Jan vom Brocke
Armin Stein
Sara Hofmann
Sanja Tumbas

Grand Societal Challenges in Information Systems Research and Education

Ideas from the ERCIS Virtual Seminar Series

Springer

Jan vom Brocke
Armin Stein
Sara Hofmann
Sanja Tumbas

Grand Societal Challenges in Information Systems Research and Education

Ideas from the ERCIS Virtual Seminar Series

SpringerBriefs in Information Systems

Series editor

Jörg Becker

More information about this series at http://www.springer.com/series/10189

Jan vom Brocke · Armin Stein
Sara Hofmann · Sanja Tumbas

Grand Societal Challenges in Information Systems Research and Education

Ideas from the ERCIS Virtual
Seminar Series

Springer

Jan vom Brocke
Department of Information Systems
University of Liechtenstein
Vaduz
Liechtenstein

Sara Hofmann
ERCIS
University of Münster
Münster
Germany

Armin Stein
ERCIS
University of Münster
Münster
Germany

Sanja Tumbas
Department of Information Systems
University of Liechtenstein
Vaduz
Liechtenstein

Foreword

In the 1980s, the United States tackled the rise of Japanese computer research, particularly their "5th Generation Computer," by introducing "Grand Challenges." Engineers and scientists were called to action to address particular challenges to keep the Unites States' competitive advantage. These Grand Challenges were revised by the National Science Foundation in 2009 but have remained largely the same over time.[1]

Grand Challenges are defined for disciplines (like information and communication technology[2] and health[3]) and for regions (like Canada[4] and South Africa[5]). The White House provides the several attributes that Grand Challenges feature[6]:

- They help create the industries and jobs of the future.
- They expand the frontiers of human knowledge about ourselves and the world around us.
- They help to address important problems related to energy, health, education, the environment, national security, and global development.
- They serve as a "North Star" for collaboration between the public and private sectors.

Grand Challenges for the information systems (IS) discipline are not new: Key issues in management information systems were published in 1984 (Dickson et al.), 1987 (Brancheau and Wetherbe), 1990 (Niederman et al.), and 1996 (Brancheau et al.) in *Management Information Systems Quarterly* (*MISQ*). In 2006 the topic of Grand Challenges in IS was reprised at a panel discussion at the European Conference on Information Systems (ECIS) in Göteborg, Sweden, was

---

[1] http://www.nsf.gov/cise/aci/taskforces/TaskForceReport_GrandChallenges.pdf.

[2] http://www.futurict.eu/.

[3] http://www.grandchallenges.org.

[4] http://www.grandchallenges.ca.

[5] http://www.gov.za/documents/download.php?f=104227.

[6] http://www.whitehouse.gov/administration/eop/ostp/grand-challenges.

repeated in 2011 at the International Conference on Information Systems (ICIS) in Shanghai, and is now gaining new momentum.

The Millennium Project is an independent and ongoing effort (http://www.millennium-project.org) that addresses 15 global challenges society faces today that cannot be solved by individuals in the short term. Prominent examples of the 15 challenges include how everyone on the planet can have sufficient clean water and a decent education. The dimensions of such challenges indicate that the IS discipline alone cannot solve the challenges, just as other disciplines cannot solve them alone. Solutions call for transdisciplinary and interdisciplinary efforts to which diverse disciplines must contribute.

It is our firm belief that IS can play a major role in contributing to solutions to grand societal challenges. Focusing on environmental challenges, researchers like Richard T. Watson (Watson et al. 2010), Nigel Melville (2010), and Steve Elliot (2011) advocate that the IS discipline has both the responsibility and the historic chance to demonstrate societal value by contributing to solutions that lessen the negative environmental effects of people's behavior. For example, the field of energy informatics has been established (Watson and Boudreau 2011) to investigate the design and use of information systems to improve energy efficiency through sensor networks in both businesses and private lives. Seidel et al. (2013) show that information systems can play a major role in facilitating sustainability transformations in organizations of various types. A recent call from vom Brocke et al. (2013) presents directives for IS research to leverage this position in contributing to grand societal challenges.

In keeping with the spirit of IS as a science of solutions to grand societal challenges, the European Research Center for Information Systems' (ERCIS) headquarters in Münster, Germany, and the ERCIS partner at the University of Liechtenstein have jointly organized a seminar series in which students are invited to provide their thoughts on how IS can contribute to the 15 societal challenges identified by the Millennium Project. The course has been offered over 3 years and has involved students from more than 30 nations. The course creates virtual multinational teams, and each of these teams is given the task of envisioning the role IS could play in contributing to a selected challenge. The Association for Information Systems (AIS) gave the course the AIS Award for Innovation in Teaching at the International Conference on Information Systems 2013 in Milan (ICIS 2013).

The students from the winter term 2011/2012 decided to continue working on their papers after the course was over, and each paper underwent a substantive review by colleagues. This book compiles the best papers from this course to stimulate further contributions of this kind. Dominik Heddier and Agata Materek collaborate on how IS can contribute to environmental sustainability, considering eco-efficiency, eco-equity, and eco-effectiveness. Dominic Steffen and Rajesh Srinivasan deal with the exponential growth of the human population and ask how IS can be used to align the global resources with the growing demand. Adrian Dolensky and Stefan Laube discuss e-participation as a way to make policymaking more sensitive to long-term global perspectives. How the benefits of ICT, which is ubiquitous in some parts of the world but all but absent in others, can be made available to everyone is the topic of Tomal K Ganguly and Klaus Fleerkötter's paper.

