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Fred Niederman
Saint Louis University, niederfa@slu.edu

Roger Clarke
Australian National University

Lynda Applegate
Harvard University

John Leslie King
University of Michigan

Roman Beck
IT University of Copenhagen
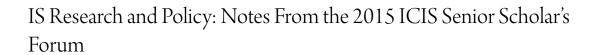
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Authors
Fred Niederman, Roger Clarke, Lynda Applegate, John Leslie King, Roman Beck, and Ann Majchrzak

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Fred Niederman

St. Louis University

niederfa@slu.edu

Lynda Applegate

Harvard University

Roman Beck

IT University of Copenhagen

Roger Clarke

University of N.S.W.

Australian National University

John Leslie King

University of Michigan

Ann Majchrzak

University of Southern California

Abstract:

Based on the International Conference on Information Systems' (ICIS) 2015 senior scholars' forum, we provide insights on the role and opportunities of IS researchers in shaping policy.

Keywords: IS Policy Research, Information Society.

1　Introduction (Fred Niederman and John Leslie King)

Information systems (IS) have changed the world. IS researchers should be studying such change to address the interests of all, not just the interests of business. The 2015 ICIS Senior Scholar's forum addressed the role of information systems faculty in addressing policy issues—both public policy and broader social policy established by non-public institutions. The world changes with each round of IT innovation that ultimately affects IS innovation. Changes might be small, such as affecting how we look for a pizza restaurant when traveling through an unfamiliar town, or large, such as affecting the global banking system through the instantaneous transfer of funds. Changes might be narrow or they might have significant social or environmental implications. New technologies and the ground rules for their use can be guided by policies from the United Nations to local townships. IS researchers with specialized knowledge about emerging technology should apply that knowledge to proposing, evaluating, and selecting policies that shape the consequences of IS change.

IS researchers address a wide range of interests relevant to technological changes, policy, and social impact. Walsham (2012a, 2012b) suggests expanding the IS field to more broadly consider IS impacts on society. Straub (2014) has admonished Association for Information Systems (AIS) senior scholars to include social impacts as "dependent variables" for research; for example, he has suggested that the health of the population should be part of healthcare IS research. The 2015 forum took a broad look at policy and the role of IS research in policy development.

The forum concluded that policy issues are important topics for IS research. Policy shapes the "information society". Policies affect broad social domains (e.g., how Internet access is granted and its content shaped and distributed). Digital security in the cloud, of particular concern to the SIM Advanced Practices Council and indeed digital security across stakeholders, is directly shaped by policies and their implementation. Recent advances in data mining, business analytics, machine learning, and "big data" generate emergent conflicts between various interests. Policies regarding the collection, storage, manipulation, and use of large data sets will be governed by policies whether explicit and enforced or simply emergent from decisions by individual actors. Code Halos (Frank, Roehrig, & Pring, 2014) suggests that the integration of mobile, cloud, analytics, and social media will come together to create new domains of applications that raise subtle issues of policy that may be applied differently or with different effects in diverse application areas. The IS research agenda must address the nature and facilitation of technologies as they are used and also the policy issues that are raised by new social situations created by new technology affordances. Some associations such as the Institute of Electrical and Electronics Engineers (IEEE) and the Association for Computing Machinery (ACM) are active in policy study and advocacy. The IS field through the AIS should incorporate policy awareness and promotion into its agenda.

2　Views on IS and Policy

2.1　IS Researchers Are Policy Researchers (Ann Majchrzak)

Some IS researchers already do policy research regardless of whether it is called "policy research". Their evidence-based management research (Pfeffer & Sutton, 2006) provides scientifically rigorous findings (what Pfeffer and Sutton refer to as "hard facts") that give policy makers an information-rich arsenal for their decisions. This research might not be intended for policy makers directly, but it can inform other researchers, consultants, or policy makers in companies or government and, thus, influence ultimate policy decisions.

Many IS researchers are well positioned to do policy research. They often partner with policy makers from organizations in broad relationships that provide data or access, hire students, or receive research results. These partnerships make IS researchers keenly aware of reciprocity, and they scramble to finish analyses to inform their partners of their results. Framing research to pique sponsor interests is as important as not overwhelming them with technical details. These partnerships give IS researchers the opportunity to learn incrementally and promote sponsor willingness to use the evidence provided.

