.

tion) to the subjective (role playing).

The extended taxonomy for IS research hopefully illustrates the point that the scientific paradigm is not the only, nor indeed always the most appropriate basis for our research. Greater thought regarding the choice of research method is required as is a wider interpretation of what is seen as acceptable research. Hopefully, the proposed taxonomy assists on both counts.

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