Artificial intelligence meets is researchers: Can it replace us?

Loebbecke, Claudia; El Sawy, Omar; Kankanhalli, Atreyi; Lynne Markus, M.; Te'Eni, Dov; Wrobel, Stefan; Rydén, Pernille; Obeng-Antwi, Astrid

Published in:
Communications of the Association for Information Systems

Link to article, DOI:
10.17705/1CAIS.04713

Publication date:
2020

Document Version
Peer reviewed version

Communications of the Association for Information Systems

Accepted Manuscript

Artificial Intelligence Meets IS Researchers: Can It Replace Us?

Claudia Loebbecke
University of Cologne
Germany
claudia.loebbecke@uni-koeln.de

Omar El Sawy
University of Southern California
USA

Atreyi Kankanhalli
National University of Singapore
Singapore

M. Lynne Markus
Bentley University
USA

Dov Te'eni
Tel-Aviv University
Israel

Stefan Wrobel
University of Bonn
Fraunhofer Institute for Intelligent Analysis and Information Systems
Germany

Pernille Rydén
Technical University of Denmark
Denmark

Astrid Obeng-Antwi
University of Cologne
Germany

Please cite this article as: Loebbecke, Claudia; El Sawy, Omar; Kankanhalli, Atreyi; Markus, M. Lynne; Te'eni, Dov; Wrobel, Stefan; Rydén, Pernille; Obeng-Antwi, Astrid: Artificial Intelligence Meets IS Researchers: Can It Replace Us?, *Communications of the Association for Information Systems* (forthcoming), In Press.

Communications of the Association for Information Systems

Panel Report ISSN: 1529-3181

Artificial Intelligence Meets IS Researchers: Can It Replace Us?

Claudia Loebbecke
University of Cologne
Germany
claudia.loebbecke@uni-koeln.de

Omar El Sawy
University of Southern California
USA

Atreyi Kankanhalli
National University of Singapore
Singapore

M. Lynne Markus
Bentley University
USA

Dov Te'eni
Tel-Aviv University
Israel

Stefan Wrobel
University of Bonn
Fraunhofer Institute for Intelligent Analysis and Information Systems
Germany

Pernille Rydén
Technical University of Denmark
Denmark

Astrid Obeng-Antwi
University of Cologne
Germany

Abstract:

In the era of accelerating digitization and rapid advances in Artificial Intelligence (AI), increasingly more job tasks may be automated by AI. However, there is little critical analysis of how this will happen, if at all, and to what kind of professions to greater or lesser extents. A few studies suggest that highly creative and knowledge-intensive tasks cannot be substituted by AI. Yet, there have been examples of creative art pieces generated by AI algorithms that even art critics could not distinguish from human-drawn paintings. As IS (and most other) researchers, we pride ourselves on the scarcity, novelty, and creativity of our work. In this context, this panel debated the critical question for IS academics –whether AI can and will replace our major activity, IS research, – or even us IS researchers.

Keywords: Artificial Intelligence (AI), Information Systems (IS) Research, Automation.

1 Introduction

With the rapid advances in Artificial Intelligence (AI) technology, increasingly more job tasks are being automated by AI (Smith & Anderson, 2014). Indeed, there are many doomsday predictions in the media that AI will replace jobs and allow computers to take over the world (Lewis, 2015). For example, Kai-Fu Lee, AI expert, has predicted that AI will automate and potentially eliminate 40 percent of jobs within 15 years (Lee, 2017). He says that AI will surely replace 'repetitive' jobs, e.g., those tasks that are being automated by robots in factories. Further, he predicts that AI will potentially replace many 'white-collar' tasks in the fields of accounting, healthcare, marketing, law, hospitality, and other areas. However, there is little critical analysis of how this will happen, if at all, and to what kind of professions to greater or lesser extents. In this regard, a few studies have attempted to research the phenomenon (Fleming, 2019; Halal et al., 2017; Makridakis, 2017), including coming up with AI automation scores for work activities of all major occupations. Much of this work suggests that highly creative and knowledge-intensive tasks cannot be automated by AI. Yet, there have been examples of creative art pieces generated by AI algorithms that even art critics could not distinguish from human-drawn paintings (Graham, 2018).

