The Knowledge Application Gap in Information Systems Research and Education
And their Quest for the Dependent Variable

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Introduction

In the information resource management (IRM) and information systems (IS) literatures, *the quest for the dependent variable* has emphasized the need to connect the information resource and technology inputs to specific performance outcomes. In other words, research studies and frameworks involving adoption and implementation of new technologies and business technology innovations need to include realistic implications for performance outcomes. Analogous to the scholarly pursuit of knowledge contributions to address "So what?", research studies and frameworks need to address the same question from a performance outcomes perspective. The challenge albeit lies in defining the specific focus of performance outcomes. In the business context such performance needs to be defined at the level of the specific business enterprise. In the context of information systems research and education such performance needs to be defined at the level of the specific stakeholders that the proponents of IS and IRM research and education claim to serve.

Growing interest in the nascent discipline of knowledge management has further contributed to pushing the emphasis from the inputs side of the performance equation to the performance outcomes. It is being realized that it is not *knowledge* archived in various technologies and related artifacts and repositories or human minds, but *if* and *how* it connects to the focal performance targets that is of critical interest. Some researchers [2] are referring to the gap between the input side of the equation [comprised of information technologies, resources, and, artifacts] and the projected performance outcomes as the "knowledge application gap." IRM and IS researchers are demonstrating active interest in their quest to bridge the knowledge application gap to better connect to the performance outcomes value proposition of such systems. Research agenda in various programs on knowledge management have been defined to target the inefficiencies inherent in knowledge processes of inter-, intra-, and extra- enterprise systems.

Overall intent of many such efforts is to create 'frictionless' flows of knowledge by minimizing the inefficiencies inherent in the design of such human computer systems as well as the supra-systems within which they are embedded. Examples of such systems that have recently occupied the interest of researchers and practitioners with focus on knowledge management include enterprise resource planning (ERP) systems, customer relationship management (CRM) systems,

enterprise application integration (EAI) systems, and supply chain management (SCM) systems. Many such systems aim to get the right information to the right individual at the right time in the right form [8], although some caveats [6] about these oversimplifications must be observed. The basic premise guiding the paradigm of developing real-time response systems is that such *push-* or *pull-* based systems could effectively help in bridging the knowledge application gap. It is presumed that bridging this gap could help ameliorate most of the problems that are attributable for 50% to 75% failure rates of many such systems.

The Knowledge Application Gap and the Quest for the Dependent Variable

While the issues of the knowledge application gap in enterprise information systems have received the deserved attention of researchers and practitioners, one observes similar challenges being encountered by IRM and IS research and education. However, despite the pre-eminence of some of the most revered research journals in IRM and IS, this knowledge application gap seems to be on the rise. Elements of this gap have been previously debated and discussed in some other scholarly forums by IS researchers who have reconciled that rigor and relevance [in research] can be achieved simultaneously. Therefore, the intent of this column is not to re-discuss the same issue. Rather, the primary focus of this column is on understanding how specific performance outcome targets for IRM and IS research and education should be defined. At stake is not only the issue of intellectual independence, but also the survival of the IRM and IS disciplines. In particular, the following discussion attempts to draw attention to the existing inefficiencies in the processes of knowledge creation, dissemination, renewal, and creation that have straitjacketed the IRM and IS research in gaining adequate attention and regard of practitioners of these disciplines. Another related issue is about the dialog about reference disciplines started in 1980 [7]. Specifically, about when and if the IRM and IS disciplines would be mature enough to contribute to the 'reference disciplines' from which they have borrowed until now. It may be argued that the very survival of the IRM and IS disciplines may depend upon their taking an equal role in terms of their contributions to not only intra-disciplinary but also intra- and multi-disciplinary research and practice. Only be establishing their sustained value proposition within the larger bodies of disciplinary knowledge *as well as* in eyes of the potential users can these disciplines hope to thrive in the future. This suggests that the quest for the dependent variable for IRM and IS research and education must give due consideration to these specific performance outcome targets that may finally determine the very survival of IS and IRM disciplines of scholarly inquiry. Accordingly, scholars and scientists in pursuit of technological "know-how" of IS and IRM as well as the research and publication processes must guide their efforts with a clear understanding about not only *what our purposes are* and *how we can best accomplish them* [10].