How decision support systems, key elements of IS research, can be used to improve the capacity to decide as the nature of work and institutions change is discussed by Marina Maschler and Asin Tavakoli. Manuela Weiss and Ekaterina Tarchinskaya discuss how IT can support changing the status of women around the globe, especially in the STEM field (Science, Technology, Engineering, and Mathematics), where the underrepresentation of women in the workforce can have negative effects on the efficiency and quality of the work. Nadine Székely explains how IS can support law enforcement officials in fighting "the dark side" as industrialization and the appearance of the Internet provide companies and individuals, including those in organized crime, with means to communicate and synchronize in real-time. Stefan Debortoli addresses the growing demand for energy as we move away from fossil fuels and seek to reduce power consumption, while governments invest increasing amounts of money in alternative green energy. Sandro Weber sketches out how IS can accelerate the diffusion of these ideas and innovations into practice. Finally, Nebojsa Milic and Krzysztof Oleszkiewicz take a look at the ethical difficulties global decisions bring to a world with more than 7.2 billion people and how IS can contribute to resolving them.

Although we reviewed and supervised the work, we kept the papers as original student papers and did not edit them ourselves. We want to acknowledge the effort our students have put into their tasks and also hope to illustrate the contribution we all can make as we start to think about how IS can contribute to solving grand societal challenges through IS research and practice. We hope you will feel as inspired as we do!

Our thanks go to all contributors for their effort and enthusiasm in working on this exciting and important topic. In particular, we recognize all of the supervisors of our seminar: Katrin Bergener, Elena Gorbacheva, Marcel Heddier, Andrea Herbst, Marco de Marco, Oliver Mueller, Stefan Seidel, Alexander Simons, Paolo Spagnoletti, and Theresa Schmiedel.

If you would like to get involved in a future seminar, we encourage you to visit our website at http://virtual-seminar.ercis.org.

Vaduz, Liechtenstein, July 2014	Jan vom Brocke
Münster, Germany	Armin Stein
Münster, Germany	Sara Hofmann
Vaduz, Liechtenstein	Sanja Tumbas

References

Watson, R. T., Boudreau, M.-C., & Chen, A. J. (2010). Information systems and environmentally sustainable development: Energy informatics and new directions for the IS community. *MIS Quarterly*, 34(1), 23–38.

Melville, N. (2010). Information systems innovation for environmental sustainability. *Management Information Systems Quarterly*, 34(1), 1–21.

Elliot, S. (2011). Transdisciplinary perspectives on environmental sustainability: A resource base and framework for IT-enabled business transformation. *MIS Quarterly*, 35(1), 1–13.

Watson, R. T., Boudreau, M.-C., Chen, A. J., & Sepúlveda, H. H. (2011). Green projects: An information drives analysis of four cases. *The Journal of Strategic Information Systems*, 20(1), 55–62.

Seidel, S., Recker, J., & vom Brocke, J. (2013). Sensemaking and Sustainable Practicing: Functional Affordances of Information Systems in Green Transformations. *MIS Quarterly*, 37(4), 1275–1299.

vom Brocke, J., Watson, R., Dwyer, C., Elliot, S., & Melville, N. (2013). Green Information Systems: Directives for the IS Discipline. *Communications of the Association for Information Systems (CAIS)*, 33(30), 509–520.

Preface

The primary concern of Information Systems (IS) research and education has been effective development and implementation of business IS. Without creating adequate benefits to business, investment in IS cannot be justified. However, as the Internet and smart phone technologies have proliferated and ERP has become standardized, the primary platform of IS is no longer internal business systems. It has become inevitable to research the societal impact of the global IS platform, and the term "IS" becomes to imply an "Information Society."

The benefits of IS have increased as the speed and capacity of information technology (IT) have increased, but the growth of IT's benefits has become marginal while the impact of malicious side effects have become more serious, potentially catastrophic and global. Therefore, it has become essential to change gears in IS research and education to pay special attention to establishing a fundamental foundation for sustainable progress.

First of all, IS should solve the problems it has caused, such as transnational cyber-crimes and cyber-terror like that Sony Pictures recently experienced. To identify the seriousness of IS's dark side and to develop preventive solutions, the Council of Association of Information Systems (AIS) has adopted the ICT-enabled Bright Society Initiative as a Grand Vision Project (in brief, the Bright ICT Initiative).

The key issues of the Bright ICT Initiative are related to the key global challenges, so the fifteen global challenges identified by the Millennium Project serve as a foundation for the Bright ICT investigation. Energy shortage and climate change are among these global challenges, and we must determine how IS can help to mitigate and adapt to climate changes. Next, the effect of IS on education and healthcare, particularly in underdeveloped regions, can be profound, and IT availability can be the platform of survival of people. We must also understand the impact of IS on employment and how it changes the nature of work in both developed and developing countries.