This debate on how AI will impact IS researchers not only targets the IS community itself. It is also relevant in the wider context of research institutions and universities. Furthermore, the future of (IS) research jobs and the accompanying competencies are also important questions for policymakers, business leaders, and world citizens, as AI becomes part of everyday life in a rapidly changing society.

As impressive examples of AI developments and implementations are gaining ground, the disruptive effects will not spare those actors or even entire professions who underestimate their increasing momentum. Shirky, professor of journalism at NYU, at the peak of the social media wave in 2008 (p. 58/59), wrote:

> *"[…] Sometimes, though, the professional outlook [here: by IS researchers on IS research] can become a disadvantage, preventing the very people who have the most at stake-the professionals themselves-from understanding major changes to the structure of their profession. In particular, when a profession has been created as a result of some scarcity, […], the 'professionals are often the last ones to see it when that scarcity goes away. It is easier to understand that you face competition than obsolescence."*

As IS (and most other) researchers, we pride ourselves on the scarcity, novelty, and creativity of our work. In this context, at the 40th International Conference for Information Systems (2019), *Claudia Loebbecke* (panel chair) organized a debate on this critical issue for IS researchers – whether AI can and will replace our major activity, IS research, – or even us IS researchers. The panelists were (in alphabetical order)

- *Omar El Sawy*, University of Southern California, CA, USA
- *Atreyi Kankanhalli*, National University of Singapore, Singapore
- *M. Lynne Markus*, Bentley University, MA, USA
- *Dov Te'eni*, Tel-Aviv University, Israel
- *Stefan Wrobel*, University of Bonn and Fraunhofer Institute for Intelligent Analysis and Information Systems, Germany

After briefly introducing topic and panelists, *Claudia Loebbecke* guided the panelists through three rounds of questions for a bit more than half of the 90-minute panel time.

1. To what degree and for which tasks or research sub-fields may (or may not) AI substitute or at least complement IS researchers and co-produce IS research insights?
2. Which specificities inherent to IS research (compared to other white-collar, intellectual, or creative professional activities) – rather than which technologies – will further increase the AI-driven challenge to IS research?
3. How could IS researchers – starting from a position of strength and early awareness – prepare themselves and the field for whatever AI will bring to IS research as our profession?

During the Q&A part, a lively discussion with the audience brought up additional, very insightful aspects.

2 Positions and Discussion

Q1: To what degree and for which tasks or research sub-fields may (or may not) AI substitute or at least complement IS researchers and co-produce IS research insights?

In the first round, panelists outlined their views on if, to what degree, and for which particular tasks or research sub-fields, AI may (or may not) substitute IS researchers, complement, or co-produce IS research insights relevant to various stakeholders (if not publishable in A journals).

