Communications of the Association for Information Systems

Volume 43 Article 14

8-2018

A Comment on "Is Information Systems a Science?"

Alan R. Dennis
Indiana University, ardennis@indiana.edu

Joseph S. Valacich
University of Arizona

Susan A. Brown
University of Arizona

Recommended Citation
Dennis, Alan R.; Valacich, Joseph S.; and Brown, Susan A. (2018) "A Comment on "Is Information Systems a Science?"," *Communications of the Association for Information Systems*: Vol. 43 , Article 14.
DOI: 10.17705/1CAIS.04314
Available at: https://aisel.aisnet.org/cais/vol43/iss1/14

Communications of the Association for Information Systems

Essay DOI: 10.17705/1CAIS.04314 ISSN: 1529-3181

A Comment on "Is Information Systems a Science?"

Alan R. Dennis
Kelley School of Business
Indiana University
ardennis@indiana.edu

Joseph S. Valacich
Eller College of Management
University of Arizona

Susan A. Brown
Eller College of Management
University of Arizona

Abstract:

In this paper, we respond to McBride's (2018) paper on whether information systems is a science. We first argue that information systems is indeed a science in that it draws from and creates knowledge in a form similar to many different disciplines, including psychology, sociology, mathematics, economics, computer science, and engineering. We counter the flawed logic of methodical extremists who believe that their approach represents the best or only path to knowledge. Specifically, we argue that many different methods of inquiry and discovery are appropriate in information systems and that each has its strengths and weaknesses.

Keywords: research, quantitative research, qualitative research, discipline, dance.

This manuscript was solicited by the Department Editor for Debates, Karlheinz Kautz.

1 Comment

Neil McBride (2018) asks if information systems (IS) is a science and perceives several problems with our current approach to research. In his paper, he argues that, although many researchers view information systems (IS) as a physical science, it is not a physical science or even a science at all. Instead, he argues that information systems is a "discipline in the humanities" (p. 163). He proposes dance studies as the most appropriate discipline to serve as a model for IS. He (p. 171) concludes:

> *The idea that information systems is a science, which Dennis and Valacich (2014) repeat in referring to replications as advancing science and calling for information systems colleagues to join a quest for scientific advancement encourages a myopic view of a living, dynamic discipline.*
>
> *Information systems are complex emergent phenomena that cannot be reduced or described in simple scientific formula. Imagine the inadequacy of reducing a dance to a description of a set of mechanical movements, and yet that it exactly what many do in information systems research.*
>
> *Unless the information systems academic community grasps this point, the IS discipline will continue to atrophy and shrink into a husk of TAM studies and introspective debates about the significance of minute statistical variation.*

As editors of *AIS Transactions on Replication Research*, we disagree with McBride's (2018) conclusion. Research *does* reduce something as complex as dance to a description of mechanical movements (Guest, 1998; von Laban, 1975) in the same manner that musicians reduce something as complex as music to a musical score. Documenting dance or music and performing dance or music crucially differ in that the first strives to capture knowledge and second strives to enact it. Dance or music is not information on a page, but information on a page is one form of knowledge about dance and music that one can document and transfer to others.

Information systems knowledge and information systems practice have a similar dichotomy. Knowledge is to practice as a musical score is to music (or a dance score is to a dance performance). A dance score or musical score is the knowledge that individuals use to enact the musical performance—but the score is not the performance. Likewise, no two musicians will likely play the same score in exactly the same way, although audiences will likely to recognize the two performances as performing the same music.

Information systems *research* focuses on producing new knowledge about information systems, not on enacting the performance of using or creating an information system. As a scientific discipline, we not only document knowledge observed in the current practice of information systems but also create new knowledge that is disconnected from current practice. In this way, we focus on changing the future and not merely on documenting the present or the past.

As such, current practitioners may perceive our research as irrelevant. And, if so, perhaps we are not looking far enough into the future. Consider the following example: do you know who invented the windows and mouse interface and in what year? Think about it before you read on.

The windows and mouse interface constitutes perhaps one of the more important pieces of academic research that IS researchers have produced: we claim the inventor as an information systems researcher because he attended the HICSS conference several times.

Doug Engelbart invented the windows and mouse interface and showed it publicly for the first time at a computer conference in 1968 (see http://www.dougengelbart.org/firsts/dougs-1968-demo.html). He showed it to all the major computer manufacturers and none expressed any interest in it. They said it lacked relevance and instead suggested that he focus his research on developing a better command line interface. He finally convinced Xerox to invest in a research project and spent half a decade at Xerox PARC working on it before Xerox closed the project due to poor relevance. Fortunately, Doug showed it to Steve Jobs at Apple as Xerox was shutting down the project, and the rest is history.