Bridging the Knowledge Application Gap in IRM and IS Research

It is a stark realization that speculative research produced by commercial technology analyst firms commands the attention of popular media as well as the practitioners of IRM and IS. Often, the same practitioners are oblivious about the existence of most of the highly regarded research journals in these disciplines. One of the most distinguished research journals in IS has been recently trying to redefine its business model in its aspiration to get similar visibility and gain attention of the popular media. Another highly distinguished research journal in IS has launched a separate executive edition that is hoped to primarily cater to the needs of the practitioners.

These and other similar efforts seem to be aimed at bridging the knowledge application gap existing between IS and IRM research and practice. With ever greater dependence of business enterprises on information systems, increasing rates of failures of complex information systems, the ongoing shift of the software-hardware paradigm to ASP model to web services, increasing levels of integration sought at intra- and inter- enterprise levels, growing interest in the plug- and play- utility computing systems that self-heal and self-adapt, and increasingly greater vulnerability of most critical national and global information infrastructure systems to security and privacy threats, it seems that *the need for guidance about IS and IRM design and implementation has never been greater* for *developers, users, vendors, and supporters of such systems and technologies*. However, it is interesting to observe that the most prestigious research journals are finding it necessary to re-assess their priorities at this time.

Isn't this time when all the business and technology users inundated with problems too complex to be fathomed by the commercial analyst firms should be turning to research journals that define the benchmarks for the IS and IRM disciplines? My reference is to practitioners in for-profit and non-profit corporations, *as well as* those in governments, academia, and all institutions and other organizations that are dependent upon information systems. Are they possibly unaware about the existence of these research journals? Are they possibly unaware about the rich insights that they may possibly derive from these research literatures to help them fathom the complex problems that determine their future survival? Or is it that they find it difficult or impossible to connect with insights published by the crème de la crème of scholars of IRM and IS in these journals? Perhaps, the knowledge gap exists because of the existing reward and recognition systems in academia that continue to emphasize the inputs side of the equation regardless of if and how those inputs really impact relevant performance outcomes. Perhaps, there is a need for connecting the inputs into the research and publication equation with the projected performance outcome targets that really matter. Given increasing attention to such concerns, some business and technology program rating criteria (such as *Business Week*'s intellectual capital score for research supporting MBA programs) have been devised but they still seem to be a far cry from addressing the dependent variable that really matters. Some empirical studies could possibly help pin down the exact reasons why in these times of greatest demand for IRM and IS research, the supply side [editors, journals, researchers] is scrambling to create new knowledge products and re-define existing knowledge products while most revered research journals seem to offer a hit-or-miss proposition for connecting with the dependent variable of interest. Whatever the reason, it is apparent that these problems are symptomatic of the *critical* knowledge application gap that increasingly characterizes the domain of information systems research. Perhaps, the situation is not as bleak as it seems if one takes into consideration some of the leading national and international research programs that are specifically trying to attack many of the pragmatic practitioner problems listed above. Nevertheless, the same knowledge application gap concern applies to the gap between the creation of knowledge in such research centers and its dissemination through the most visible channels of academic research and applied practice. The critical issue is about the link between research and its impact on policy and practice at some level and is relevant to all the above scenarios regardless of the diversity of their contexts [4].

