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## Identifying Issues for the Bright ICT Initiative: A Worldwide Delphi Study of IS Journal Editors and Scholars

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### Abstract:

Information and communication technology (ICT) continues to change business as we know it. As ICT further integrates into our daily lives, it creates more opportunities to both help and hinder fundamental social problems throughout the world. In response to these growing and urgent societal needs, the Association for Information Systems approved the Bright ICT Initiative to extend IS research beyond a focus on business to take on the broader challenges of an ICT-enabled bright society. We conducted a Delphi study to provide guidance on where bright ICT-minded researchers might focus to produce their greatest impact. In this paper, we report on our findings. The Delphi panel comprised 182 globally distributed IS journal editors who participated in a three-round consensus-building process via the Internet. Our results provide a framework of eleven research priority areas and specific research topics for those engaged in future-oriented, socially conscious IS research.

**Keywords:** Delphi Method, Research Priorities, Information Systems, Bright ICT Initiative, ICT-enabled Bright Society Initiative, Association For Information Systems, Societal Impact.

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## 1 Introduction

The information systems (IS) field has grown tremendously in business schools since the advent of the International Conference on Information Systems in 1980. IS is well established as an enduring discipline among business departments and information schools across the world. The maturing of the field led to the establishment of the Association for Information Systems (AIS) in 1994 to provide a home for this distinctive research and educational domain. Membership has grown to over 4,000 academics from more than 100 countries (Association for Information Systems, 2014b). AIS's mission is to "serve society through the advancement of knowledge and the promotion of excellence in the practice and study of information systems" (Association for Information Systems, 2016).

The IS academic community, with the support of AIS, has achieved a critical mass of researchers who maintain a balanced perspective between technology and management by researching the design and application of systems and technologies used to manage a wide array of business organizations and industries.

Technologies and business opportunities have emerged and changed often over the IS field's short history. As a field, we began by looking at technologies as freestanding entities and slowly recognizing their widespread impact across all aspects of organizational settings. In the 1970s, we focused on understanding transaction processing, management information systems, and decision support systems and on prescribing how to best apply these concepts in day-to-day business settings (Ewing & Bielski, 1977; Gerke, 1974; Huang, Stankovic, Towsley, & Ramamritham, 1989; Osborn, Bain, Lloyd, & Perring, 1975). In the 1980s, strategic information systems became a popular buzzword as businesses began to recognize the competitive value of information systems (Clemons & Row, 1988; Henderson, Rockart, & Sifonis, 1987; Lederer & Mendelow, 1988; Lederer & Sethi, 1988; Rackoff, Wiseman, & Ullrich, 1985). Systems analysis and design became another focal point of research and practice as programming and database technologies advanced (Codd, 1981; Davis, 1993; Kendall, Kendall, Kendall, & Kendall, 1992; Kozar, 1988). In the 1990s, IS research evolved again: it presented technology as an agent of change in business processes by stressing how IS contributes to the reengineering of these processes (Davenport & Stoddard, 1994; Hammer, 1990). We studied how organizations installed ERP systems to enable communication and control in their own walls (Hayen, Holmes, & Cappel, 1999; Hicks & Stecke, 1995). In the 2000s, with the exponential growth of the Internet, e-commerce and e-business became the focal point of research and practice in MIS, and the field moved away from the organizational entity to propose inter-organizational systems (Subramani & Walden, 2001; Turban, King, Lee, & Viehland, 2002). Now, in the 2010s, we expand our focus beyond organizational control and design of IS as smart technologies begin to define the future by relying on the cloud, repositories that enable big data and analytics, blockchains, social media, mobile devices, and the Internet of Things (IoT) (Baesens, Bapna, Marsden, Vanthienen, & Zhao, 2016; McKelvey, Tanriverdi, & Yoo, 2016; O'Leary, 2013). These smart devices (e.g., smart phones, tablets, RFID-tracking devices, autonomous vehicles, and drones) increasingly permeate the fabric of our daily lives and blur the technological and organizational boundaries between our public and private lives. Thus, ICT has clearly become a change agent and source of transformation in our daily lives. It has infiltrated most of our daily routines by replacing older mechanisms and work processes. Further, individual and organization dependence on ICT has commoditized such technologies.. The digital transformation of business has brought changes to the basic assumptions inherent in outmoded industrial business models to now incorporate greater social awareness. Firms are now (or will soon be) inextricably intertwined with the communities, governments, and societies that shape business' decisions and actions. This transformation has resulted from a combination of active labor movements, increased emphasis on corporate social responsibility, and the increased speed of communication and convergence of information enabled by the Internet and cheap technology. Given the predominance of ICT as the key enabler of communication, business processes, inter-organizational relationships, and now social interaction, the IS field needs to step up to the new challenges that society and its members face. The time has come for IS academics to expand our research (and education) horizons beyond business and management to embrace the societal impacts of ICT.

AIS recognized the importance of this evolution when creating its first grand vision project in 2015. The AIS website describes the need for the project in this way:

*Global societal knowledge infrastructures and communication platforms have proliferated to almost all inhabitants of the earth, owing to the ubiquitous penetration of the Internet, mobile phones, and ICT-enabled systems for daily life and business. However, many side effects*

*emerged from ICT platforms in particular countries as well as across borders. AIS aims to take the initiative to investigate the problems in societal knowledge infrastructure and to design the vision of ICT-enabled bright society. The solution space will encompass the development of relevant technologies, business models, public policies, social norms, international agreements and metrics of measuring national progress. (Association for Information Systems, 2015)*

As a part of this grand vision project, Jae Kyu Lee, the AIS president at the time, proposed the ICT-enabled bright society initiative (in short, the Bright ICT Initiative). This initiative, which the AIS council approved, encouraged the creation and cross-fertilization of global research partnerships to tackle significant socially problematic challenges (Association for Information Systems, 2014a; Becker, vom Brocke, Hedder, & Seidel, 2015; Eymann, Legner, Prenzel, Krcmar, & Liggesmeyer, 2015; Fedorowicz & Lee, 2015). The Bright ICT Initiative seeks to expand IS research by encouraging researchers to: 1) focus on the macro-level information society, 2) engage in visionary research based on principles, and 3) take a goal-driven, holistic approach (Lee, 2015; Lee, 2016b). Largely, this initiative recognizes that new opportunities for IS research community will reach beyond what we have studied historically and calls for researchers to refocus by examining how technology development impacts communities and society.

## 2 Prior IS Frameworks

The Bright ICT Initiative is not the first attempt to delineate the domain that comprises information systems research. The first efforts to do so harken back to the earliest days of information systems research. For instance, Mason and Mitroff (1973) provided a taxonomy that comprised psychological type, class of problems, methods of evidence generation and guarantor of evidence, organizational context, and modes of presentation. Ives, Hamilton, and Davis (1980) compared Mason and Mitroff's framework to four others to propose a more comprehensive framework for computer-based information systems from which they developed a model to study the individual constructs of environment characteristics, process variables, and information system characteristics individually or jointly. Recent years have seen the publication of many papers on the state-of-the-art of particular research areas such as the technology acceptance (TAM) model (Lee, Kozar, & Larsen, 2003; Ma & Liu, 2004; King & He, 2006; Schepers & Wetzels, 2007), end user satisfaction (Mahmood, Burn, Gemoets, & Jacquez, 2000), peer-to-peer computing (Aberer & Hauswith, 2001), environmental information systems (Teutenberg & Strassenberg, 2009), cloud computing (Zhang, Cheng, & Boutaba, 2010), enterprise systems (Xu, 2011), and many others. Most of these studies were retrospective, based on a meta-analysis of past research, and resulted in a framework or a set of testable propositions. Other authors contacted leading researchers in their field to obtain answers to a series of questions on the dimensions of the topic under study. Of particular note, Lee et al. (2003) employed both methods; in addition to evaluating over 100 TAM papers, they queried the authors of the top TAM papers plus the most prolific researchers in *ISR* and *MISQ* to identify areas needing further exploration.

Further, several frameworks stem from surveys of those in practice. Dickson, Leitheiser, Nechis, and Wetherbe (1984) first reported an annual survey of practice: specifically, they conducted a Delphi study on behalf of the Society for Information Management (SIM) of top IS managers to identify the most critical issues they face. Various authors have replicated this study annually under SIM sponsorship. The most recent version appeared in 2016 (Kappelman et al., 2016). Kappelman et al. mailed questionnaires to over 5,000 SIM members. Of particular relevance to our work are their results on what they deem "IT leaders' personally most important/worrisome IT management issues". Table 1 shows the 2016 responses to this query, and they reflect the IT development issues that correspond to many of the societal concerns at the heart of the Bright ICT Initiative. Because IT leaders face these challenges in their own organizations, the lack of a societal perspective is not surprising. Thus, although the idea of a research directive framework is far from unique, the scope and purpose of the Bright ICT Initiative calls for revisiting the IS research domain with an eye to expanding to the societal impacts of ICT.