- *Atreyi Kankanhalli (No, It Can't!)* outlined the key activities performed by IS researchers and discussed to what extent state-of-the-art AI tools are able to automate each activity. The activities include problem formulation, literature review, theoretical modeling, empirical study design, data collection and analysis, discussion of results, theoretical and practical contributions, and finally, writing quality publications based on the work. To her, almost all of these tasks are currently not replaceable by AI. While AI can support search of references for literature review and discovery of patterns from data, it fails considerably in research problem identification and theory building, since these activities require semantic understanding that AI is not capable of. While AI could assist in data analysis, she argued that understanding the contributions of the work requires human interpretation. Similarly, for the writing process, AI solely provides tools for preparing an initial draft – helpful in some science fields, which are more structured than IS. Last, she argued that even future AI tools may not be able to replace our current activities because they lack semantic understanding, where little technological progress is being made.
- *Omar El Sawy (No, It Can't!)* argued that AI offers an opportunity; not a threat. To him, AI creates new critical research issues that need IS researchers' attention. With regard to on the opportunities arising from AI in the context of the digital business strategies, he pointed out that narrow views of AI are deceptive and may miss the nuances and broader implications. Instead, AI brings new research issues to the evolving context of digital platform ecosystems for human researchers to investigate newly arising and highly relevant topics more closely as well as from broader perspectives – rather than making IS researchers redundant.
- *Dov Te'eni (Maybe It Will Eventually)* argued that we should not examine current practices of IS researchers in order to predict the impact of AI and its role as they will surely change whether AI supports or replaces the human IS researcher. Already, AI-supported research reverses the sequence of activities followed in traditional hypothesis-testing research. Many works based on machine-learning begin with selecting a data set and follow with an interesting finding, which can be formulated as an answer to a hypothesis that can be explained by some theory. Eventually AI may be able to do autonomously all the above more effectively than humans, although humans are still better in generating research questions and identifying insights from textual information that goes beyond the linguistic analysis of a corpus. IS researchers should distinguish between research with human-augmented AI and research conducted by AI alone. To him ethical concerns arise when moving to an autonomous AI research mode before the AI conduct is fully transparent and acceptable – at least to the researchers overseeing the AI research – in order to be capable of governing morality and ethical issues related to the research.
- *M. Lynne Markus (Yes, It Can!)* argued that, given certain assumptions about the nature and topics of IS research, it is almost certain that AI can and will replace IS researchers. AI has already been demonstrated itself capable of generating empirically testable hypotheses from analysis of the scientific literature, and AI is currently being used to generate publishable news stories from press releases and wire service bulletins. In particular, AI already demonstrated to be capable of creating research literature reviews, as evidenced by the German publisher Springer that recently published an AI-generated book, aggregating 150 other Springer books on a specific research topic (Springer Nature, 2019). To her, it is not implausible to expect that AI will replace a large swathe of IS research (and those IS researchers who do it) across the full scope of theory generation, hypothesis testing, and research report writing. M. Lynne Markus referred to the research by economists Frey and Osborne (2017), which forecasted that 47% of the US workforce could be automated, pointing out that their own algorithm forecasted the high likelihood of economists being replaced. To her, the real issue is not whether such automation can happen to IS researchers, but how IS researchers should rethink their mission and value proposition now. Researchers initially need to consider their socioeconomic role and value proposition.

- *Stefan Wrobel (Yes, It Can!)* is convinced that AI will have a significant impact on both, the way IS research is carried out and on the topics at the core of the research. Over time and across fields, research ultimately produces deep, original, and novel insights that require creativity, highest intelligence, and social interaction with the scientific community. In the digital era, data-driven research has gained a more prominent role as AI systems excel at dealing with large volumes of data, filtering, aggregating, and generalizing them. To him any successful application of AI technologies in practice will involve a combination of machine-analyzed data and human knowledge; he talks about 'Hybrid AI' . Such (hybrid) AI will be embedded in an organizational context – also that of IS research – has to deal with the unavoidable limits that AI systems will have in the not too distant future. When understanding research and IS research in particular as a social process, those issues are likely to become exciting avenues for future (human) IS research.
- *Claudia Loebbecke (panel chair leaning towards yes it can!)* commented that today's AI research works towards understanding the black box behind the phenomena although other black boxes are widely accepted in our society. She questioned that a broader understanding the black box will be realistic or relevant – except for those very few who actually develop it the black box, i.e., the AI. She claimed that hardly anybody ever tried to understand how and why the Beatles composed the Yellow Submarine the way they did or ever challenged the black box behind the weather app on one's smartphone. As it does not take a meteorologist to happily use and benefit from the weather forecast – with its mistakes and lacking preciseness – it will not take a world-class composer to enjoy or market AI-composed music pieces. Similarly, not everybody who uses spreadsheet functionalities understands how the calculations work. Hardly anybody can explain the result list of one's last google search. Would it be nice to know and understand? Perhaps yes, perhaps in most cases the user could not care less. Are we used to not knowing? Yes! Claudia Loebbecke favors increasing awareness among IS researchers and their audiences of how dependent results and insights are upon input data and developing the algorithms – certainly not new, but easily pushed aside.

Summarizing the first round, *Atreyi Kankanhalli* and *Omar El Sawy* began in the IS research comfort zone. To them, IS research is different from more structured research fields and hence will be less replaceable by AI. Therefore, IS researchers should not waste the community's precious time with worrying too much about ourselves – rather they should embrace AI and make it help in making a difference to the world. To them, the time is not yet ripe for research conducted autonomously by AI tools. *Dov Te'eni* questioned if AI may or may not substitute or complement certain IS research tasks is the right question to pose and suggested that it may be more relevant and fruitful to look at the new human tasks that the AI revolution brings. At the end of the first round, *M. Lynne Markus* and *Stefan Wrobel* made us leave our IS comfort zone and laid out what was happening in the real world – outside the wallet garden of IS departments and protected, tax-funded research institutes. The questions should be whether the products meet the expected quality demands and are actually interesting to read.

