WHAT ARE THE GRAND CHALLENGES IN INFORMATION SYSTEMS RESEARCH? A DEBATE AND DISCUSSION

SENIOR SCHOLAR'S FORUM

CO-CHAIRS:

Moez Limayem
Associate Dean for Research and Graduate Programs
Edwin & Karlee Bradberry Chair in Information Systems
University of Arkansas
mlimayem@walton.uark.edu

Fred Niederman
Shaughnessy Professor of Decision Science and Management Information Systems
St. Louis University
niederfa@slu.edu

Sandra A. Slaughter
Professor of Information Technology Management and Alton M. Costley Chair
Georgia Institute of Technology
sandra.slaughter@mgt.gatech.edu

PARTICIPANTS:

Hsinchun Chen
McClelland Professor of Management Information Systems
University of Arizona
hsinchunchen@gmail.com

Shirley Gregor
Foundation Professor of Information Systems
Australian National University at Canberra
Shirley.gregor@anu.edu.au

Susan J. Winter
Program Director – Office of CyberInfrastructure
National Science Foundation
swinter@nsf.gov

Introduction

Scientific disciplines such as biology, engineering, physics and environmental sciences have been identifying "grand research challenges". Grand research challenges are challenges such as the Human Genome Project that are fundamental problems and are critically important to society.

For example, the National Academy of Engineering has identified 14 Grand Challenges for Engineering such as: making solar energy economical, preventing nuclear terror, advancing health informatics, providing access to clean water, enhancing virtual reality, engineering better medicines, and securing cyberspace (National Academy of Engineering, 2011). In environmental sciences, a Committee organized by the National Research Council identified 8 Grand Challenges in Environmental Sciences, such as understanding how the Earth's major biogeochemical cycles are being perturbed by human activities (National Research Council, 2001).

Identifying such challenges is a way to motivate and coallesce a scientific community around important themes. It is also a way to bring identity to the community. Senior scholars in the community can play an important role by providing intellectual leadership in helping to identify the important ideas.

Are there grand challenges in IS research? If so, what are they? What are the most important research challenges and how should we start to examine them?

In preparation for the Forum, the co-chairs have been conducting a number of Delphi-based studies. Our first Delphi-based study posed these questions to the Senior Scholars who discussed them and identified several research topics during the Senior Scholars' Consortium at ICIS 2010. Since then, the co-chairs have conducted additional Delphi studies of the AIS membership at large. Results from these studies will be presented as part of the Forum discussion.

The senior scholars is a group composed of senior information systems academics (including Leo and AIS Fellow Awards winners, current and former Presidents of AIS, current and former Editors-in-Chief of the journals listed in the AIS basket of six journals, plus Journal of Strategic Information Systems and Journal of Information Technology, and the current and former Conference Chairs and Program Chairs of ICIS). The senior scholars meet once a year at ICIS to discuss issues relevant to the IS field.

Join us as we discuss and debate important questions regarding the future of the IS discipline: Should we identify grand research challenges in IS, and if so, what are they? What are the most important challenges and how should we initiate our study of them?

Organization of the Forum

Sandra Slaughter, one of the Forum co-chairs, will introduce the discussion. She will briefly outline the motivation for this year's senior scholars' Forum and will introduce the speakers.

This will then be followed by a presentation by Fred Niederman, one of the Forum participants. Fred Niederman will share results from the Delphi-based studies of the Senior Scholars and the AIS membership and briefly discuss their implications.

This will be followed by short presentations on the question of interest by the other Forum participants: Hsinchun Chen, Shirley Gregor, Moez Limayem, and Susan Winter. These participants will provide unique perspectives on the question of grand research challenges in IS.

Hsinchun Chen will offer a perspective based on the design science paradigm and from his role as Editor-in-Chief of ACM Transcations on Management Information Systems.

Shirley Gregor will offer a view based on her role as editor-in-chief of JAIS, the flagship journal of the international Information Systems community, and her own work in applied research and epistemology. She will question the concept of "grand" challenges for Information Systems (IS) in the current state of the discipline's development. Indeed, she will argue that the study of scientific progress in general shows that many major advances have followed practical problem-solving activity rather than "blue sky" theorizing around grand challenges. Her argument is that in IS at this point we need to understand and highlight how research that truly adds value is performed, comparable to ongoing practice in other disciplines of a similar nature, such as medicine, engineering and economics. The challenge for IS researchers is to undertake work that truly provides value by simultaneously: (i) attacking research

problems that stakeholders want solved, (ii) developing robust knowledge that is soundly based in empirical evidence; and (iii) developing knowledge and theory that is sufficiently layered to provide both actionable knowledge and high-level generalization. The arguments made will be supported by reference to the work of several research groups that have achieved national and international recognition for the value of their work.