## 3 Research Objective

The grand vision project and the Bright ICT Initiative give prominence to an expansive set of ICT-enabled social problems and opportunities—one that grows daily to include new technologies and social challenges. Given its broad scope, the individual researcher would benefit from some guidance on the highest-priority project-sized questions that most merit their attention. In other words, a next iteration of the initiative's development should identify implementable research areas and questions so that research

programs and individuals in the AIS community can proceed in a concerted and coordinated manner. Researchers benefit from guidance in identifying those issues that both fit in the IS purview and address the most critical problems or opportunities espoused by bright ICT.

As an early step in the Initiative, soon after the AIS council approved it at the Pacific Asia Conference on Information Systems in June, 2015, we were commissioned to conduct a study to identify the most important topics and issues that fall in the parameters of the Bright ICT Initiative.

**Table 1. IT Leaders' Most Important/Worrisome Concerns (Kappelman et al., 2016)**

Rank	Topic	Percent of responses
1	Security/cybersecurity/privacy	46.4%
2	IT talent/ skill shortage/retention	28.3%
3	Alignment of IT and/with the business	24.0%
4	Credibility of IT/perception of IT leadership	20.3%
5	Business continuity	17.4%
6	Disaster recovery	16.5%
7	Innovation	15.1%
8	Agility/flexibility (IT)	14.7%
9	Speed of IT delivery/IT time-to-market	14.4%
10	Improving IT communications and relationships with the business	12.6%

## 4 Research Approach

In this paper, we identify the most pressing IS topics that fall in the purview of the Bright ICT Initiative. By doing so, we assist IS researchers in focusing their work on topics that make significant contributions to both academic research and societal challenges. Following the AIS council's endorsement, we conducted the study between August and December, 2015, to ensure we could share our preliminary results with the IS community at the 2015 International Conference on Information Systems. To ascertain a manageable list of topics, we involved individuals with significant IS research experience and extensive knowledge about societal issues.

In a community of more than 4,000 researchers, identifying topics and issues that appeals to the whole community would not be an easy task. Rather than conducting surveys or interviews with samples of individual researchers, we observed that, as an academic community, we already have highly experienced, well-recognized, and knowledgeable gatekeepers for our research publications: the editors of our top journals. They are the ones who monitor the pulse of IS research and affected communities to identify forward-thinking research and should, therefore, have well-formed opinions concerning what research needs to be done to advance society and the field. Given our focus on obtaining researchable themes that concur with the Bright ICT Initiative, we chose the Delphi technique as the most efficient and appropriate research method for garnering the input of these leaders in the field.

### 4.1 Delphi Process

The Delphi method has a long and successful history in IS research (Brancheau, Janz, & Wetherbe, 1996; Dickson et al., 1984; Holsapple & Joshi, 2002; Nambisan, Agarwal, & Tanniru, 1999; Niederman, Brancheau, & Wetherbe, 1991; Schmidt, 1997; Watson, 1990; Watson, Kelly, Galliers, & Brancheau, 1997). Several papers that assess its applicability to a wide range of IS topics and purposes have appeared recently (Nickerson, Varshney, & Muntermann, 2013; Okoli & Pawlowski, 2004; Pare, Cameron, Poba-Nazaou, & Templier, 2013; Skinner, Nelson, Chin, & Land, 2015; Strasser, 2016), including one extensive review in the *Communications of the Association for Information Systems* (Skinner et al., 2015). Based on these meta-studies, we adopted the classic Delphi method for this work with the updated approach of conducting data gathering electronically rather than in paper form.

The classic Delphi method requires the participants to be experts in the related field's technical knowledge base and cognizant of the issues at play in the greater world around them. In our case, such experts were particularly important because we focused on identifying issues that are central to both the technical field

and society. We chose indisputable leaders in the domain, including the editors of the Senior Scholars' basket of 8 journals<sup>1</sup>, current AIS council members (during the 2015-2016 AIS fiscal year), and bright ICT taskforce team members. These editors screen and edit the newest research papers in the IS field. All invited respondents were well positioned to forecast areas where the field can best address societal privations. This panel was much larger than the typical Delphi panel and represented a broad range of backgrounds, research experience, and, most importantly, world views. Further, the issues they identified would likely reflect those of interest to the larger academic community concerning the immediate needs in the scope of the Bright ICT Initiative.

Delphi studies typically have four features: participant anonymity, controlled feedback, iterative process, and statistical aggregation of group response (Strasser, 2016). We conducted our study completely online using a mix of Google forms and Qualtrics surveys that allowed participants to respond anonymously—an important condition for Delphi studies because it helps to reduce bias and individual influences.

We conducted the study in three rounds, which researchers consider sufficient to produce realistic results (Rowe & Wright, 1999; Skinner et al., 2015). We invited all participants to respond in each of the three rounds; we emailed questions to them in each round over a five-month period (i.e., August to December, 2015). In the first round, we gathered input that we aggregated into a single list. In the second round, we evaluated and culled the collective, summarized first-round input. In the third round, we ranked the results of the second round. In other words, we produced a ranked list of research priorities that reflect the consensus of this group of IS research experts. These three steps resemble the goals of the classic SIM study of the field conducted by Dickson et al. (1984), which looked at: 1) "What are the ten most critical issues that IS executives face over the next three to five years?", 2) "What is the order of importance of these issues?", and 3) "How much agreement is there among IS executives about the importance of these issues?".

## 4.2 First Round

The participant list for this study consisted of the editorial board members of each of the Senior Scholars' "basket of 8" journals, all current AIS Council members, and the Bright ICT task force members. Some individuals appeared multiple times because they served different journals and/or positions. We removed duplications, which resulted in a list of 182 unique individuals. We contacted these 182 individuals by email in early August and invited them to participate in our Web-based Delphi study. Two weeks after the initial email invitation, the first round commenced. During the first round, we sent participants the background information we present in Appendix A. The email introduced them to the rationale for the Bright ICT Initiative and the study's purpose. The email then asked them to list between one and three researchable problems in line with the goals of the Bright ICT Initiative and to provide three research questions related to each of these problems. They also had the option to provide explanations for their input. We sent out a reminder after two weeks to all who had not yet participated, and we closed the round two weeks after the reminder. We chose the two-week interval to achieve the highest response rate without prolonging the length of the study given that we sought to present our results during the International Conference on Information Systems, which occurs in December. Table 1 summarizes the response rate for each round.

**Table 2. Delphi Responses**

	<b>Total invitees</b>	<b>Round one</b>	<b>Round two</b>	<b>Round three</b>
Responded	182	49	67	65
Response rate		26.9%	36.8%	35.7%

In the first round, 49 respondents out of 182 individuals identified and submitted 85 problems and 202 related research questions. We include these problems and research questions in Appendix B. Beyond correcting a few grammatical errors, we provide the responses verbatim. The resulting response rate was 26.9 percent—an encouraging number because it is somewhat high for an initial wave in a Delphi study. The higher than typical response rate may be due to sampling researchers who were actively involved in

<sup>1</sup> The Senior Scholars basket of eight journals contains the journals the Senior Scholars College considers to be the leading publications in the IS field: *European Journal of Information Systems*, *Information Systems Journal*, *Information Systems Research*, *Journal of the Association for Information Systems*, *Journal of Information Technology*, *Journal of MIS*, *Journal of Strategic Information Systems*, and *MIS Quarterly*.

the study's subject matter, who were aware of the proposed Bright ICT Initiative from its announcement in the *AIS Insider* and at several conferences, and who had received the personal invitation to participate in advance of the actual study. The response rate also speaks to the personal dedication of our journal editors and leadership to support AIS and the IS field.

### 4.3 Clustering

The two authors and one doctoral student conducted a series of clustering analyses of the initial responses. We subjected the 85 issues to a sorting procedure based on similarity. Initial sorting, which we all conducted separately, resulted in a total of 27 categories (22, 21, and 23 from each individual coder). The inter-rater reliability for the first sorting was initially around 63.8 percent. Table 2 contains the initial sorting results. The numbers in each grouping match the sequence numbers of the 85 issues in Appendix B.

**Table 3. Initial Sorting of Responses**

Categories	Researcher A	Researcher B	Researcher C
1	30, 37, 40	30, 37	30, 37, 27
2		40	40
3	35, 54	35, 45, 54, 57	54, 13, 55
4	36, 53	36, 53, 74	35, 11, 74, 53
5			36
6	26	26	26
7	64, 7, 75, 71, 59, 65	7, 59, 64, 65, 71, 75	64, 65, 71, 75, 7
8	10	10	8, 22, 10, 21
9	23, 81, 79, 52, 50	23, 52, 81	18, 81, 23, 50, 52, 76
10	76, 18, 57	18	
11	11, 66	11, 66, 80	80, 66, 2, 47, 1
12	19, 73, 46, 56	19, 28, 46, 56, 69, 73	56, 46, 73, 19
13	69, 28		28, 69
14	34, 38	8, 34, 38	39, 38, 34
15	62	62	62
16	68	20, 68	68, 20, 57, 59, 45, 72
17	12, 70	1, 2, 3, 5, 12, 14, 15, 41, 42, 44, 47, 48, 51, 61, 70, 72	3, 12, 70
18	44, 51, 42, 61, 1, 16, 14, 2, 80		48, 5, 15, 41, 44, 51, 42, 14, 61, 16
19	33, 31, 21, 29, 9, 45, 43, 32, 24, 8, 6, 60, 39	6, 29, 31, 32, 33, 43, 50, 60, 79	31, 32, 60, 79
20			29, 43
21			33
22			6
23	63	9, 39, 63, 24	63, 9, 24
24	25, 17, 77, 67, 22, 4, 78, 58, 55, 49	4, 13, 16, 17, 22, 25, 49, 55, 58, 67, 76, 77, 78	49, 25, 17, 77, 4, 78, 58, 67
25	47, 72, 20, 48, 3, 5, 15, 41	45	
26	13	21	
27	74, 27	27	

After the initial sorting exercise, we discussed the categories by comparing the research questions provided for each issue. We refined and consolidated the categories into 17 topics. For confirmatory purposes, two master's students then independently coded the responses into one of the 17 topic

categories. Their inter-rater reliability was around 91 percent. The two students resolved all discrepancies before we proceeded with the second round of the survey. After intensive discussion among focus group members and after reviewing the explanations that the respondents provided, we summarized the 17 clusters of topics as Table 3 shows.