Q2: Which specificities inherent to IS research (compared to other white-collar, intellectual, or creative professional activities) – rather than which technologies – will further increase the AI-driven challenge to IS research?

In the second round, panelists abstracted from the current state of technology and reflected upon the specificities inherent to IS research in comparison to other white-collar and intellectual or creative professional activities. All panelists provided their educated guess and assessment of how technological progress would impact the situation further and increase the challenge. Again, the contributions ranged from "no, it can't" to "yes, it can".

- *Atreyi Kankanhalli (No, It Can't!)* pointed out that AI can help in business analytics and some industry tasks to 'get something that works' without worrying about how things work. Even as could be seen with IBM Watson' failures (Strickland, 2019), the machine is still in its infancy when performing complex tasks like clinical diagnoses. However, IS researchers are, by their nature itself, interested to understand how things work. AI can be more salient in research fields which are more structured than IS research. She argued that AI may still not be useful for creative tasks. To her, claims of art and music generated by AI are hyped by the media and IT companies. As the algorithms for such music or art creation systems are still designed by humans, she is skeptical about creative and complex research tasks being executed by AI.

- *Omar El Sawy (No, It Can't!)* pointed out, that IS research is just another business sector or application field that could gain from reviewing and potentially reviving its digital business strategy including AI-based components. He argued that parts of IS research are likely to be assisted by AI, but that AI initially does not cover the "why" in research. To him, AI might serve as a research assistant focusing rather on the technology instead of human skills of creating value or trust. Whereas IS researchers' motivation is mainly to build theory and formulate the "why", AI networks only open up new possibilities and support for providing answers to the "why" and thereby to contribute to testing and finalizing theories.
- *Dov Te'eni (Maybe It Will Eventually)* argued that IS research had from its origin been engrained in the practice of humans managing, using, and being affected by IS. Therefore IS research should be directed and validated by practice. As long as humans continue to be involved in the practice, they must be part of the research-practice loop. Human practitioners, i.e., designers, managers, users, and those affected, should be part of the research validation and directing the research – whether it is performed by humans or AI. In an extreme scenario, when IS researchers and IS practitioners are replaced by AI, AI could be studying and evaluating itself without human IS researchers knowing what moral decisions the AI took evaluating itself – would we want that?
- *M. Lynne Markus (Yes, It Can!)* pointed out that IS research has begun to exhibit fundamental changes in focus and methods. Earlier, IS research used to focus primarily on the design, use, and management of IS. Today, IS research covers increasingly remote topics; for instance, much IS research uses data analytics for understanding IS-distant topics such as changes in physician behavior in response to changes in health care guidelines. The farther IS research moves into the use of analytics as a research method for non-IS topics, the more likely it is to be automated, because data analytics, programming, and analysis are automatable and increasingly being automated. Overall, moving away from initial IS research roots makes IS researchers more vulnerable to being replaced by AI and other automating technologies.
- *Stefan Wrobel (Yes, It Can!)* pointed to cases, for instance in medicine or agriculture, where not using AI would be irresponsible. Here, AI supports individual solutions for highly specified medical research areas (Conner-Simons & Gordon, 2019). He wondered who would today feel comfortable to draw the line between more or less influenced or automated research applications and disciplines.

Concluding the second round, *Atreyi Kankanhalli* and *Omar El Sawy* agreed that there are still vital tasks for IS researchers to conduct such as developing new ideas and original thinking. The "why" is still a question for humans to answer, even though AI can augment the research process. *Dov Te'eni* questioned the abilities of humans (the human brain is still not able to explain itself) and pondered on AI's self-investigative potential. *M. Lynne Markus* and *Stefan Wrobel* emphasized the choices that IS researches must make to stay relevant in the future and not seeing AI solely as a competitor.

Q3: How could IS researchers – starting from a position of strength and early awareness – prepare themselves and the field for whatever AI will bring to IS research as our profession?

In the shorter third round, panelists stated how IS researchers – starting from a position of strength and early awareness – could prepare themselves and the field for whatever AI will bring to IS research as our profession.