IS researchers also have the advantage of a three-pronged skill base: practical experience, strong training in social science methods, and understanding what drives the need for evidence-based management research in IS. They often have first-hand experience with IS professional work because they have done such work prior to becoming an academic. They have common ground with policy makers and appreciate

the difficulties of and the opportunities for organizational change. Strong training in social science methods allows them to produce scientifically rigorous research results of "hard facts" and to creatively use methods by combining them (e.g., mixing quantitative and qualitative methods, simulation and econometrics, or natural experiments in the field with lab experiments). They understand the sociotechnical nature of technological change in organizations and can avoid treating technology as a black box in a policymaker's decisions.

IS researchers are well positioned for policy research because they recognize that scientific facts are produced across multiple channels and go to different audiences. They know this by blogging or tweeting about their research, by writing about it in practitioner-based papers (*Harvard Business Review, California Management Review*, trade journals), or by integrating research findings into their classrooms. Students are future employees or consultants who remember and reuse frameworks, anecdotes, and evidence. Many IS researchers are involved in industry-academic collaborative consortia for which they give talks to practitioners, prepare policy briefings, and testify before government bodies. Even if IS researchers are not involved as scientific advisors to top management or government agencies, they influence policy.

The IS research community should recognize this fact and encourage research that is both scientifically rigorous and practically relevant. A special issue of *MIS Quarterly* has appeared on this more specific topic of information and communications technology and societal challenges (Majchrzak, Markus, & Wareham, 2016). IS researchers are already doing policy research! The fourteen papers in this special issue show the influence of ICT on policy issues such as infant mortality, corruption, refugee social inclusion, and the use of media for propaganda. These studies leveraged natural variations in ICT to assess differences for societal issues, allowing policy makers to compare alternative policies. The papers considered ICT a sociotechnical system (Gibson, 1979; Leonardi, 2013; Majchrzak & Markus, 2014). They considered technology in social and organizational contexts, across multiple levels of analysis (cognitive, individual behavior, group, collective, organization, industry, ecosystem). They considered intended and unintended consequences. All the papers provide details for future research often in the context of existing literature streams. All the papers have implications for policy makers.

IS researchers should study "the impact of ICT" and avoid technological determinism by taking a sociotechnical perspective. By opening up the black box of the sociotechnical system, IS researchers can study behavior that the system affects. By studying how change processes are intertwined with content (e.g., the system), IS researchers can understand feedback loops, emergence, and unintended consequences. All have policy implications. Venkatesh Rai, Sykes, and Aljafari (2016)examined the effects on infant mortality of a government-sponsored initiative implementing health information kiosks in remote villages in India. They looked beyond the kiosks at mothers' social ties and how they combined with kiosk information to influence pregnant mother behavior that might affect the fetus and the infant once born. One should couple health information kiosks with local influencers to create advice networks and facilitate adoption. Srivastava, Teo, and Devaraj (2016) examined corruption in political, legal, and media institutions in 63 countries, finding that e-government reduces political corruption only if legal and media institutions also are less corrupt. E-government transparency initiatives should focus first on reducing corruption in legal and media institutions. McGrath (2016) compared three cases of identity verification systems for delivering government services to understand why some systems were more successful than others in generating trust among citizens. Study results showed that systems should be tied to widely publicized short-term development goals that are broadly shared by financial, political, and service delivery institutions.

Such studies require local collaborators, extensive travel, negotiations to access data, ethical considerations, and the complication of being enmeshed in fragile interventions. Yet, helping decision makers consider evidence is an influence "opportunity". It is sometimes faster to influence business leaders than government leaders. One challenge of IS policy research is how best to influence leaders when the opportunity appears.

Policy researchers must consider the question of activism. Activism and science are not at opposite ends of a spectrum. Doctors now actively encourage patients to lose weight. Climate change scientists publish blogs that cite the evidence of climate change to influence policymakers of the need for change. IS researchers can be activists. The more that IS researchers are active, the more visible their research becomes to policy makers. There are many topics about which one can be active: security, app development, open innovation, implementation successes, privacy concerns, Web 3.0, the design of ecosystem platforms, and so on. Activism helps raise awareness that someone is studying these issues.

2.2 Understanding Implications of Breakthrough IT Innovation (Lynda Applegate)

IS faculty can play two roles as they help to conduct research that shapes policy and educate future business leaders about the importance of addressing policy implications and social impact as they develop IT-enabled strategies. The others on this panel address the role of that IS faculty should play in shaping policy concerning emerging IT. I address the second: the role that IS faculty play as educators who must prepare our students to address policy implications and social impact of the new technologies that are redefining industries and the companies that compete within them. To help frame this role, consider a case study on Tesla that is taught at HBS. When you read this case, consider how the investment bank analysts, who are educated in colleges and universities around the world, failed to see that technologies are dramatically altering industry boundaries and how convergence across industry boundaries requires them to analyze company strategies and actions differently than they did in the past. They also failed to identify the policy implications of the impact of emerging technologies.