Thus, we see information systems research as about building IS knowledge that will eventually lead to better performance even though today's practitioners may not find it relevant in the same way that practitioners in the 1960s and 1970s found the windows and mouse interface relevance.

The IS discipline is a polyglot. It draws from and creates knowledge in a form of many different disciplines. Some IS research is a social science and draws on the knowledge and forms of psychology, sociology, and so on. Some IS research is mathematics and draws on the knowledge and forms of economics, operations

research, and so on. Other IS research is design science and draws on the knowledge and forms of engineering, computer science, and so on.

We are social scientists by nature (critical realists), although we began our careers as computer scientists and mathematicians. Thus, in this paper, we focus on the social sciences that we draw on in our research and leave the economics and design science arguments to our more knowledgeable colleagues.

As social scientists, we believe that humans are predicable creatures and that fundamental theories that can explain and predict human behavior exist. Humans have free will, so humans can always choose to behave in unpredictable ways, but free will does not mean an inability to predict behavior. When I drive my car around a curve, I predict that no cars will be coming towards me in the lane. That does not mean that a car *cannot* ever do so: just that we have social structures that guide behavior, so I can predict that one will not. Likewise, our automatic cognition (which Kahneman (2011) calls "system 1" cognition) acts in predicable ways so that priming and framing have predictable effects, although they do not affect everyone to the same extent (Dennis & Minas, 2018).

Counter examples will always exist. Cars in England drive on the left side of the road compared to the right in the US (different social structures) and car accidents occur from people driving on the wrong side (either by accident or deliberate violation of social structures). People can choose to ignore social structures and people have different system 1 heuristics. But counter examples do not prove the fundamental predictability wrong, which explains why we are a social science, not a physical science. Humans are not as predictable as physical substances because, as Giddens (1984) notes, they always have the choice to do otherwise.

McBride (2018) also argues that "information systems research would benefit from a return to the *primacy* of narrative" (p. 169, emphasis added). He views the narrative and the qualitative research that produces it as the best and primary way that IS researchers should build knowledge. We agree that narrative and qualitative research represents an important component of research and have explicitly argued as much in our own work (Dennis & Valacich, 2001; Venkatesh, Brown, & Bala, 2013). However, we disagree that they represent the only way or the preferred way to do IS research.

All our careers, we have fought the battle against methodological extremists who believe that their path constitutes the only path to knowledge. Like religious extremists, their positions are dangerous because they contain a seed of truth that the uninformed can mistake for the only truth. For example, as we have argued earlier (Dennis & Valacich, 2001, pp. 4-5):

> *Each scientific method has its strengths, and unfortunately, all methods of science are flawed. For example, one of the most common criticisms leveled at experimental research is that it is artificial. How can studying undergraduate students working on pretend tasks for which they have little interest or experience possibly be "real"? Isn't laboratory research seriously flawed? Well, yes. The critics are right: all laboratory experiments are seriously flawed. However, all research methods are seriously flawed. One of the best discussions of the limitations of experimental research—and survey research and field research—is that by McGrath (1982). McGrath (1982) argues that research methods can be evaluated on three dimensions:*
>
> - *Generalizability with respect to populations*
> - *Realism for the participants*
> - *Precision in the control and measurement of variables.*
>
> *It is literally impossible to design a research study that satisfies all three dimensions, although sometimes it is possible to strike an uneasy balance among two of the three (and fail miserably on the third) (McGrath, 1982). Laboratory experiments, for example, maximize precision, but usually fail to satisfy generalizability. Field studies maximize realism, but fail to satisfy generalizability (because they study a small number of non-randomly selected situations) or precision (because there are a host of uncontrolled factors). Surveys maximize generalizability, but fail to satisfy realism (because they do not study actual behavior but instead ask participants to recall perceptions) or precision (because there are a host of uncontrolled factors).*
>
> *Because all research methods are imperfect, anyone claiming that experimental research is too seriously flawed to be used or that surveys or field studies are better is simply ignorant. No one method is better or worse than any other; they are simply better at some aspects and worse at others. Therefore, to truly understand a given phenomenon, we believe it is important to study it using different methods across a series of different studies.*

This sentiment is echoed in our recent call for mixed-methods research (e.g., Venkatesh et al., 2013; Venkatesh, Brown, & Sullivan, 2016) and grounded in the awareness that no single method can provide a complete picture of the phenomena we study. Although we appreciate qualitative research, it sacrifices precision and generalizability for realism. However, by adopting a more pluralistic methodological view as seen in IS research, we can leverage different approaches to arrive at a more complete understanding and explanation of what we study.