**Table 4. Clusters Resulting from Round One of the Delphi Survey**

	<b>Topic</b>	<b>Descriptive question</b>
1	Changing nature of work due to ICT	How can we transform old jobs and design new jobs to better reflect how work is or can be changed by ICT?
2	Future jobs in our ICT-based economy	How can we best accommodate the changes in social income provision, labor markets, and economic structures enabled by a future ICT-based society?
3	Educational systems for ICT society	How should our education systems be redesigned for the future ICT-intensive society?
4	Over dependency on ICT	How are we becoming overdependent on technology, and, if so, what (if anything) should be done about it?
5	Information overload processing	How will we best handle the deluge of information overload at the individual and organizational level?
6	ICT-based life	How will life be changed by ICT, and how should we prepare to deal with these changes?
7	ICT addiction	What are the negative consequences of addiction to ICT and how should we address these problems?
8	Green IT	How can we best prepare to solve the environmental problems caused by or associated with using ICT?
9	Healthcare ICT	How can ICT provide widespread access to high-quality healthcare?
10	Social problems by and of ICT	What are the consequences of a digital, educational, and/or economic divide caused by ICT, and how do we address these divides?
11	Ethical use of ICT	How can we address the ethical issues related to the use, misuse, or misrepresentation of information?
12	ICT security	How can we build more reliable and trustworthy sociotechnical systems for secured ICT?
13	Privacy	How can we protect the private information of citizens and organizations while advancing an information-based society?
14	Cybercrime	What do we do to prevent and eliminate newly emerging cybercrimes, cyberterrorism, and cyberattacks?
15	Problems in IS research	How can we refocus IS research so that it has a strong positive impact on the world's important problems?
16	Understanding and designing technologies	How do we understand, design and use future ICTs?
17	ICT professional education	How can we best educate and train ICT professionals for this future ICT society?

#### 4.4 Second Round: Surfacing Critical Topics

We sent out the list of seventeen topics to the whole group (182 recipients) for the second round of the Delphi survey. In this phase, we sought to identify the most critical issues. To do so, we asked each participant to choose up to eight of the most critical of the seventeen topic clusters. They could also amend the list and provide additional topics if they thought it lacked something. We presented the topics in random order to avoid any ordering effects.

Again, we sent the invitation to participate by email with a reminder two weeks later. We closed the second round two weeks after the reminder. A total of 67 individuals responded, and they cast a total of 536 votes. Table 4 presents the voting results.



**Table 5. Voting Results from Round Two of the Delphi Survey**

Number of votes	Topic
48	Changing nature of work due to ICT
44	Problems in IS research
42	Privacy
39	Social problems by and of ICT
36	Future jobs in our ICT-based economy
35	ICT security
35	Understanding and designing technologies
32	Ethical use of ICT
32	ICT-based life
32	Healthcare ICT
30	Cybercrime
24	<i>ICT professional education</i>
23	<i>Information overload processing</i>
22	<i>Green IT</i>

We studied the responses to detect if there was a set of topics that received higher priority than the others. Upon examination, a clear cutoff appears to occur between the topic that garnered 30 votes and the next topic with 24 votes. As such, we produced a final set of 11 distinct issue statements with all topics that received 30 votes or higher.

#### 4.5 Third Round: Importance Ranking

In the third and final round, we again emailed the original 182 participants in the study with a reminder after two weeks. Once again, we closed the survey two weeks after the reminder. This time, we asked the original 182 participants to provide a ranking of the eleven issues that resulted from the second round. Respondents could rank any number of topics and could choose fewer than eleven if they felt some were not important. A rank of 1 designates the respondent's top or most important choice. Sixty-five individuals participated in this final round.

We list the 11 topics in Table 6 along with the results of the final round of the survey.

**Table 6. Clusters Resulting from Round One of Delphi Survey**

Topic	Assigned ranks											Total responses	Mean rank*
	1	2	3	4	5	6	7	8	9	10	11		
Changing nature of work due to ICT	11	12	6	3	3	6	3	5	5	2	2	58	4.55
Future jobs in our ICT-based economy	12	9	4	7	1	2	5	5	3	3	4	55	4.78
Cybercrime	6	6	9	4	2	5	7	4	3	3	3	52	5.23
Social problems by and of ICT	9	5	7	4	3	9	5	4	6	4	2	58	5.31
Problems in IS research	12	6	3	5	5	5	4	2	4	2	10	58	5.48
Privacy	1	7	7	9	4	2	7	7	3	7	1	55	5.76
ICT security	2	6	6	6	7	11	0	5	5	4	5	57	5.91
ICT-based life	4	4	6	7	6	2	5	6	4	7	5	56	6.14
Understanding and designing technologies	6	2	4	6	9	7	3	3	8	4	9	61	6.38
Healthcare ICT	0	3	7	7	8	3	4	9	2	8	5	56	6.54
Ethical use of ICT	1	0	4	3	10	5	10	2	9	6	6	56	7.11

\* Non-response ignored.

Note that this original mean rank does not account for a respondent's choosing not to rank a topic; to wit, a non-response should affect the ranking by lowering its rank. To accommodate the impact of a non-response, we first reverse-scored the rankings and gave added weight to reflect those topics that respondents did not choose. Subsequently, we re-ranked the topics. The results of this analysis led to the final ranking of topics that we present in Table 7. The senior researchers that participated in our study deemed these topics to be the most critical.

**Table 7. Final Results of the Delphi Survey Ranking**

Topics	Ranking
Changing nature of work due to ICT	1
Social problems by and of ICT	2
Problems in IS research	3
Future jobs in our ICT-based economy	4
ICT security	5
Cybercrime	6
ICT-BASED LIFE	7
Understanding and designing technologies	8
Privacy	9
Healthcare ICT	10
Ethical use of ICT	11

## 5 Discussion: Key Issues for the Bright ICT Initiative

Closely examining the eleven topics that resulted from our Delphi analysis shows that the IS researchers prioritized specific societal impacts of ICT as those areas where we should focus our research efforts. Looking at the topics at a more macro-level, they include topics that affect the workplace (changing nature of work; future jobs) and societal aspects of ICT (social problems by and of ICT; ICT-based life). A third area of focus emphasizes the nature and process of IS research (problems in IS research; understanding and designing technologies). The final area of impact relates to institutional aspects of technology (ICT security; cybercrime; privacy; ethical use of ICT). In addition to these four areas of focus, research on healthcare ICT, they believed, is a significant domain that deserves special attention.

Our identifying these topical areas permits and encourages ICT researchers to continue examining a wide landscape of ICT—its technologies and their impacts. The topics contain the potential for researchers to widely collect data from the field because “real-world” subjects provide an enormity of examples across many nations from which to draw case examples, large sets of culled data, and material to support a wide variety of research methodologies. Most importantly, contributions to understanding the positive and negative influences of ICT provide immediate and indispensable social value. Appendix B lists the detailed topics and questioned our respondents proposed to assist researchers in further understanding each area.

ICT researchers have addressed topics that fit in these areas for quite some time with a noticeable uptick in attention to areas of societal importance since the introduction of the Bright ICT Initiative. Soon after AIS began the initiative, then-President Jae Kyu Lee provided a research framework for it in a *MIS Quarterly* editorial (Lee, 2015) in which he listed five open questions and ten issues of interest that map very closely to the eleven topics we found in this Delphi study. The five open questions concern security, privacy, addiction, social dynamics, and green IT, all of which we found (see Appendix B). The researchable issues cover examples related to privacy, security, cybercrime, ICT-based life, social problems, and the ethical use of IT, which concern both work and personal situations. In other words, the results of this Delphi study align quite well with the grand vision that Jae Kyu Lee first put forth and provides rigorous support as a short list of topics that should prove to endure as project-level guidance (Lee, 2016b).