During his quarterly call with analysts on March 19, 2015, Elon Musk, CEO and Founder of Tesla, said: "We really designed the [Tesla] Model S to be a very sophisticated computer on wheels" (Ramsey, 2015). For most of the traditional automotive analysts on the call, this simple statement did not cause them to change the questions they asked as they attempted to link Tesla's current financial results and financial forecasts with strategic and operating decisions Musk and his business leaders made. Instead, they continued to attempt to understand Tesla's current and future impact on the traditional automotive industry despite the fact that the decisions made by Musk and his team at Tesla differed radically from those of traditional automakers. For example, like Steve Jobs at Apple, Musk decided that a proprietary, integrated electronic vehicle "platform" justified the additional cost and designed and built Tesla's proprietary drive train, engine, braking systems, electronics, and other platform components rather than sourcing them from established automotive suppliers. In addition, while most automakers who designed and built a proprietary battery for their early electronic vehicles, Musk decided to partner with Panasonic—a global leader in designing, producing, and distributing consumer and industrial batteries—to design and develop Tesla's revolutionary new battery.   In addition, he decided to partner with cities and the businesses in them and with highway rest stops and small town coffee shops, schools, and other gathering places to develop his own network of charging stations that would lease—not buy—the proprietary charging equipment developed by the Tesla/Panasonic partnership.

Clearly, the bright MBAs who cover the automotive industry for leading investment banks have learned how to analyze traditional industries, but they have not learned how to study the current and future impacts of radical new technology-enabled innovations—not just on current industry structures but also on society. Nor have future business leaders learned how to help shape the policies needed to achieve potential benefits while protecting against potential risks. In fact, the societal impacts of the automotive industry's evolution, where the car becomes a "computer on wheels", are staggering. For example, recent press reports have looked at how cyber hackers and terrorists can take remote control of an automobile away from its driver by hacking into its mobile applications and operating systems. Additional societal impacts emerged in the months after Tesla and Panasonic's July 2014 announcement that they were building a large "gigafactory" to produce Tesla batteries in Nevada. Initially analysts questioned why the partners needed such a large factory when there were only 21,000 Tesla Model S cars produced during 2014 and most doubted that total Tesla production would even reach the forecasted 500,000 cars by 2020. A press release by the partners a few months later brought some clarity but also more confusion to the debate as the partners announced two new Tesla products. Powerwall—a consumer and small business battery storage device that could store solar energy collected by solar panels—would help overcome a significant barrier to adoption of solar energy panels. Powerblock—a battery storage system for large commercial facilities and energy utilities—would unite multiple Tesla/Panasonic batteries into energy storage systems that would provide energy on demand in the same way that network computer servers provide information processing capacity on demand. It is no surprise that, in 2016, Tesla Motors, which had changed its name one year ago to simply Tesla--announced it would acquire Solar City for its new Tesla Energy Division. Recall how Apple Computers changed its name to Apple as it launched its iPod, iStore, iPhone and iPad and expanded its "playing field" beyond the computer industry. Similarly, the shift in name from Tesla Motors to simply Tesla, signaled Musk's decision to expand the "playing field" for Tesla beyond its initial automotive entry position.

Given the dramatic impact of IT on industry and society over the past few decades, IT researchers and educators must lead other fields in understanding and shaping future IT impacts and policies. The Tesla case, discussed above, is but one example of emerging information technologies that are having a

profound impact on business and society that policy will strongly influence. Other important technologies, such as 3D printing—which is being used to enable consumers and entrepreneurs to make an unlimited number of "things" as diverse as jewelry, dishes, clothes, cars, houses and even human body parts—and the Internet of Things (IoT) and robotics—which are dramatically influencing both where and how products are manufactured and the skills required for the jobs of today and in the future—are having dramatic impacts on society. IT researchers and educators around the world must take the lead in understanding these potential impacts and shaping policy discussions. In addition, they must also influence how we educate society's workforce and its leaders today and in the future.