Moez Limayem will present a different perspective on grand research challenges in IS by drawing on his personal experience to discuss how IT has affected the lives of millions of people in the Arab World lately.

Susan Winter will offer a perspective based on her role in the National Science Foundation and her involvement in evaluating and supporting grand challenges efforts in other disciplines. In contrast to science based on accretion through incremental additions of individual research studies, grand challenge efforts drastically alter the boundaries of existing knowledge, established disciplines, and available capabilities: they become goals. Efforts to engage grand challenges require cooperation and interaction between groups with differing perspectives over years and decades. While the importance of problem selection in shaping the collective identity of the IS research community has been noted, the grand challenge concept is generally absent from IS scholarship. Instead, we have historically focused more narrowly on research agendas defined by the ability of individual scholars to address issues arising from surveys of corporate executives and business consultants. Scholars in IS have neither articulated cognizant research grand challenges nor have they yet undertaken collective projects of the size and scope of a grand challenge. IS research is undervalued, at least in part, because as a community we fail to engage the full range and scale of problems to which our work and knowledge is relevant. Rather than scoping problems for study that are familiar and tractable, we must develop the ability to seek out and engage critical problems, even when they are unfamiliar and significantly exceed the capabilities of any one individual or research team. New norms, structures, and practices must be developed to provide the support and incentives necessary to sustain these long-term, large-scale collaborative efforts. Addressing the IS grand challenges also requires mobilization of substantial resources and significant participation from members of many relevant academic, practitioner, and policy-oriented communities. To justify this level of investment and effort, IS grand challenges must be perceived as having the potential to significantly impact not only multiple academic fields but also community, national, or international concerns such as competitiveness, security, economic development, or well-being.

Following these presentations, Sandra Slaughter (Forum co-chair) will briefly summarize the discussion so far and suggest some key points for debate. She will then facilitate what promises to be an interesting and lively discussion with the audience.

Forum Participant Bios

Hsinchun Chen is the McClelland Professor of MIS at the University of Arizona. He received the Ph.D. degree in Information Systems from the New York University. Dr. Chen had served as a Scientific Counselor/Advisor of the National Library of Medicine (USA), Academia Sinica (Taiwan), and National Library of China (China). Dr. Chen is a Fellow of IEEE and AAAS. He received the IEEE Computer Society 2006 Technical Achievement Award, the 2008 INFORMS Design Science Award, the MIS Quarterly 2010 Best Paper Award, and the IEEE 2011 Research Achievement and Leadership Award in Intelligence and Security Informatics. He is author/editor of 20 books, 230 SCI journal articles, and 140 refereed conference articles covering Web computing, search engines, digital library, intelligence analysis, biomedical informatics, data/text/web mining, and knowledge management. His H-index is 54, among the highest in the MIS. He has been an advisor for major NSF, DOJ, NLM, DOD, DHS, and other international research programs in digital library, digital government, medical informatics, and national security research. Dr. Chen is founding director of Artificial Intelligence Lab. The UA Artificial Intelligence Lab, which houses 20+ researchers, has received more than $30M in research funding from NSF, NIH, NLM, DOD, DOJ, CIA, DHS, and other agencies (90 grants, 40 from NSF). Dr. Chen's COPLINK system, which has been quoted as a national model for public safety information sharing and analytics, has been adopted in more than 3500 law enforcement and intelligence agencies. The COPLINK company founded by Dr. Chen was acquired by IBM in the summer of 2011. In collaboration with selected international research centers and intelligence agencies, the AI Lab's ongoing Dark Web project has generated one of the largest academic databases of geopolitical extremism social media content. Dark Web research supports link analysis, content analysis, web metrics analysis, multimedia analysis, sentiment analysis, and authorship analysis of multilingual social media contents and communities. The project has received significant international press coverage, including: Associated Press, USA Today, The Economist, NSF Press, Washington Post, Fox News, BBC, PBS, Business Week, Discover magazine, WIRED magazine, Government Computing Week, Second German TV (ZDF), Toronto Star, and Arizona Daily Star, among

others. Dr. Chen's current research focuses on security informatics, health informatics, and business intelligence. He is currently the EIC of the ACM Transactions on MIS and the Springer Security Informatics Journal.

Shirley Gregor is the foundation Professor of Information Systems at the Australian National University, Canberra, where she is a Director of the National Centre for Information Systems Research. Professor Gregor's current research interests include the adoption and strategic use of information and communications technologies, intelligent systems and human-computer interface issues, and the theoretical foundations of information systems. She has led several large applied research projects funded by the Meat Research Corporation, the Department of Communications, Information Technology and the Arts, the Australian Research Council and AusAID. Professor Gregor spent a number of years in the computing industry in Australia and the United Kingdom before beginning an academic career. Dr Gregor's publications include 4 edited books, 15 book chapters and over 100 papers in conferences and journals such as MIS Quarterly, Journal of the Association of Information Systems, International Journal of Electronic Commerce, International Journal of Human Computer Studies, European Journal of Information Systems and Information Technology & People. Professor Gregor is Editor-in-Chief of the Journal of the Association for Information Systems 2011-2013. Professor Gregor was made an Officer of the Order of Australia in the Queen's Birthday Honour's list in June 2005 for services as an educator and researcher in the field of information systems and in the development of applications for electronic commerce in the agribusiness sector.