One can easily find research projects that support these important topics in IS journals and conference programs. Security and privacy research have a long history in our field. It is only more recently that an expanding number of our colleagues have begun to study problems that pervade society. For example, a

panel at the 2016 International Conference on Information Systems looked at a challenging societal issue: how ICT could be used to support large numbers of refugees as they begin new lives in unfamiliar environments (AbuJarour et al., 2016). The Bright ICT Initiative also encourages research on the “dark side” of ICT. For example, studies on the “dark side” include those that examine how working with ICT can lead to technostress (Tarafdar, Gupta, & Turel, 2013; Tarafdar, Ragu-Nathan, & Ragu-Nathan, 2011), technology-induced problems that affect the elderly’s accepting mobile health services (Guo, Sun, Wang, Peng, & Yan, 2013; Hur, 2016), and how social media relates to terrorism (Aleroud & Gangopadhyay, 2016; Fischer, Eismann, & Fischbach, 2016) or interferes with e-participation (Dini, 2017).

Recent special issues and research communities also reflect topical interest in these areas. For example, *Information Systems Research* has recently published a special section on the changing nature of work with ICT (Forman, King, & Lyytinen, 2014), and Lee (2016a) has recently edited a book on similar research issues. Researchers from our community have reinvigorated Working Group 9.1 of IFIP, the community that studies computers and work (International Federation of Information Processing, 2015).

All of these examples point to the interest that IS researchers have in addressing the dark side of technology or advocating for a bright society. In essence, researchers who conduct studies in the purview of the Bright ICT Initiative embrace wide-ranging and socially significant work that will help to make an ICT-enabled world a better place to live.

## 6 Implications, Limitations, and Conclusions

The Bright ICT Initiative is a call to action for ICT researchers to move beyond the business and management of firms to study problems and opportunities of real societal importance. This Delphi study makes clear that there is a range of topical areas that cover a panoply of ICT impacts in the workplace and in daily life where we can make a real and substantial difference in the world. The time is ripe for our community to widen the scope of our research. In this paper, we provide guidance on the most significant topics and issues that merit our attention.

Like all studies, this one suffers from its inherent limitations. Although we gathered input from a large number of well-published, senior members of the community for our Delphi study, it does exhibit some of the common deficiencies associated with this method. By asking a small number of open-ended questions and ranking the provided responses, the results may not reflect the most critical topics. Rather, the weighting scheme identifies the most popular topics according to this set of researchers. The list of topics, issues, and questions we propose (in Appendix B) are imprecise and preliminary. Just like any strong study premise, they need to be examined through a theoretical lens and refined and operationalized by in-depth conceptualization and with empirical support. We welcome further refinement and framing of the guidance in Appendix B and the entire study. The Bright ICT Initiative is a collective effort that can only succeed with the participation of our research community.

The initiative also suggests that, as we study the ICT itself, we can provide leadership to business and governmental entities about its best uses (along with misuse prevention methods) to improve the world we live in. Our results provide guidance on the most critical areas where we can contribute the most good. We urge readers to consider the eleven suggested focus areas (in Table 6) that encourage research about issues that affect the workplace, elucidate societal aspects of ICT, help to improve the nature and process of IS research, and emphasize the institutional aspects of technology. In addition, we found specific researchable domains such as healthcare ICT among the many areas that need more research (in Appendix B), which should help to direct those colleagues who are considering future directions for their ICT research. We must increase the relevance and value of our research, and these topics will guide the field in that direction.

## Acknowledgments

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## Appendix A: Online Delphi Instrument for Round One

This appendix contains the email invitation sent as a precursor to the first round of the Delphi study. It explains the purpose of the study and requests the recipient's participation.

\*\*\*\*\*

### Personal Invitation to Participate in an Important AIS Delphi Study: The Bright ICT Initiative

#### Background

Global societal knowledge infrastructures and communication platforms have made life and business more efficient and effective. However, many serious SIDE EFFECTS HAVE EMERGED alongside these information and communications technology (ICT) platforms, imperiling the foundation of society's future not only in a particular country, but also across borders.

There has been no dedicated academic discipline or society that aims to address these problems through systematic research on a global scale until now. The AIS Council recently voted to adopt the concept of an ICT-enabled Bright Society as an AIS Grand Vision Project, calling it the Bright ICT Initiative.

The Initiative will encompass research about and development of relevant technologies, business models, public policies, social norms, international agreements, metrics of measuring national progress and more. This endeavor is intended to encourage members' research opportunities and to make AIS research outcomes more available and significant for society.

#### Characteristics

Topical Foci for the Bright ICT Initiative will build upon and move beyond current research issues in the following respects:

- Related to the GLOBAL SOCIETAL KNOWLEDGE INFRASTRUCTURE (beyond traditional business information systems)
- Geared towards social PROBLEM SOLVING (beyond theory development)
- Targeted to DESIGN our FUTURE (beyond empirical validation)
- Aiming to CREATE VALUE FOR SOCIETY (beyond creating academic knowledge for our community)

#### Personal invitation to the editors of eight journals to participate

This Delphi Study aims to identify and prioritize topical issues for this Bright ICT Initiative. The invitation is extended only to the EDITORS of the BASKET of 8 JOURNALS in AIS. The summarized (and anonymous) results will be reported at ICIS 2015. Delphi survey will be conducted in three rounds, each of which will entail filling out a short questionnaire. Your participation in all three rounds will be appreciated.

2015. 08. 01~21: First wave: open ended questionnaire asking you to list from one to three topical issues as candidates for the Bright ICT Initiative.

2015. 09. 01~21: Second wave: you will be asked to select 20 important issues from the list identified in the first round.

2015.10. 01~21: Third wave: you will be asked to rank order 20 important issues that collectively emerge in the second round.

Thanks for your participation. For any questions, please contact Dr. Jungwoo Lee at [jlee@yonsei.ac.kr](mailto:jlee@yonsei.ac.kr).

Principal Investigator: Jungwoo Lee

Advisory: Jae Kyu Lee, Jane Fedorowicz, Niels Bjorn-Anderson from the AIS Council



\*\*\*\*\*

1. Your full name: \_\_\_\_\_

2. Email address: \_\_\_\_\_

\*\*\*\* Example 1\*\*\*\*

1. What is the first problem came to your mind that, you think, is caused by the advance of ICT?

Most of jobs are becoming projectified, knowledgified and virtualized, and ordinary people are losing jobs because of automation and transformation by ICT.

2. What are the research questions to address this problem?

Identify the characteristics of future job, work, and tasks?

What kind of jobs will be emerging as a results of ICT replacement of human?

What are the required skills and knowledge for future jobs?

What are the characteristics of newly emerging knowledge works in every profession?

Are these future jobs will be more team based than organizational or individual based?

3. Why do you think it is important?

Decreasing number of jobs in the industry is becoming a serious problem. One of the driving forces of recent global depression is, I think, is related to this problem. Unless we prepare ourselves against this problem and institutionalize our systems ready for this, we will face disastrous situation as technology advances.

\*\*\* Delphi questions \*\*\*

What are the critical problems and research questions? We are asking you to report at least one problem, and feel free to report more. This form accommodates up to three problems. If you have more than three, please send those as an email to [jlee@yonsei.ac.kr](mailto:jlee@yonsei.ac.kr).

Problem 1 \*

\_\_\_\_\_

Research question #1 for problem #1 \*

\_\_\_\_\_

Research question #2 for problem #1

\_\_\_\_\_

Research question #3 for problem #1

\_\_\_\_\_

Would you explain a little bit about why it is important? \*

\_\_\_\_\_

## Appendix B: Respondent-generated Topics and Research Questions

Each of the 85 topics is followed by its suggested research questions and optional explanation using this template:

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### Problem identified: topic

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- Research question 1
- Research question 2
- Research question 3

Explain reasons why it is important?

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#### 1. Automation of knowledge work.

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- How can concepts like crowd sourcing and crowd work shape the future of knowledge-intensive jobs?
- How can we design crowd work systems that allow good and fair work conditions?

Computers and the Internet change the way we work and machines become more and more powerful and intelligent. How can we design better jobs with those new possibilities instead of replacing people by machines?

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#### 2. IT and changing nature of work,

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- Does IT help boost worker productivity or does it lower employee morale due to constant tracking and monitoring?

There are many recent news stories about new tools that major companies are using to track their employees 24/7 and their contribution to company goals at a level of detail that was impossible to collect a few years ago. Some firms claim that this is empowering to the employees and helps boost performance. Some employees complain about this being highly intrusive. Unbiased research is needed to understand the implications

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#### 3. The commoditization of IT.

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- Are enterprise systems outdated? What will enterprise systems based on commodity IT look like?
- Should a worker have to supply his/her own IT in the workplace?
- How will enterprise provided IT service have to change?

The communization of IT overwrites the long held tradition in IS research that information systems are built by developers. What if employees can write their own system? And what if they take their own system with them when they switch jobs?

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#### 4. Global outsourcing of ICT creates unemployment and eliminates entry level positions for young ICT professionals.

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- How can global outsourcing become more socially responsible, while respecting laws of economics?
- For new ICT graduates, what mechanisms can help them to gain the first 2-5 years of experience required to start a professional career?
- When ICT is outsourced to global locations, how can buyers confirm that social value is being created?