- *Atreyi Kankanhalli (No, It Can't!)* argued that IS researchers should prepare for the AI onslaught by embracing a more abductive process to leverage AI, as we are moving to a more data-driven paradigm – whether we like it or not. She believes that the use of AI will allow inductive revealing of data patterns which will inform deductive research approaches and vice versa. Overall she advocates a switch from viewing AI as a substitute to seeing AI as a complement, and suggests thinking how IS researchers can work symbiotically with AI.
- *Omar El Sawy (No, It Can't!)* referred to the likely arising focus in the world of AI on abductive research where there is continuous interplay between data and theory. He particularly claimed that data give us insights and options regarding sequences and patterns in research. Furthermore, to him, IS researchers have a responsibility to comprehend the black box of AI, to make it more transparent with explainability and understand the facets at the interface of the AI-human domains.

- *Dov Te'eni (Maybe It Will Eventually)* emphasized that as AI still has grey marks for IS researchers which for now makes it hard to trust AI. To maintain control and autonomy, he claimed that "if we can't beat them, join them". He suggests that IS researchers should actively affect the development of AI to tackle its current limitations such as problematic communication, and simultaneously maintain trusted research communities. He wishes to see human activity in research that involves the person's feelings and desires (e.g., having fun), colleagues' dialog, criticism and judgement, and cultural and societal norms of thinking and behaving.
- *M. Lynne Markus (Yes, It Can!)* states that IS researchers do not have the main responsibility and decision power over how to use AI in research and teaching. Institutional actors such as funding agencies, universities, and accreditors may have a bigger say in whether and to what extent we are automated. It remains to IS researchers to use what autonomy we have for the benefit of IS research.
- *Stefan Wrobel (Yes, It Can!)* emphasized the importance of considering AI in a macroscopic perspective. He specifically questioned how larger ecosystems should be run and how we can design organizations that are resilient to disruption and change with regard to AI. So far, organizations have been driven by technological advancements. IS researchers should look at things they cannot yet do with current technology, i.e. where AI could come in. With this regard, he claimed that even music compositions often use AI applications, such as for creating death metal music (Winkie, 2019).
- *Claudia Loebbecke (panel chair leaning towards yes it can!)* again questioned the claim that IS researchers' need to understand the black box. She wondered whether any IS researcher ever understood, or even tried to understand, how a drop of his and her blood could easily fill a page-long table – written for medical experts and – upon request – also rephrased and formatted so that patients think they understand. She is convinced that people trust a lot of data-driven results, products, and decision supports – maybe not the first time they are confronted with them, but once they see that the 'results' are better than what human experts could provide. Remember grandpa who looked into the clouds for telling when the next rain would fall? To her, IS researchers should not insist that technology, here AI, is only of good use if they fully understand. Instead IS researchers should raise and spread awareness of potentially good and bad use of AIs.

Summarizing the final round, *Atreyi Kankanhalli*, *Omar El Sawy*, and *M. Lynne Markus* reminded us how important it is to take responsibility for important tasks ahead such as maintaining a critical view. *Dov Te'eni* recapped the social values of doing research, emphasizing the process rather than the outcome. *Stefan Wrobel*, and *Claudia Loebbecke* invited the audience to zoom out and see AI from a larger perspective as well as taking a historical perspective on the value and wisdom of factual research.

3 Q&A with the Audience

After the three panel rounds, the audience challenged the panelists and offered insightful arguments to dig deeper mainly into three aspects of the topic at hand:

1. **The social grounding of debating the AI impact on IS research.** How can we take into account that the body – as center of human intuition – can guide research done by humans in a way that AI is not capable of?
2. **The future contribution of IS research on a continuum from generating to regenerating Knowledge.** What will characterize IS research in the future? Do you expect that IS research may turn into mainly regenerating knowledge originally presented as massively collected data 'massaged' for human digestion and regeneration? What will IS researchers do and disseminate their insights if text is produced and skimmed by AI and a good part of learning moves towards real-time?
3. **The role and impact of human irrationality compared to 'rational' machines in the context of (IS) research.** To what degree will IS (and other) researchers base their predictions on what they know about technology or on what they know about the broader domains under investigation? How should they deal with the assumption that machines are rational and people are irrational?