2.2   Rethinking Organizations and Individuals as Economic Entities (Roman Beck)

Living in interesting times means changes in our research and how we educate students to make them leaders. The long view is important. For hundreds of years, researchers have tried to make sense of things. In 1826, Johann Heinrich von Thünen developed the optimal distance to grow agricultural products in relation to their markets and came up with an agricultural system to address perishability of products up to the time of their sale. He was concerned about the manual processing of products in the agriculture era to rationalize how the environment, the ecosystem, was actually working. During the era of industrialization, we learned many theories and insights that we still teach. From Frederick Winslow Taylor came Taylorism that enshrined the principles of rationalization and industry systems that characterized industrialization. Much of what we teach today such as supply chain management and transaction cost theory is grounded in insights developed over the past 150 years.

In the 1990s came the Internet and the globalized world. We outsourced processes and competed with colleagues from abroad. Automation and virtualization became important. Yet we still apply the lessons of 150 years of industrialization. We have no systematic view of the world we live in today. We lack the ideas and theories to explain the effects of the digital in contemporary service systems because we are locked in the thinking acquired in the industrial era. We talk about Ronald Coase's transaction cost theory and see the market as a place where value is created and disregard the many hybrid forms between markets and hierarchies (alliances, joint ventures, and networked approaches). Outsourcing, shared services, and inter-organizational systems are all *anomalies*. Yet they seem very common for anomalies. Coase said that his transaction cost theory would cause us to focus too much on of "markets" and "firms" and ignore all kinds of collaboration forms in-between. Why do companies continue to exist? Why have they not been replaced by individual contractors? Could it be that individual contracting will grow in the future and it will become the "new normal" instead of an anomaly? It is already happening in academic work. We do not have sufficient insights and theories about it, nor do politicians have a clue what it means. The workforce is experiencing decentralization, parallelization, and virtualization, but academics teach what was learned in 150 years of industrialization.

Perhaps we should study something that could change the game significantly. One candidate is blockchain, most famously known as the technology behind the crypto-currency Bitcoin. Blockchain is fundamentally about trust, a central element in economic exchange. Lack of trust is to a large extent what the transaction cost theory is all about. Frictions are overcome by working together: for example, we use law to ensure that our partners deliver the goods and services we order, and they use the law to ensure they get paid. Blockchain technology enables transparency and "knowing" to deal with lack of trust. Organizations like the International Telecommunication Union (ITU) are concerned about trust. Trust has been a major factor in many kinds of IS. Is it possible to create trust-free transactions using blockchain? If so, is this a paradigm change challenging existing models and theories? What are trust-free transactions?

Blockchain-based transactions encode the transaction logic in smart contracts that are visible to everyone and cryptographically secure. Instead of trusting your collaborator to store your data in a secure way or trusting your outsourcing partner in India to deliver the software you ordered, you now can see the fulfillment in the blockchain. The social system must follow the logic encapsulated in the smart contract. Blockchain allows one to avoid third parties such as central banks or companies while keeping data secure. Users can say, "We know where our data are". Command over intellectual property is supported in a decentralized, public ledger way similar to the decentralized network economy.

Blockchain is a decentralized and distributed, peer-to-peer, cryptographically secured scheme. It does not depend on a central agency or government. It secures transactions that have been specified as smart contracts in the blockchain. However, we need to think beyond crypto-currencies; the crypto-currency Bitcoin represents less than one percent of what one can do with blockchain. Blockchain could have effects on the Internet of things, micropayments, microequity, and many other areas. One must see the

use cases to understand how it works. Many leaders, bankers in particular, have not yet fully realized the implications of blockchain.

A new, techno-social economy has possibly begun to emerge. Technology can support the decentralized and distributed way many people are already working. It could liberate people from central stakeholders or agencies trusted to store information. The notion of trust might be reinvented or redefined. The firm of the past might give way to a new form of human enterprise in which independent actors control their digital intellectual property. The CIO of a German consulting company recently said each person hired thinks and behaves like a "one-person start-up". Independent knowledge workers can deliver services in different organizational settings, locations, or time zones. Humans can work together as freelancers, without being incorporated in large organizations. This work distribution challenges the way organizations make decisions, which has already begun to change because of data analytics and business intelligence. While decentralized system lack central actors for coordination, the distributed governance in such systems can be secured through blockchain solutions, which has important policy implications. The IS community should make blockchain a key topic.