Global outsourcing of ICT, including cloud sourcing, will continue to grow, with offshore locations experiencing the highest growth. This trend is beneficial to business buyers, but has a negative impact on existing ICT workers and reduces opportunities for new ICT workers to find entry level positions. The concept of Impact Sourcing has emerged as a mechanism to use outsourcing to help impoverished communities (e.g., bottom of the pyramid). However, accepted standards and consistent definitions of Impact Sourcing do not yet exist. A buyer cannot readily validate the social contribution that an outsource

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provider claims to deliver. In short, global outsourcing will continue, our industry must be able to demonstrate social value beyond economics.

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### **5. Rise of technology platforms that are expanding the use of contingent workers.**

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- What policies are needed to moderate the shift in risk from institutions to individuals that results from the rise of technology-mediated contingent work?

The rise of online labor platforms like UpWork (formerly oDesk and Elance), Amazon Mechanical Turk, InnoCentive, Topcoder, 99designs, and TaskRabbit has accelerated the shift from full time work relationships to contingent work. Contingent work arrangements can be economically efficient and have some potential benefits for workers (especially non-traditional workers) but also shifts risk on to workers, who no longer can count on a regular income stream, worker protections, benefits programs (esp. healthcare), etc. Right now various forms of risk sharing (e.g., you still get paid even when times are slow) and insurance (health, unemployment, workers comp) are bound to full-time working relationships. The question is, would it be possible to disentangle some of these protections from the full-time employment form in such a way as to retain the economic advantages of contingent work relationships while moderating the shift of risk from employers to workers?

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### **6. Job loss due to automation.**

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- What mechanisms will align benefits and costs of automation?

Companies that automate reap the benefits of this but avoid the social costs of joblessness. What mechanisms (regulatory? social pressure? competitive?) will better align the benefits companies enjoy with the costs they are creating for society at large?

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### **7. Provisioning and Income.**

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- How do changes in provisioning (meeting needs for products and services) fit with income provision that is traditionally tied to labor?
- Is the problem we face unemployment or is it lack of appropriate income distribution (they are not mutually exclusive).
- What, if anything, can IS researchers do about this?

The fall of communism made it pretty clear that the link between provisioning and income is deeply embedded and important. But we do not have an answer for what to do if substantial disruption in income follows IT making it possible to take much labor out of provisioning. All the social and legal mechanisms are set up around notions of "ownership" that made sense in an old regime of almost balanced "prosumerism" that might change dramatically in coming years.

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### **8. Capital investments in ICT replace labor intensity of production leading to unemployment and further income inequality.**

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- How to design IT-enabled work systems that allow for shorter working week and job sharing?
- How to improve technology skills (both use and development) across a wide set of world population?
- How to develop global finance, accounting, and payment systems to reduce corruption, tax evasion, and fraud?

As economic production becomes more capital intensive, those who are educated and already well-to-do are able to gain benefits from the economy, while the rest are becoming poorer. Part of the solution is reducing workweek so that more people can be part of the digital economy, part of it is in having more educated IT savvy people, and part of it is in governments collecting enough taxes to fund these social programs.

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### **9. The GIG economy.**

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- What are the implications of companies contracting workers for "gigs" (short term assignments) rather than long term employee contracts

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This has profound implications for the global society as expectations of long term employment with a

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single (or even few) employers gives way to having shorter term contracts. Tom Malone's grand vision is coming to fruition!

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#### **10. Job loss.**

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- How to provide innovation
- 

Innovation enables expansion of jobs and possibilities. Simple replacement of people by technology provides only replacement.

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#### **11. Educational systems are not designed to prepare future generations.**

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- What is the kind of learning that citizens would benefit from to thrive in a future ICT-intensive society?
  - How can socio-technical systems for such learning be designed?
- 

The educational system is at the heart of the community, and it is likely that it faces significant ICT-related changes.

---

#### **12. If products, services, and cities become smarter, will people become stupider?**

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- Do eHealth or eFitness applications improve users' understanding of health?
  - What are the unintended consequences of smart city initiatives?
- 

Tools like FitBit are fun and encourage people to collaborate with others to meet their fitness goals. But is there a downside to this phenomenon, in terms of users' understanding of basic and advanced health principles? Do users become so attached to these applications lead them to overlook simple rubrics such as a 30-minute walk at a leisurely pace is good for you.

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#### **13. How will we know if have become dangerously overdependent on ICT?**

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- What are the consequences of high dependence on ICT?
  - Under what conditions do users recognize their dependence on ICT?
  - How can ICT-dependent organizations ensure resilience when ICT fails?
- 

The most extreme current example is the driverless automobile, about which many people are both excited and concerned. Yet we don't need to look for extreme examples to recognize that hospitals, our military, our airlines, utilities, and many other organizations are dangerously reliant on systems that are in use 24X7, and dangerously unprepared to revert to manual or semi-manual procedures when these systems fail. Since it is not possible to prevent all outages and breaches, this is a big concern.

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#### **14. The problems associated with our increasing dependence on algorithmic decision making (ADM).**

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- To what extent are we reliant on ADM? (i.e., in certain industries/countries)?
  - How do we balance security and privacy considerations in the above contexts?
  - What are the unintended outcomes of this dependence (societal, organizational, personal)?
- 

See the *JSIS* SI CFP that I sent you.

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#### **15. Information overload.**

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- How to deal with too much information
  - How to filter relevant information
  - How to focus on goals
- 

Self-explanatory

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#### **16. The ever-increasing deluge of information or "big data".**

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- How can the IS field help in analyzing "big data"? What kind of IT artifacts can we build that help us
-

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doing so?

- How can the IS field prepare its results so that they are accessible and understandable for everybody?
- 

As a field, we are at the core of storing, handling and disseminating information. However, we have not been able to clearly define what we can contribute to making sense of the ever-increasing flood of information. A framework or business model is missing.

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**17. A problem with “big data” and analytics, in my view, is a shift in focus from things and events in the world to reality as a form of documentation.**

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- As dominance of documentation and data grows, to what extent does creating the appearance of facts push out the experiences desired?
  - In education, to what extent has the documentation of learning replaced the experience of actual learning as a set of goals and social norms?
- 

More and more what we know is derived from electronic mediated sources. At some point what it says on Internet becomes more real than what one experiences around them. As this penetrates education, the appearance of learning that can be documented begins to take precedence over actual learning. This may not matter in marketing, but can be deadly in medicine, engineering, and agriculture. It seems at times that business has become obsessed with metrics, but that only a small subset of easily measured metrics is referenced and that these produce strongly negative consequences.

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**18. Reality and virtuality.**

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- How is the increasingly instantaneous representation of the world affecting our sense of what is real and what is representation/virtual?
  - How is the intertwining of the real and the virtual (e.g., through social media, simulations, virtual reality) affecting individual's sense of self and what is real?
- 

With increasingly sophisticated ICT, it will be hard to tell the difference between what is real and what is representation/virtual. What implications this has for our ability to distinguish between the real and the simulated is unclear. But what implication the inability to distinguish between the real and the virtual has for the ability to manipulate entire societies, for example, raises serious questions about the second-order effects of people losing their mooring in reality and possibly their sense of self.

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**19. Changes to individual identities due to ICT.**

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- How does the ability to ceaselessly communicate affect the way individuals see and describe themselves
  - How will the "always on" situation change due to current technical developments?
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Many of the social changes caused by ICT have consequences for personal identity. We do not understand these well and should think about how current socio-technical developments may affect, accelerate, change this trend.

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**20. Technology is increasingly becoming intertwined in our lives.**

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- The current generation has always grown up with IT and it is an invisible phenomenon to them (i.e., it is embedded and part of what they do). How might this impact the future of IS and our field?
  - How do we evaluate and understand the benefits and consequences of technology as it becomes increasingly embedded in our lives?
  - What are the benefits and consequences of IT becoming increasingly embedded in our lives (work and play)?
- 

There has long been a discussion on whether or not IT matters as a strategic resource versus a utility for a firm. We have become so dependent on technology in organizations, personally, and in society that is changing how we work, how we interact, and how we consider others in our society. Demonstrating the value of IT might be challenging because IT will increasingly be viewed as a utility that should always work (like electricity). Personally, the use of social media and personal technologies (e.g., smartphones and

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wearables) change how we access information and connect with people. In a quest to always be connected with social media (which is often a one-way conversation), are we creating an impact on our society that emphasizes personal wants over the collective's needs?

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**21. Our dependence on IT in so much of modern life in the developed world has changed how we behave, what we take responsibility for, where we abdicate responsibility to the computer system. We have changed our expectations in regard to social interaction. We have not adequately explored these changes, articulated them, or discussed how they change humanity for good or ill.**

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- In what ways has ICT changed/is changing our self-image as humans and as humans in society?
  - What do these changes mean for humans and society?
  - How might we exploit the upside to develop humanity and society while mitigating the downside?
- 

ICT-enabled change has happened too fast for society to adapt satisfactorily in real-time. Unless we know what is happening to us, we risk being transformed into people and societies in ways we would never in retrospect choose.

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**22. Cultural changes related to ICT.**

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- How does the availability of information and ICT change the way we interpret our cultural context?
  - What are the cultural consequences of digital divides?
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This corresponds to the first question but instead of looking at the way in which ICT affects our individual view of ourselves, it focuses on the question of the consequences of cultures (and societies).