As we argue above, we believe that IS *research* focuses on producing new knowledge about information systems. As a science, we not only document knowledge observed in the current practice of information systems but also strive to create new knowledge that, in some cases, may seem to be disconnected from current practice. In this pursuit, researchers appropriately use many reference disciplines and associated discovery methods. By openly embracing such diversity, such multi- and mixed-method approaches greatly increase the likelihood of gaining broader and deeper insights. Likewise, by embracing the fundamental principle of scientific inquiry (i.e., replication), IS research can further refine and enhance the knowledge it creates. In conclusion, information systems is a science, a science that accepts a variety of discovery methods, and it openly accepts their flaws and aggressively works to maximize their strengths.

References

Dennis, A.R., & Minas, R. M. (2018). Security on autopilot: Why current security theories hijack our thinking and lead us astray. *The DATA BASE for Advances in Information Systems*, *49*, 15-37.

Dennis, A. R., & Valacich, J. S. (2001). Conducting research in information systems. *Communications of the AIS*, 7, 1-41.

Dennis, A. R., & Valacich, J. S. (2014). A replication manifesto. *Transactions on Replication Research*, *1*(1), 1-4.

Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. London: Macmillian.

Guest, A. H. (1998). Choreo-graphics: A comparison of Dance Notation Systems from the fifteenth century to the present. New York, NY: Routledge.

Kahneman, D. (2011). *Thinking, fast and slow.* New York, NY: Macmillan.

von Laban, R. (1975). *Laban's principles of dance and movement notation, with 114 basic movement graphs and their explanation*. Boston, MA: Plays.

McBride, N. (2018). Is information systems a science? *Communications of the AIS*, *43*, 163-174.

McGrath, J. E. (1982) Dilemmatics: The study of research choices and dilemmas. In J. E. McGrath (Ed.), *Judgment calls in research* (pp. 69-80). Beverly Hills, CA: Sage.

Venkatesh, V., Brown, S., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly*, *37*(1), 21-54.

Venkatesh, V., Brown, S. A., & Sullivan, Y. (2016). Guidelines for conducting mixed-methods research: An extension and illustration. *Journal of the Association for Information Systems*, *17*(7), 435-494.

About the Authors

Susan A. Brown is the APS Professor and department head of Management Information Systems in the Eller College of the University of Arizona. She completed her PhD at the University of Minnesota. Her research interests include technology implementation, individual motivations and consequences of IT use, mediated interactions, and research methods. She has received funding for her research from the National Science Foundation, and other public and private organizations. Her work has appeared in leading journals including *MIS Quarterly*, *Information Systems Research*, *Organizational Behavior and Human Decision Processes*, *Communications of the ACM*, *Journal of Management Information Systems*, *Journal of the Association for Information Systems*, and others. She has served as an AE at *MIS Quarterly*, *Information Systems Research*, *Journal of the Association for Information Systems*, and *Decision Sciences*, and is currently an SE at *MIS Quarterly* and coeditor-in-chief of *AIS Transactions on Replication Research*, and became an AIS Fellow in 2017.

Alan R. Dennis is Professor of Information Systems and holds the John T. Chambers Chair of Internet Systems in the Kelley School of Business at Indiana University. He was named a Fellow of the Association for Information Systems in 2012. Professor Dennis has written more than 150 research papers, and has won numerous awards for his theoretical and applied research. His research focuses on three main themes: team collaboration; fake news on social media; and information security. He is President Elect of the Association for Information Systems and co-Editor-in-Chief of *AIS Transactions on Replication Research*. He also has written four books (two on data communications and networking, and two on systems analysis and design).

Joseph (Joe) S. Valacich is the *Eller Professor of MIS* within the Eller College of Management at the University of Arizona, a Fellow of the Association for Information Systems (2009), and the Chief Science Officer (CSO) of Neuro-ID, Inc. His primary research interests include deception detection, human-computer interaction, cyber security, and e-business. Dr. Valacich is a prolific scholar, publishing more than 200 scholarly articles in numerous prestigious journals and conferences. His scholarly work has had a tremendous impact not only on the Information Systems field, but also on a number of other disciplines, including computer science, cognitive and social psychology, marketing, and management. In August 2018, Google Scholar lists his citation counts as 22,800, with an H-index of 69. He was the general conference co-chair for the 2003 International Conference on Information Systems (ICIS) and the 2012 Americas Conference on Information Systems (AMCIS). He is the Honorary Chair for ICIS 2021 to be held in Austin, Texas.