2.3   Building Policy Research into IS Research (Roger Clarke)

To argue that policy is an important focus for IS researchers, it helps to know that "policy" deals with matters of national or regional significance and involves enunciating objectives and principles; formulating steps to achieve them through legal and other regulatory measures; allocating resources; and conceiving, articulating, and implementing programs of action. Objectives are not just economic but social and environmental. Fulfilling policy objectives depends on cooperation among disparate organizations that often come from all sectors (public, private and voluntary). Research into policy processes is served neither by approaches that are too "pure" nor too "applied". Too pure and policy makers will not see the relevance. Too applied and it seems that "when you have a hammer in your hand, everything looks like a nail". Research useful for policy matter perceives problems of an economic, social, and/or environmental nature as inherently normative. Such research demands an instrumentalist mindset to devise possible solutions, evaluate them, articulate them, and implement them. Research should generate information from data.

In principle, IS researchers are well positioned to make contributions by focusing on data, information, and their management by drawing heavily on social science and business and embodying multi-disciplinary thinking essential to the policy arena. In practice, IS researchers often treat policy as out of scope. A system-sponsor perspective has been dominant in IS research with corporations perceived as clients. Clarke (2015b) argues that researchers should recognize and adopt other perspectives in their research projects. Other stakeholders include individuals (both users and as "usees" that are affected by an information system without themselves being users), communities and societies with geographical and cultural commonalities, and environmental and ecological interests at local, regional and global levels. We can extend the Tesla example from above beyond whether it can disrupt the automotive industry. What facets of the economy, society, and the environment might Tesla disrupt? Who cares? What stakeholder categories are likely to be affected?

IS researchers often avoid policy issues because they feel "real science" (to which IS aspires) deals only with the descriptive, explanatory, and predictive. It excludes the normative and deprecates instrumentalism. Design science has helped bring instrumentalism back into the mainstream. However, design science still has a strong orientation towards the system-sponsor perspective. IS researchers often perceive other perspectives as constraints and all too often as impediments to adoption. IS researchers often avoid "information" and focus on "technology". The largely fruitless "IT artifact" debate of the last decades occludes "information" and "systems" as core to the field. Information systems serve defined needs in effective, efficient, and adaptable ways. Technology is merely a means to the end; when it drifts into core thinking, technological determinism becomes a real hazard. Available technologies are inappropriately applied to fit human needs. Overemphasis on technology can undermine organizational fit and strategic alignment for system sponsors. In the policy space, where one needs needs to frame needs more openly, one can invest too much effort in balancing the conflicting objectives of multiple stakeholders.

With information and systems at the core, it is not necessary to ignore IT. "Big data', the Internet of things, increasingly intensive "datafication", and digital business and digital users are all expected to contain embedded chips. Animals increasingly do. As individual are perceived as walking, talking data generators, chipification is no longer a paranoid delusion (Clarke, 1994). A new phase of data expropriation and

exploitation is in motion. How soon might *Homo sapiens* lose out to its own creations? This question has been mainstream in the arts for a century (Clarke, 1993, 2005). Scientists are now also asking it (Cellan-Jones, 2014).

Policy must be part of the IS field, but integrating it requires asking what research techniques are applicable. Evaluating a policy or its implementation can use techniques familiar to business faculty, such as business case construction, cost/benefit analysis, and risk assessment, but might need other, less well known techniques such as technology assessment, privacy impact assessment, and related forms of surveillance impact and social impact assessment. If one seek to propose, articulate, or implement policy, some techniques are familiar to IS academics. Majchrzak & Markus (2014) provide guidance. An important part of this challenge is moving beyond backward-looking empirical techniques to gain understanding about the future. We might need techniques on the fringe, such as Delphi rounds, to cope with the normative and explanatory, social and economic, the future, the contingent, and the rapidly changing. Examples are instrumental futurism (Clarke, 1997) and quasi-empirical scenario analysis (Clarke, 2015a).

IS researchers are observers of mighty revolutions; some even contribute to them. A narrow, organizational perspective and excessive emphasis on technology rather than on systems provides an inadequate frame. IS researchers should embrace research from other perspectives. Some research projects should embody multiple perspectives. Research conventions are challenged by policy because policy involves normative propositions, is instrumentalist, reflects multiple stakeholders, and depends on speculative data about as-yet-unobservable or observable-but-unstable phenomena in addition to "objective" empirical data derived from measurements of past phenomena. IS researchers must rise to these challenges, not avoid them.

Policy is legitimate and important for IS researchers. IS needs sufficient breadth to enable it to differentiate itself within the cluttered battleground of fields. More importantly, IS has a moral obligation to consider the implications of the information systems that we observe and that we assist in developing (Clarke, 1988).