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**23. Addiction and mental health issues.**

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- How and why IT can cause addiction and mental health disorders?
  - How and why IT can diminish addiction and mental health disorders?
  - What is the role of gamification (of non-game IS) in developing addictions, away from proficient IT use?
- 

20% of the population is suffering from some form mental health problem in western countries (I found such statistics for Canada and France - Canada is arguably one of the most advanced countries for mental health prevention). This is huge and often goes unnoticed. This means that students we teach and possibly some colleagues suffer from this. We need to know more about this and adapt, especially if IT use is part of the problem and solution. As we know IT can be used for good, but also for bad. How could we prevent IT usage leading to addiction or mental health problems? Could we develop design principles for IS that would reduce the risk of leading to such problems? Conversely can IT usage (e.g. through specialized websites, or websites with an appropriate design) lead to fewer problems of addiction or mental health? What is the role of gamification (of non-game IS) in developing addictions, away from proficient use? On these issues like game addiction, IT use, I would argue that the community has a lot of competencies, but we need to do much more. I am not doing research in this area, but I strongly believe this is needed and would be supportive of comparative projects at an international scale.

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**24. Social media addiction.**

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- What is the etiology of social media addiction?
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Neither the causes of nor consequences of social media addiction are well understood. As a result, social media addiction grows apace but no one knows if this is a problem or not, or what to do about it if it is a problem.

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**25. Green IT.**

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- How can IT enhance the use of green technologies?
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If we don't do something about it, life on this planet will either end or will be severely degraded in the next several hundred years.

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## 26. Environmental consequences.

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- How can IT/IS enable better economic behavior at the macro and micro level?

The environmental consequences of human behavior are going to adversely impact the coming generations most severely.

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## 27. Coping with disruption.

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- How does growing human population contribute to disruption?
- How does change in natural systems (e.g., the climate) figure into disruption?
- Does this have special meaning for IS researchers (I think it does).

There is little doubt that the world, which has become more interdependent since the population has grown and more "systems" have been created, is facing many disruptions due to climate change, interdependencies, and so on. Coping with disruption is likely to be a huge challenge going forward. IS applications probably have a lot to do with whether the transients generated by such disruption "damp" or "oscillate" -- if they oscillate we are in big trouble.

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## 28. ICT advancements lead to further urbanization, which in turn leads to further environmental impact and pollution.

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- How to enable sociotechnical change in organizations so as to enable better virtual work allowing people to work more from home?
- How to use IT to reduce pollution through ride sharing programs, better public transport systems, and so on?
- How to use IT for greener rural living?

Urbanization trends have become stronger due at least in part to geographical concentration of knowledge workers in urban areas as well as the need for collocation. This has significant environmental impact as it has been shown that urban living has high impact on the environment than rural. While factory production may need collocation, much knowledge-intensive work can be done virtually if we develop new socio-metrical practices to enable such work.

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## 29. Disaster relief (where disasters can encompass floods, fires, earthquakes, hurricanes, tornadoes, etc.).

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- How can IT solutions enable the logistics processes for disaster relief?

Timely response to disasters continues to be a major problem confronting society. The response is especially challenging as it requires mobilizing and utilizing various types of resources in the face of significant uncertainty about the types of obstacles that will need to be contended with.

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## 30. Sustainability, mitigation and adaptation to climate change.

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- How can we engage civil society in making informed decisions that are good for the environment?
- How can we infuse sustainability values into designers and builders of the physical and social environment?
- What mechanisms for improving the environmental conditions will prove most powerful?

Cross-country comparisons make it clear that the use and stewardship of resources is strongly influenced by cultural concerns embodied in regulatory frameworks and the built environment. Addressing global climate change will require engaged interdisciplinary communities equipped with the tools to drive political and social action. There are many roles that ICT could play here. Mobilizing communities to monitor local changes, building models that include complex human and environmental changes, engaging decision-makers and taxpayers to take action

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## 31. IS support for healthcare.

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- How can IS influence stakeholder role change

- Can healthcare IS influence behavioral change
- What is the role of wearable devices

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No country in the world can meet emerging healthcare needs in the way they are currently being addressed. IS can play an important role not only in terms of efficiency and effectiveness in the way healthcare is currently being practiced but, more importantly, can be useful in creating new models and services including wellness to meet future healthcare needs.

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### **32. Health divide.**

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- What are the design characteristics of IT-enabled solutions to expand healthcare awareness of different chronic diseases among the socioeconomically disadvantaged?
  - How can IT solutions be combined with other resources to expand preventive healthcare practices for chronic diseases among the socioeconomically disadvantaged?
- 

Broadening access to professional medical care is a significant societal challenge, with the challenge being much more severe in rural parts of developing and underdeveloped countries. Yet, providing access to professional medical care (including authenticated healthcare information) is crucial to develop awareness, to achieve behavioral modification, and to promote preventive healthcare practices.

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### **33. Health and wellbeing.**

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- How do predictors of health and well-being interact to affect people's physical and mental health?
  - How do nutrition, stress, activity and meditation affect physiology?
  - How do social ties and interactions affect well-being?
- 

As medicine moves from acute care with a hospital-based treatment episode to management of chronic conditions, it is becoming clear that health and well-being requires much more than just medications. However, little is known about other contributors and about their interaction. With ICT we can do much better monitoring of individual responses over time and much better modeling of complex interactions. Though not strictly a problem, this is a huge opportunity.

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### **34. The ICT-enabled healthcare effects on patientcare.**

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### **35. IS for social problems.**

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- Can ICT help curb corruption, and if so, why, how, and under what circumstances?
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Some of this research is already been done in schools of information/informatics, but is often avoided in business schools. IS researchers working in B-schools should take a broader view of the impacts on IT not only for business, but also the contexts under which businesses operates. Our management colleagues are much more progressive about this than we are; they look at their discipline as not just studying current management processes, but also shaping and improving future management processes.

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### **36. Social fragmentation.**

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- How can we build and support strong and resilient communities
  - How can we tell whether a community is strong and resilient? What are the indicators and metrics?
  - What can strong and resilient communities accomplish that cannot be done without them
- 

To realize the promised benefits of ICT requires communities (these include communities of developers, adopters, and users). Without understanding the nature of these communities and how to strengthen them, our ICT capabilities are crippled. Though not strictly a problem, this is a huge opportunity and can include issues of privacy and security.

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### **37. Digital divide.**

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- What systems and technologies can be used to bridge the digital divide
  - What kinds of education needs to be incorporated into curricula to handle this issue
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- How can the progress be accelerated for those at the bottom of the pyramid

The digital divide keeps widening

### **38. Educational divide.**

- How can IT solutions be used to broaden access to education among the socioeconomically disadvantaged?

Broadening literacy rates continues to be a major need especially among the socioeconomically disadvantaged. The problem is complicated in contexts where power structures (including those exercised through social networks) can be obstructive to literacy-enhancing initiatives.

### **39. Economic divide.**

- How can technology help overcome the global economic divide?

It is a global issue that is worsening by the minute.

### **40. Economic Inequality and the role of digital innovation.**

- What are the roles of digital innovation on economic equality?
- What are the means to close economic disparity using digital technology?

The use of digital technology brought unprecedented gain in productivity for most organizations. However, the benefit of such growth is felt unevenly in the society. The use of technology favors those who can make capital investments, than those who participate in the economic production through labor. The use of digital technology in organizations through outsourcing and automation increased the productivity of capital, but it resulted in rapid and irrevocable deindustrialization. This led to a widening income and wealth gap globally. From a macro-economic standpoint, this is an unsustainable position. IS scholars who contributed so much in increasing the productivity for corporates must pay attention to this global issue and must look for potential solution to reverse the widening economic gap.

### **41. Does IS application contribute to or work against rising income and wealth disparity?**

- What is the link, if any, between IS and income/wealth?
- What is the link between IS and economic cycles (e.g., the business cycle)?
- Are there examples of IS applications resulting in real and permanent power shifts, or just in power reinforcement?

Most things come down to power and control. One can make a good case that much if not most IS applications reinforce the power and control of those already in power and in control. If so, is this inevitable or is it more a matter of choice?

### **42. Information transparency.**

- Online consumer feedback and recommendation transparency
- Social network information sharing transparency
- News media website comments transparency

As Internet becomes the major media and information sharing tool, information transparency has become the major issue for the bright ICT. For example, more and more website users are checking the previous consumers' comments listed in the website, but many of them are not the actual users or consumers. There are many cyberbullying that can result in even suicide in some cases in the world. Cybercurrency transparency such as Bitcoin can be another research topic in view of information transparency. Bright ICT should consider information transparency as the major issues in the global Internet environment.

**43. Truth and rumors: we used to think that because the Internet is so open, truth will prevail because people will shine a harsh spotlight on untruths. Instead, misinformation sometimes spreads like wildfire and also seems to feed peoples' desire for information that confirms their views (don't confuse me with the facts, my mind is made up). This is very dangerous.**

- Under what conditions are people able to distinguish truth from half-truth and rumor?
- How can ICT applications help people recognize confirmed facts versus half-truths and rumors?
- What are the implications for democracies?

This summer the big threat is ISIS, which is recruiting young people from all over the world based on misinformation. Also in the US, political candidates are telling lies faster than the press can reveal that they are lies.