Moez Limayem is the Walton College Associate Dean for Research and Graduate Programs, Executive Director of the Information Technology Research Institute (ITRI), and holder of the Edwin and Karlee Bradberry Endowed Chair in Information Systems. Dr. Limayem obtained an MBA and a Ph.D. in Management Information Systems from the University of Minnesota. His current research interests include information technology (IT) adoption and usage, customer relationship management and Social Media. He has had numerous articles published or forthcoming in many journals such as MIS Quarterly, Management Science, Information Systems Research, Communications of the ACM, Journal of AIS, IEEE Transactions, Accounting, Management & Information Technologies, Group Decision and Negotiation, and Small Group Research. He won the best MIS paper award at the Administrative Sciences Association of Canada (ASAC) conference in 1998 and at the International Conference on Information Systems (ICIS) conference in 2003. He is the past president of the Association of Information and Management (AIM), and was also the program co-chair for ICIS in 2008 and AIM in 2007 and 2008.

Fred Niederman serves as the Shaughnessy Endowed Professor of MIS at Saint Louis University. He obtained an MBA and a Ph.D. in Management Information Systems from the University of Minnesota. His research interests include building global information management, MIS personnel, and using MIS to support teams and groups. Recently he has been investigating the integration of MIS functions after corporate mergers and acquisitions. He is a proponent of grounded theory and theory building as a way to enrich the MIS discipline and build intellectual content customized specifically to our field of practice. He has published more than one hundred articles in leading research journals and refereed conference proceedings. He serves on editorial boards for *TMIS, JAIS, CAIS, Human Resource Management, Journal of International Management*, *IEEE Transactions on Engineering Management* and the *Journal of Global Information Management.* He has edited or co-edited special issues for *CACM, DATABASE, Journal of Global Information Management*, *Journal of Organizational Computing and E-Commerce* and *Human Resource Management*. He recently served as co-program chair for the 2010 ICIS conference in St. Louis, Missouri, and is an active member in the MIS "senior scholars".

Sandra A. Slaughter is a professor of information technology management in the College of Management at the Georgia Institute of Technology and holds the Alton M. Costley Chair. Prior to her academic career, Sandra worked as an IT systems analyst and project leader in companies including Hewlett-Packard, the Allen-Bradley division of Rockwell International, and Square D Corporation. Her research builds upon her practical experience in IT and focuses on development productivity and quality issues and on effective management of IT projects, systems and people. Currently, she is conducting research on open source communities, performance in IT services outsourcing, and the compensation, skills and careers of IT professionals. She has published more than one hundred articles in leading research journals, conference proceedings, and edited books and has received eight best paper awards. Her research has been supported by more than $1.5 million dollars in grants from the National Science Foundation, the Department of Defense, the Alfred P. Sloan Software Industry Center, the Carnegie Bosch Institute, the Center for International Business and Leadership Education at Georgia Tech, the Center for Analytical Research on Technology at Carnegie Mellon University, and the Quality Leadership Center at the University of Minnesota.

Professor Slaughter currently serves as co-Departmental Editor for Management Science, and served as the Program co-Chair for the International Conference on Information Systems in 2009.

Susan J. Winter, Ph.D., is a Program Officer in the Office of Cyber-infrastructure at the National Science Foundation supporting distributed, interdisciplinary scientific collaborations. She is responsible for programs funding research on virtual organizations as sociotechnical systems, cyber-enabled discovery and innovation, cyber-infrastructure education, and enabling resources for complex data-driven and computational science including high performance computers, large scale databases, and advanced software tools. She received her PhD in business administration from the University of Arizona, her MA in organizational research methods from the Claremont Graduate University, and her BA in organizational psychology from the University of California, Berkeley and has extensive international managerial and consulting experience. Her research on the impact of ICT on the organization of work has appeared in top journals including Information Systems Research, the Journal of Information Technology, and Information & Management, and been presented at the International Conference on Information Systems and at the Academy of Management. She currently serves on the editorial boards of the Journal of Information Technology, Information and Organization, and Group and Organization Management.

References

National Academy of Engineering, homepage, accessed September 2, 2011. http://www.engineeringchallenges.org/cms/challenges.aspx

National Research Council, Grand Challenges in Environmental Sciences, National Acadmey Press, Washington, D.C., 2001.