3   Conclusion (Fred Niederman and John Leslie King)

Whether they are aware of policy or not, most IS researchers are policy researchers. As long as the topics they study have social implications, IS researchers must be concerned with policy. In addition, as teachers, IS researchers have the duty to prepare people to spot the policy implications of changes in technology, especially information technology that changes so fast. We need to ask whether fundamental precepts (e.g., trust) that have guided research to this point are, themselves, changing. If so, the policy implications can be great.

We need change in IS research if such research is to serve policy needs. One change is in perspective. Contemporary IS research often serves the needs of business, but taking the perspective of only the business client risks overlooking the interests of other non-business stakeholders. Even where businesses are the client, multiple-perspective research can be helpful by recognizing issues that may occur when all and rather than just one organization takes a particular initiative and how short-term benefits may set in motion unintended consequences relative to outside stakeholders. IS research that moves beyond the narrow confines of a single perspective requires paying attention to the social and environmental dimensions as well as economic consequences of handling information. Policy research demands recognizing stakeholders, depending on often-overlooked techniques such as stakeholder analysis, and analyzing requirements in a way that considers interests of all relevant parties rather than just the system's sponsor.

It is also worth asking if the focus on the IT artifact helps IS research be more useful for policy. If IS research is grounded in the socio-technical tradition, its primary research interest is not solely in technology, whether it be an electric car, a battery, a personal health monitoring device or a blockchain system. Rather, its primary research interest might be in how people use it over time within eco-systems filled with artifacts and stakeholders with widely varying purposes and preferences.

Emphasis on policy can benefit IS research by opening up new avenues for funding and for influence, but it requires a long-term outlook and readiness to conduct research aimed at solving problems. It often requires embracing uncertainty and mastering new techniques not in the mainstream. Human values must be incorporated. Research questions must embody norms. Sometimes researchers, as a result, are thrust

into the role of advocate and even activist. Following Majchrzak and Markus (2014), this may sometimes require splitting work between the role of surfacing valid evidence and separately advocating based on interpretations of that evidence.

Policy research can be risky for IS doctoral candidates and junior faculty. It is not yet part of the mainstream, and the time involved to develop the requisite skills and conceive and conduct research might conflict with the need for rapid-fire publication. Junior researchers should consider long-term impacts of short-term research efforts and prepare a scalable research program that involves policy as part of an overall lifetime portfolio of work. Established researchers should expand their horizons into the policy field.

IS researchers have discussed how to achieve academic respectability. Many feel discomfort moving beyond descriptive and explanatory models toward uncertainty and perceived lack of rigor often present in policy research. It is too early to say whether design science, now emerging as mainstream, will solve this problem. The world is in need of IS research that supports policy needs. IS researchers should capture sufficient intellectual space to encompass policy, which is more of an imperative than an option.

References

Cellan-Jones, R. (2014). Stephen Hawking warns artificial intelligence could end mankind. *BBC News.* Retrieved from http://www.bbc.com/news/technology-30290540

Clarke, R. (1988). Economic, legal and social implications of information technology. *MIS Quarterly, 12*(4), 517-519.

Clarke, R. (1993). Asimov's laws of robotics: Implications for information technology. *IEEE Computer*, *26*(12), 53-61.

Clarke, R. (1994). Human identification in information systems: Management challenges and public policy issues. *Information Technology & People*, *7*(4), 6-37.

Clarke, R. (1997). *Instrumentalist futurism: A tool for examining I.T. impacts and implications.* Retrieved from http://www.rogerclarke.com/DV/InstFut.html

Clarke, R. (2005). *Human-artefact hybridisation: Forms and consequences.* Retrieved from http://www.rogerclarke.com/SOS/HAH0505.html

Clarke, R. (2015a). *Big data quality: An investigation using quasi-empirical scenario analysis.* Retrieved from http://www.rogerclarke.com/EC/BDSA.html

Clarke, R. (2015b). *The concept of entity perspective and its implications for IS research.* Retrieved from http://www.rogerclarke.com/SOS/EPinIS.html

Frank, M., Roehrig, P., & Pring, B. (2014). *Code halos: How the digital lives of people, things, and organizations are changing the rules of business: A playbook for managers.* Hoboken, NJ: John Wiley and Sons.

Gibson, J. J. (1979). *The ecological approach to visual perception.* New York: Taylor and Francis.

Leonardi, P. M. (2013). When does technology use enable network change in organizations? A comparative study of feature use and shared affordances. *MIS Quarterly, 37*(3), 749-775.

Majchrzak, A., & Markus M. L. (2014). Methods for policy research: Taking socially responsible action (2nd ed.). Thousand Oaks, CA: Sage.