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#### **44. Ethical issues of misuse and misrepresentation of information.**

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- How to define "misuse" in different cultural and political contexts
- How to instill ethical principles of journalism into tweets too
- How to define the balance between freedom of speech on the internet and policing the internet

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#### **45. ICT security and privacy**

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#### **46. Dependency on complex, insecure systems.**

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- How to measure the independent nature of complexity on a global scale
- How to address issues of security
- How to design resilient systems

If we rely on systems—and we do—how to make sure that these systems remain reliable and do not get "out of control".

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#### **47. How can we arm users against behavioral security problems?**

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- How do we arm people against phishing attacks?
- What training is required to prevent predictable attacks?
- How can we handle the variety of attacks with a singular set of behavioral fixes?

A Sixty Minutes episode recently reported that 80% of breaches were conducted by stealing a password. These passwords are often revealed by keyloggers or viruses. The Anthem attack was able to extract passwords of five people with high-level IT access. Users often fail to recognize the importance of creating complicated passwords, and perhaps more importantly, they also fail to recognize phishing messages that will reveal both complex passwords and secondary factors such as city of birth, pet's name, etc. Cutting edge technical solutions seem to be failing because of behavioral issues. Hillary Clinton even stated that the defense department IT people recommended that she use a private email server for her phone. Even browsing to an unfamiliar website can result in a keylogger.

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#### **48. Security.**

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- How do we secure personal information
- How do we sanction violations
- Can the infrastructure evolve so that information is more secure

While the internet provides tremendous advantages to connecting people and supporting commerce, there is an equal amount of danger for individuals and societies regarding personal information and vulnerabilities from nation states and hackers. There is a great need to secure information to continue to benefit from this digital platform.

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#### **49. Digitization of critical systems such as medical, energy, ventilation, national security, and finance makes such systems more vulnerable to failure and deliberate attacks.**

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- How to build more reliant sociotechnical systems?
- How to protect sociotechnical systems from malicious attacks?

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Examples of natural disasters caused failure of IT systems (e.g., during 911), Flash Crash, and many

others show vulnerability of our increasingly digitized society. Meniscus attacks further intensify these threats. This is a key problem for our society.

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#### **50. Security without violating privacy.**

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#### **51. Lack of security on the Internet.**

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- Big question: How can users of the Internet be protected?
  - Can some kind of secure authentication be introduced to prevent criminals accessing the Internet?
  - Can privacy be protected?
- 

The Internet has become a dangerous place. People need a license to drive a car but any criminal can access the Internet and pretend to be someone else. Some new ways need to be found to improve security on the Internet.

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#### **52. How at risk is global society and the global economy to a total meltdown either as a result of a cyberterrorist attack or freak accident?**

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- What are the key areas of vulnerability of the global ICT infrastructure?
  - Why has no such attack succeeded thus far?
  - What would be the implications of a partially or totally successful attack leading to melt-down and what would it take to recover? What would it cost (in all senses) before such recovery occurred?
- 

Our way of life could be destroyed in seconds.

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#### **53. Information privacy.**

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- How to protect the private information of citizens and organizations
  - What industry-government-academic initiatives are needed to improve information privacy
  - What technological innovations are needed
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Loss of information privacy by people and organizations is perhaps the greatest IT-related problem of our time

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#### **54. Personal control over an individual's digital persona in society.**

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- How has IT and the Internet affected our capacity to control info about ourselves
  - What ways can researchers use to assess the costs of this to people in various personal ways
  - What technologies can assist people to regain control, and make their own decisions about what information to share
- 

The idea of individuals having the freedom to share information, as well as the capability to not share all their information ought to be fundamental privileges in society. Just technology doesn't permit that now, and people have lost control.

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#### **55. Cybersurveillance.**

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- What are proper standards and policies that regulate governments' abuse of personal information using personal data from cyberspace?
  - Does the emergence of social media, mobile service and big data change the relationship between governments and citizens? If so, how does it affect the nature of civic society?
- 

The use (both legal and illegal) use of personal data by governments are rampant. There are no proper positions that IS community is taking. Recently, APA declared that it will not collaborate with governments in conducting ant-terror interrogation efforts. What should be a proper form of standards, policies and governance structure to ensure a proper balance between civic liberty and national security? IS scholars must lead the dialogue on how the use of digital technology is changing the relationship between governments and their citizens.

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### 56. Privacy invasion.

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- What does a global ethic of data use look like?
  - What rights should individuals have over the data they generate by simply moving through an increasingly sensor-studded world?
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The right to privacy historically has been defined as the right to be left alone. However, being unconnected and alone is increasingly challenging in the networked world of ICT. This raises questions about whether the meaning of privacy might need to change or what a new ethic of privacy would look like in an increasingly connected world of "always on" ICT.

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### 57. Increased merger of the intimate, the social, and the technical.

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- How do we resolve the issue of increased reliance on deeply intimate information for mainstream business processes?
  - How do we solve the privacy problem?
  - How can customers, citizens and users gain control over data representing them in complex business and civil society processes?
- 

As technology becomes more intimately intertwined with our bodies and everyday activities, recording and mapping our activities and bodily functions, the fact that governments and commercial organizations are controlling this data, and not the producers and "owners" of the data represents a significant design bottle neck for further innovation in these complex interrelationships. It is naive to assume that people will always choose convenience over privacy in these relationships. Some form of privacy-by-design implemented through Vendor Relationship Management (VRM) must be essential to solve the privacy issue. Yet, next to no IS research has shown interest in this.

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### 58. Privacy and security issues in a globalized world.

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- What are the key concerns for consumers
  - How can the privacy concerns of consumers be effectively addressed?
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Privacy and security issues are key concerns of consumers, particularly in carrying out transaction activities in a global scale.

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### 59. Amount and pervasiveness of Internet spam.

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- Invades privacy and criminal activity
  - Creates higher disparity between rich and poor
  - More uneven distribution of wealth creates social unrest and is simply not fair
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Fraud

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### 60. Cyberfraud.

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- How can technology mitigate the problems
  - What technological advances are required
  - What new interdisciplinary research work can address this
- 

The costs are high, the damage to society and economic have been dramatic and failure to address the problems has the potential to create a new "tragedy of the commons".

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### 61. The constant threat of somebody stealing our identity

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- Technical compatibility problems when moving geographically
  - The loss of resources and efforts are very high
  - Invasion of privacy
- 

Social media and data collected by everybody from Internet giants to criminals is making the world a more

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insecure place

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**62. Cybercrime and terror.**

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- How to eliminate the origin of cybercrimes and terrors?
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Privacy

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**63. Malicious websites (viruses, fake sites for ID theft).**

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- Can we develop a community process and protocol for automating blacklisting websites
- 

It is easy to create a fake website for malicious purposes whether to distribute viruses or steal information. It is impossible to manually keep up with the sites as they change rapidly (sometimes daily). If we had a process and protocol for blacklisting sites pseudo-automatically based on millions of users, then we could quickly block these sites.

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**64. IS research has tended to focus on the “good” aspects of technology but has neglected the “dark” or “grey” aspects.**

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- Obtain better understanding of 'dark' or 'grey' motivation
  - Case Studies of such applications
  - Extent or penetration of such applications
- 

The range of 'adverse' use of IT is growing posing a major threat to society. Protective methods lag behind attacks. The array and range of adverse is huge and we know too little about what goes on and the threats posed.

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**65. Much of the research that we publish has no discernible impact on practice, in particular with respect to making the world a better place.**

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- How can we encourage researchers to engage with practical problems using methods that focus on creating positive impacts?
  - How can IS research make a difference to the world of practice?
  - What is the practical impact that IS research brings to as to make the world a better place, especially in developing countries?
- 

I feel that too much of the IS research that is published has very little bearing on what is useful in practice. Research problems are often contrived, trivial and of little or no interest to anyone. It seems to be conducted for its own sake. The contributions to knowledge are minimal, and to practice are negligible. This divorce from practice is not healthy for IS as a discipline.

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**66. Doing impactful research like the Bright ICT Initiative is inadequately valued by our discipline and journals.**

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- What are the less well recognized knowledge contributions from design science research?
  - How can we increase the rigor of multidisciplinary design science research?
  - How can we promulgate recognition of such value across the discipline?
- 

To do strong and valuable research in such an applied, multidisciplinary direction, we need appropriate tools. We need also to change the mindset of the gatekeepers to recognize and acknowledge diverse value.

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**67. IS has lost its sense of direction. This is exacerbated when people who are really in different disciplines, notably economics, econometrics, operations research, organizational behavior, etc. submit their work to IS journals, with minimal amounts of IS content beyond a very simplistic context. IS as a discipline gains very little from this research. I suspect that the home disciplines of the contributing authors gain very little too. The papers are often highly technical and so serve as vehicles to demonstrate arcane analytical skills but little else.**

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- How should we evaluate IS research?
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- What kind of research should we publish, and not publish?

IS is not economics. IS is not marketing. IS is not OB or operations research or psychology. We need to have a stronger IS core to the research that we publish.

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#### **68. How can we develop better understanding and cooperation between academics and stakeholders in IS?**

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- How can we increase relevancy of IS research?
- Where do practitioners search when they face an IS problem?
- How do we interact with practitioners?