Bridging the Knowledge Application Gap in IRM and IS Education

Another related issue that is difficult to understand is why some of the information systems education programs need to re-justify the reasons for their existence as valid domains of higher education curriculum. Given increasing complexity of information systems constellations that are more and more critical for any and all types of organizations, how can one understand diminishing need for related education? Or, does the problem lie elsewhere? Perhaps, IS and IRM have been gradually lagging behind other business and technology related disciplines that have been busy incorporating information and technology related themes within their curricula. However, regardless of greater integration of information and technology themes within other disciplines, they still cannot address the increasing complexities that characterize the problems and challenges faced by the IS and IRM practitioners. Perhaps, IS and IRM practitioners are finding that the curricula of most IS and IRM programs and courses have been unable to keep pace with the tumultuous changes that characterize the landscape of IS and IRM technologies. Perhaps, the IS and IRM practitioners are finding that given the evolving nature of the discipline, some faculty may have become disconnected from the related fields of practice and have to themselves depend upon secondary sources of information. Non-existing standards about practical experience and expertise of most IRM and IS faculty and increasing emphasis on prior practical experience for most students may further compound this problem. Again, whatever the reason(s), the knowledge application gap of IS and IRM education is apparent given that what must be boom times for such programs are turning out to be times of status quo or challenge for survival. Given the writers' greater familiarity with the business programs in higher education, these problems may or may not be as representative of educational programs that are not in business schools. However, given the increasingly greater context of IRM and IS practice embedded within multi-disciplinary contexts, similar challenges seem to characterize all educational programs with focus on IRM and IS.

Increasing agility and adaptability of other business and technology disciplines in quickly learning and integrating the information and technology themes cannot be ignored. It is not surprising that in many business and technology research and education programs, IRM and IS have to incessantly assess and redefine their core value propositions for ongoing subsistence as viable disciplines of research and practice. IRM and IS research and education can perhaps take a leaf from the lessons of success of some other business and technology disciplines. Specifically, the IRM and IS disciplines need to realize that increasingly their success and competence will depend *not only* on advancing their own disciplinary research and practice *but also* in contributing to the advancement of inter-disciplinary and multi-disciplinary research and practice. Accordingly, any definition of the dependent variable as well as related metrics of performance needs to take these issues into account. Apparently, the more structured and routine aspects of information processing and decision-support that constituted the earlier core of IRM and IS research are relatively easy to integrate into the respective curricula by other disciplines. However, there are more challenging non-structured and non-routine aspects of information processing and decision-support that have increasingly greater relevance for success of business and technology systems as well as organizations that deploy such systems. Therefore, perhaps it is time to heed the call for addressing the information and systems related challenges inherent in wicked environments that was last made about 30 years ago [3, 9].

Embracing Uncertainty as Information is Improbability

In Cybernetics of the Modern Mind, Fuchs [5] remarked: "The information is greater the less probable it is. In this sense, information is 'improbability.' The information of a signal is the measure for the improbability with which this signal occurs in a certain communication. The uncertainty is always largest when all signals appear with the same probability." It is not surprising that the tradition of information systems is embedded in making sense about uncertainty and acting on that sense by connecting operational, tactical and strategic systems to performance control systems. Other business and technology disciplines have been apparently able to assimilate and integrate issues of relatively low and moderate uncertainty and complexity that defined traditional IRM and IS disciplines. Perhaps, IRM and IS disciplines need to sustain their focus on addressing issues of increasing uncertainty and complexity that are pertinent to survival and competence of most business and technology systems. Often, many such issues would defy easy structuring and would be inherently 'risky' to scope, define, or deliver. However, the challenge of charting new frontiers of knowledge relevant to IRM and IS practice [while defining its links with rigorous theories and methods] is unavoidable for IRM and IS researcher and educators. In absence of innovative approaches that may have the potential for advancing knowledge, learning, pedagogy, and methodologies, the IRM and IS disciplines may just wither away having outlasted their utility. It is imperative for the pallbearers of these withering disciplines to realize that innovation, especially in face of uncertainty, is inherently risky. But, do we have another option for resuscitating these disciplines of knowledge that we so cherish? By avoiding uncertainty at the risk of compromising on innovation would we be truly serving the cause of these disciplines? It does not seem to be an altogether altruistic cause as the future survival and competence of most professional practitioners of pedagogy and research in these disciplines may hinge upon these issues. Increasingly uncertain environments encountered by the latest generation of complex business technology systems require that IS research and education make concerted efforts in addressing such issues. Markedly *wicked environments* [3, 9] that threaten the survival, competence, and success of organizational systems impose the need for evolving the IRM and IS disciplines for standing up to the challenge of the interesting times ahead.