Majchrzak, A., Markus, M. L., & Wareham, J. (2016). Designing for digital transformation: Lessons for information systems research from the study of ICT and societal challenges. *MIS Quarterly*, *40*(2), 267-277.

Majchrzak, A., & Markus, M. L. *(2014). Technology affordances and constraints theory of MIS. In E. Kessler (Ed.), Encyclopedia of management theory* (pp 832-836). Thousand Oaks, CA: Sage.

McGrath, K. (2016). Identity verification and societal challenges: Explaining the gap between service provision and development outcomes. *MIS Quarterly*, *40*(2), 485-500.

Pfeffer, J., &. Sutton, R. I. (2006). *Hard facts, dangerous half-truths and total nonsense—profiting from evidence-based management.* Boston, MA: Harvard Business School Press.

Ramsey, M. (2015). Tesla to upgrade cars through the Internet. *The Wall Street Journal.* Retrieved from http://www.wsj.com/articles/tesla-to-add-car-safety-features-via-downloads-1426785366?tesla=y

Srivastava, S. C., Teo, T. S. H., & Devaraj, S. (2016). You can't bribe a computer: Dealing with the societal challenge of corruption through ICT. *MIS Quarterly*, *40*(2), 511-526.

Walsham, G. (2012a). Are we making a better world with ICTs: Reflections on a future agenda for the IS field. *Journal of Information Technology*, *27*(2), 87-93.

Walsham, G. (2012b). A better world with ICTs? Response to the commentaries. *Journal of Information Technology*, *27*(3), 255-257.

Venkatesh, V., Rai, A., Sykes, T. A., & Aljafari, R. 2016. Combating infant mortality in rural India: evidence form a field study of ehealth kiosk implementation. *MIS Quarterly*, *40* 2), 353-380.

About the Authors

Lynda M. Applegate is the Sarofim-Rock Professor of Business Administration at HBS and Chair of the HBS Executive Education Portfolio for Business Owners & Entrepreneurs. Since joining the HBS faculty in the 1980s, she has held a variety of leadership positions, including serving as the head of the Entrepreneurial Management Unit, Co-Chair of the MBA program, Chair of Field Based Learning and as a member of the HBS Technology Board and Academic Technology Advisory Board. She has also held a number of Harvard University leadership positions, including serving as Co-Chair of the Harvard Policy Group on Networked Government Services and on the Harvard University Provost's Technology Advisory Council. Prior to joining the HBS faculty, she was on the faculty of the University of Michigan, University of Washington and University of Arizona. In addition to her academic positions, she also held a variety of leadership positions in the health care industry. Her current research and recent publications focus on the challenges of building new ventures and leading radical business innovation in the face of significant industry, technological, capital market, and regulatory turbulence. A second stream of research examines emerging governance models to support inter-firm collaborative innovation. She is the Series Editor for Harvard Business Publishing's newly launched Core Readings in Entrepreneurship and is the author of over 40 articles, books, and book chapters, and over 350 published case studies, online learning DVDs, and course materials. In addition to her work at HBS, she has been active in helping to shape policy as a board member and adviser on public companies, entrepreneurial ventures, and government agencies. In the policy field, she has served on the Board of Trustees of the Massachusetts Technology Leadership Council, as a member of the Industry Advisory Board for NASDAQ, and on the US Federal Governments' Executive Council for Information Management and Technology. She has also served as a policy advisor on a Blue-Ribbon Panel to define a National Research Agenda on the development of the Network Economy and as a member of a roundtable panel for President Clinton's Commission on Critical Infrastructure Protection.

Roman Beck serves as Full Professor in the area of IT management and leadership at IT University of Copenhagen since 2014. His research focuses on the role of IT service sourcing, services management, and services engineering with a special focus on IS outsourcing, social media, and virtualization. He is interested in institutional logics of organizations, organizational mindfulness, and awareness. Before joining ITU, he was Assistant Professor and the E-Finance and Service Science Chair at Goethe University in Frankfurt between 2008 and 2013. He serves as Senior Editor for the *JITTA* and the *DATA BASE* journals and as Associate Editor for *BISE* and has published over 30 journal and 80 peer-reviewed conference papers in outlets such as *MISQ, JIT, CAIS, IT&P,* proceedings of icis, among others. He served as principal investigator of the German government-funded joint research project "Financial Business Grids" between 2008 and 2010 and headed several research projects at the E-Finance Lab from 2006 to 2014. He also conducts research in the area of IT cooperation within public private partnerships and the management of critical systems in the public sector together with the ISPRAT institute. He has supervised nine successful PhD students and currently supervises six PhD students. His research has been award with several best paper awards. As a visiting scholar, he spent three months at CRITO, University of California at Irvine in 2003 and further two months at the School of Information, University of Michigan at Ann Arbor in 2004. In 2008, he was visiting professor at the CIS Robinson College of Business, Georgia State University at Atlanta for three months and spent another two months at NYU Stern in 2010. During his research sabbatical in 2012, he was a visiting fellow at the Australian National University in Canberra for three months.