Whereas the issue of relevance of our research has been raised from a long time, we have addressed this issue from our viewpoint. It would be interesting to reinvestigate the issue starting from the stakeholder's viewpoint. And in particular investigate Where do practitioners search when they face an IS problem?

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#### **69. Research methodologies.**

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- Can we develop an IS toolset that is accessible and usable for everyone?
- Can we develop a central database that holds IS researchers' collected data sets?

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#### **70. Lack of theorizing in IS research.**

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- How to build theories in IS research?
- How to modify/extent/apply theories in IS research?

Most IS academics are trained in methods and not in theories. We often borrow theories from other disciplines, and use them somewhat arbitrarily (without paying attentions to their assumptions or boundary constraints), sometimes misapply them (use them at the wrong level of analysis, integrate theories that are inherently incompatible, etc.). There has been very few theories that are native to IS, unlike say management, psychology, or other disciplines. Most IS researchers (including senior ones) have never proposed a new theory. For the discipline to mature and be "respected" in the academic community, we must educate our community how to build, extend, modify theories and provide illustrative examples. I'll be happy to lead or play a role in this effort, if AIS deems it important.

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#### **71. The context is missing from ICT research.**

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- Can ICT improve agriculture, and if so, why and how?
- What are the problems small businesses face in benefiting from IT, and how can they overcome these problems?

historically, we have always conducted IS (e.g., ERP, MRP, etc.) research in large organizations, but non-traditional organizations, such as small businesses, government sector, non-profit enterprises, nursing care, agriculture, etc. have been ignored. These organizations have unique challenges (e.g., resource constraints, corruption) and findings from large Western organizations do not apply to their instances. Rather than search for generalizable theories that apply everywhere (which they don't), we must look for specific solutions to specific problems in specific contexts. We also think of IT as an "artifact" that can apply equally across contexts, which is also not the case. To do this type of work, we must get our feet wet, and understand the context (e.g., agriculture), its work processes, people, and problems. There should be space in journals for people who take the effort to describe specific contexts and research questions for others to research. We can think of this as the contribution of "problematization" rather than a theoretical or practical contribution, which are the typical standards for publishing in our top journals.

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#### **72. Lack of engaged scholarship in IS.**

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- How can we better collaborate with industry?
- How can IS scholars contribute to policy making?

IS scholars are largely invisible from public policy debates regarding ICT and the Internet. We have a lot to contribute but we tend to focus on small research topics in order to get published in top journals. I think

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the journals themselves need to open up to encourage policy debates on important public issues.

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### **73. Identification of important issues in IT.**

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- What topic is most critical in IS research
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We do research topics. I think most of them are important. But I wish there was a way to identify the most critical issues that we most focus our attention,

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### **74. Technology use in rapidly changing environments.**

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- What features of the immediate context drive change in dynamic environments?
  - Can we train individuals to more effectively use technologies to buffer them from rapid technological change?
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We are operating in an increasingly quickly moving work and social context, yet, most of our models rely on relatively static models, which do not take into account the subtleties of the context. Studies looking at the interplay between context and feature sets in rapidly changing environments could illuminate understanding of technology use in field settings.

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### **75. Moving IS beyond the mainframe.**

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- How can the IS field address interconnected issues spanning intimate technology and global digital infrastructures?
  - Why do the most researched new IS trends tend to be situated in and studied from an organizational perspective?
  - How do we ensure that the full force of digital innovation is properly conceptualized and understood by the IS field?
- 

The IS field is decidedly poor at understanding technology-in-the-small. For example, while the mobile phone and subsequently the smartphone the past 25 years have set the World on fire, around 3% of IS publications in the Basket of 8 journals has dealt with this development in any capacity (Sorensen & Landau, 2015). Equally, there is a significant lack of research studying the technology-in-the-large with a significant lack of research studying digital infrastructures and platforms (Tilson et al., 2010). At the same time, phenomena such as ERP, CRM, outsourcing, cloud computing, and big data seem to be much better represented in IS research. It looks suspiciously as though the IS field is still very much stuck in a mainframe trap. If the field is to gain further relevance, it needs to address the emerging breadth of socio-technical relationships under the broad umbrella of digital innovation. Otherwise, no table will be turned to paraphrase Yoo's argument (Yoo, 2013)

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### **76. Dread risks and unknown risks.**

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- What are the socio-technical issues important to understand these risks
  - What economic mitigating mechanisms can be created to handle these risks
  - What technologies can be developed to mitigate the risks that cannot be handled using current technology
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The Internet has great potential but with the constant barrage of risks, the potential cannot be realized.

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### **77. Innovation.**

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- Where is innovation being innovative?
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Much of what is done is simply providing electronic versions of what is already available. Innovation is needed in all areas and by its nature is harder to come across or to create. This provides step changes and creates new jobs, services, and products

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### **78. Utilization of existing technologies.**

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- What drives innovation with established work place technologies
  - What drives invention with established technologies
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- What drives abandonment of existing technologies

We need a richer understanding, using mixed methods, quantitative, and qualitative approaches to understanding more about the use of existing workplace technologies. Our literature focuses far too much on what is new - and not nearly enough - on significant and established technologies in the workplace.

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### **79. Technology-mediated communication is replacing face-to-face communication.**

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- For what types of communication purposes are technology-mediated channels superior to face-to-face communication?
- Are they essential communication skills that our young people are lacking?
- Can training/education programs improve communication skills?

I am concerned that we are losing the ability to communicate effectively because our daily interactions take place almost exclusively via technology. Because of this, less information (of certain types of) is being shared across generations, communities, and society in general. While we are "sharing" a lot of information, it is superficial and not the deeper kind of communication that builds relationships.

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### **80. Proliferation of standards for IT.**

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- How can we reduce the number of ICT standards?
- How can we make standards simpler to use (and yet efficient)?
- How do standards get designed?

Not only people as citizens, but companies get lost with the proliferation of ICT and corresponding standards.

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### **81. How can we balance usability (UX or user experience) with art?**

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- What are the organizational processes required to ensure usability?
- How can the importance of usability/user experience design be recognized?
- How are costs and benefits balanced for UX design?

Asking my students to identify "bad websites" resulted in a shocking, large set of shoddy work that resulted in confusion, poor impressions, and likely lost sales. The designers apparently do not test their designs due to project constraints and although the functionality is (perhaps) there, the sites appear to fail to achieve their goals.

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### **82. Platform ecosystems.**

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- Dynamics of platform evolution
- Intra-platform competition
- Inter-platform competition

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### **83. ICT talent shortage.**

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- How can we develop a global ICT talent that is diverse and ready to meet the markets' needs?

Decreasing numbers of students studying technology related fields, coupled with poor career retention, compounded by pending retirements in the existing technology workforce create a confluence of forces that will continue to create headwinds for IT organizations to meet staffing requirements over the next decade. It is not just enough to graduate students in ICT but we need to focus on the market readiness of our graduates.

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**84. The capabilities of ICT continue to advance. Shaping future capabilities of ICT and adapting those capabilities to serve organizational needs could be antagonistic or synergistic with ICT capabilities driven by consumers. As consumer-driven demand for ICT expands (e.g., communication, social networking, entertainment), human and organizational resources devoted to identifying and developing ICT innovations to meet demand for those could create opportunity costs or additional opportunities for similar resources devoted to identifying and**

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**developing ICT innovations in the organizational domain.**

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- How is demand for ICT professionals changing over time and what are the drivers? What is the demand for new and continuing roles for ICT professionals? How do those roles relate to the roles of others involved in identifying and developing ICT innovations?
- What are the knowledge, skills, and abilities needed by ICT professionals in various roles? How do those needs affect the education of ICT professionals?
- What are continuing and emerging issues in managing ICT professionals and their career paths.

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The work of ICT professionals has been essential for the successful implementation of ICT innovations in organizations. Understanding and characterizing how this work will change in the future as ICT innovations are more driven by consumer demand will have profound influence on attracting, educating, and managing future ICT professionals.

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**85. Preparing workforce.**

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- How best to train MIS students
- How best to prepare and retain faculty for the changing skill set?
- How to position MIS as an important discipline in the college?

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There are many problems/research issues to be addressed in IS. I singled this out because we are a group and have come together as educators—we prepare the workforce. Hence, we should have one major focus on educating our students and be sure they get good jobs.

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## About the Authors

**Jungwoo Lee** is the Director of Center for Work Science, and a professor of information systems and technologies at Graduate School of Information, Yonsei University, Seoul, Korea. His current research focuses on the changing nature of work by information and communication technologies. In the early days of digitalization of government, he published a developmental model of digital government, providing a theoretical basis for numerous international indices for e-government development. Aside from academic responsibilities, he is serving as the CIO of Yonsei University since 2016. He was a regular columnist for the Digital Times and the Segyeilbo. In 2013, he ran a news program at the M-Money Broadcasting Station specialized in economic analysis. He holds a PhD and MS in computer information systems from Georgia State University, MBA from Sogang University, BA in English Language and Literature from Yonsei University. Currently, he chairs the IFIP WG 9.1 on ICT and Work.

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