A Pragmatic Vision for IRM and IS Research and Education

One example of the interesting times characterizing the current era relates to what used to be the success story of Enron. One of the latest textbooks includes five major case studies related to success stories of which Enron is one. The student team that had chosen this "success story" was awe-struck by the irony as the Enron debacle unfolded during the same semester in which they were analyzing this case. Asked by this team about the lessons learned from this success story, I suggested that this story was most interesting given that it showed the two sides of the same story [one told in the case, and the other experienced live] within the publication cycle of a given textbook. One may believe that the lesson that they learned from this story in terms of re-assessing the fundamental assumptions, and critically analyzing what went wrong with one of the greatest success stories offered them more in terms of learning than would have been otherwise possible. Given that the probability of the two stories represented such a stark contrast, this case was characterized by the greatest uncertainty in terms of the best practices and the best business models. Such dynamically evolving success stories remind us that real life situations faced by

business practitioners often defy the controlled environments characterizing most research studies and may be more accurately described as 'messes': managers do not solve problems, rather they manage 'messes' [1]. Therein lies perhaps the key to the future of *life-long learning* and *learning on demand* unbounded by the constraints of increasingly ephemeral life of course textbooks and course curricula. Given the nature of the IS and IRM disciplines, these areas of knowledge may possibly provide some of the most interesting avenues for defining the most engaging opportunities for emphasizing the paradigms of self-learning, learning how to learn, critical inquiry, and reflective thinking. Given that the future competence and survival of IS researchers and IS practitioners depends upon these very traits, these seem to be some possible bases for defining and implementing the future vision of IS and IRM disciplines that is hoped to reconcile the needs of education, research, and practice. If adopted and executed, this vision may perhaps help these disciplines contribute to the large bodies of knowledge that need to catch on to the paradigms of non-linear and systems-oriented learning in face of increasingly radical discontinuous change.

References:

[1] Ackoff, R. "The Future of Operations Research is Past," *Journal of the Operations Research Society*, 1979, 30, p. 93.

[2] Alavi, M. and Leidner, D. Review: knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*, v. 25, no1, Mar. 2001, pp. 107-36.

[3] Churchman, C.W. *The Design of Inquiring Systems*, Basic Books, New York, NY, 1971.

[4] Cook, T.D. and Campbell, D.T. *Quasi-Experimentation: Design & Analysis Issues for Field Settings*, Houghton Mifflin Co., Boston, MA, 1979.

[5] Fuchs, W.R. *Cybernetics for the Modern Mind*, MacMillan Company, New York, NY, 1971.

[6] Hildebrand, C. "Does KM=IT?" *CIO Enterprise*, Sep. 15, 1999.
[URL: http://www.cio.com/archive/enterprise/091599_ic.html, last examined on Nov. 18, 2002].

[7] Keen, P. G. W. "MIS Research: Reference Disciplines and a Cumulative Tradition,"
Proceedings of the First International Conference on Information Systems. 1980. pp 9-18.

[8] Lindorff, Dave. "GE's Drive to Real-Time Measurement," *CIO Insight*, Nov. 11, 2002.
[URL: http://www.cioinsight.com/, last examined on Nov. 18, 2002]

[9] Mason, R.O. & Mitroff, I.I. "A Program for Research on Management Information Systems,"
Management Science, 19(5), January 1973, pp. 475-487.

[10] Wiener, N. *The Human Use of Human Beings*. Houghton-Mifflin, Boston, MA, 1954.

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