Fred Niederman serves as the Shaughnessy Endowed Professor of MIS at Saint Louis University. He obtained an MBA and a PhD in Management Information Systems from the University of Minnesota. He is a proponent of grounded theory and theory building as a way to enrich the MIS field and build intellectual content customized specifically to our field. He has published more than one hundred articles in leading research journals and refereed conference proceedings. He serves on editorial boards for the *Project Management Journal*, *TMIS*, *JAIS, CAIS, Human Resource Management, Journal of International Management*, *IEEE Transactions on Engineering Management* and the *Journal of Global Information Management.*

Roger Clarke is Principal of Xamax Consultancy Pty Ltd, Canberra. He is also a Visiting Professor in Cyberspace Law & Policy at the University of NSW, and a Visiting Professor in the Computer Science at the Australian National University. His focus, in his consultancy, academic and advocacy work alike, is on the strategic and policy implications of advanced information technologies. He has published on many aspects of electronic commerce, business and government, and on consumer and privacy issues. He is

particularly concerned about three directions that the IS field has taken over the last few decades. Firstly, he perceives IS researchers to be far too heavily oriented towards technology rather than towards systems. Secondly, far too much published work is addressed by researchers to other researchers, with limited relevance to real-world problems and their solutions, and far too much dedication to rigor for its own sake, and to intellectualization. Thirdly, a large majority of published research is heavily committed to the perspective of business, to the extent that the interests of the users of systems, and of the people otherwise affected by them ("uses"), are marginalized and not infrequently entirely ignored.

John Leslie King is W.W. Bishop Professor of Information, former Dean of the School of Information and former Vice Provost at the University of Michigan. He is also visiting Professor in the Department of Management at the London School of Economics and Political Science. He came to Michigan in 2000 after twenty years on the faculty of the University of California at Irvine. He has published widely from his research on the relationship between changes in information technology and changes in organizations, institutions, and markets. He has been Marvin Bower Fellow at the Harvard Business School, distinguished visiting professor at the National University of Singapore and at Nanyang Technological University in Singapore, and Fulbright Distinguished Chair in American Studies at the University of Frankfurt. From 1992-1998, he was Editor-in-Chief of the INFORMS journal *Information Systems Research*, and has served as associate editor of many other journals. He has been a member of the Board of the Computing Research Association (CRA), the Council of the Computing Community Consortium, and NSF advisory committees for Computer and Information Science and Engineering (CISE), Social, Behavioral and Economic Sciences (SBE), and Cyberinfrastructure (ACCI). He has served on numerous National Research Council studies. He holds a PhD in administration from the University of California, Irvine, and an honorary doctorate in economics from Copenhagen Business School. He is a Fellow of the Association for Information Systems and a Fellow of the American Association for the Advancement of Science.

Ann Majchrzak is the USC Associates Chaired Professor of Business Administration for the Marshall School of Business at the University of Southern California. She is in the Department of Data Sciences and Operations at Marshall where she teaches digital innovation. She holds concurrent appointments as a visiting professor at Esade Business School, Ramon Llull University, Barcelona, and at LUISS University, Rome Department of Business and Management in the areas of Innovation and Organization. She is also an external expert for the Information Systems and Innovation Group, Department of Management at the London School of Economics. She is a Senior Scholar and a Fellow of the Association for Information Systems, awarded for "making an outstanding contribution to the IS field in research, teaching, and service". She has been a member of 3 National Research Council Committees. She is the longest-running Senior Editor for *Organization Science* and has served as senior editor twice for *Management Information Systems Quarterly*. Her research interests focus on understanding how affordances of technology can support worker agility and ingenuity within collaborative settings. She has published multiple times in all the top journals in her field (*Management Science, Organization Science, Information Systems Research, Management Information Systems Quarterly*) as well as top practitioner journals (*Harvard Business Review, Sloan Management Review, California Management Review*).