Panelists' responses to each of the three discussion blocks showed that there is more than one educated opinion and guess out there: Below, we present the main reactions given during the panel session:

1. **The social grounding of debating the AI impact on IS research.** How can we take into account that the body – as center of human intuition – can guide research done by humans in a way that AI is not capable of?

   Reflecting the Social Grounding. During the discussion, the audience pointed to the importance of considering the foundations of the human being according to Bourdieu (1986) and Dewey (1930) and underscored emphasized the embodied cognition, i.e., people's ability to understand through the body (Dreyfus, 1972). There is a risk of taking a too narrow approach to knowledge creation, intelligence, and research as being solely based on the individual. Social constructionism provides alternative explanations to scrutinize for understanding the future impact of AI on the IS researchers and their community. In response, Stefan Wrobel granted that the human body is an important factor distinguishing us from AI. M. Lynne Markus agreed that the human body can be an advantage in decision-making, considering the quality of intuition that machines currently lack. However, she also stressed that human decision-making suffers from fatigue, illness, and bad moods, as behavioral economics shows. Consequently, we cannot rely on comforting claims to human uniqueness to save us from external pressures toward automation.

2. **The future contribution of IS research on a continuum from generating to regenerating Knowledge.** What will characterize IS research in the future? Do you expect that IS research may turn into mainly regenerating knowledge originally presented as massively collected data 'massaged' for human digestion and regeneration? What will IS researchers do and disseminate their insights if text is produced and skimmed by AI and a good part of learning moves towards real-time?

   Generating versus Regenerating Knowledge. The audience also suggested that emphasizing the importance for IS researchers to understand how AI works and how AI influences the value of knowledge. IS researchers should put more effort into making such information accessible and comprehensible to laypersons. Original research – supposedly offered by humans – drives value, whereas common or trivial insights – likely to be generated by machines – usually do not drive value. Machines rather speed up the research process and ease the IS researchers doing their work.

   Since industry 1.0, when electricity was launched, people have been replaced by technology. Resistance towards new technology that we do not fully understand, and therefore perceive as potentially threatening to status quo, is not a new phenomenon and typically leads to emotional reactions. It is important to better understand the contextual influence of AI and detect when AI poses a problem or when the human attitude towards change in general needs to be addressed.

3. **The role and impact of human irrationality compared to 'rational' machines in the context of (IS) research.** To what degree will IS (and other) researchers base their predictions on what they know about technology or on what they know about the broader domains under investigation? How should they deal with the assumption that machines are rational and people are irrational?

   Irrationality of Humans Compared to Machines. Referring to the issue of irrationality of humans compared to machines, the audience questioned whether we base our predictions on what we know about technology in particular or on what we know about more broad domains. Moreover, the level and scope of AI knowledge is also relevant to debate in a socio-political context. Knowledge is power, so what is necessary to know about AI and for whom? Should IS researchers speak for democratization of AI skills, i.e., that every layperson understands the technology and processes behind AI in depth or should we 'black box' AI knowledge and label it 'IS researchers only'? Some argued that the former is neither valuable nor possible, due to the high complexity of the processes, which are even hard to understand for specialists.

4 Takeaways

The panelists agreed that AI is here and will increasingly become a human companion. However, paying tribute to the panel structure, they did not reach consensus on the future AI impact on IS research and IS

researchers. While the general notion was that *AI would* likely make the life of IS researchers easier; to some AI may also help identify and perhaps even solve future problems.

Concerning the issue of human – AI interaction (and substitution), it remained open for future discussion to what extent IS researchers should they *meet AI* as a friend or foe; and whether they should embrace AI or try to keep it at distance. The discussion tapped into deeper concerns of professional roles, identity, as well as working culture due to the shift in jobs and skills in the future if AI taking over existing competences.

Although the panelists had several answers to the questions posed in the panel, more questions actually emerged from the debate. Altogether, the panel offered seven sets of questions for future research:

- **Digging deeper within IS discipline:** For which IS research tasks or research sub-fields may AI substitute or at least complement IS researchers and co-produce IS research insights? Which parts of IS research will be least and most impacted by ongoing AI developments? And why so?
- **Comparing the IS discipline to other intellectual fields:** Which specificities inherent to IS research (compared to other white-collar, intellectual, or creative professional activities) will further increase the AI-driven challenge to IS research demanding the field to pro-actively take position?
- **Preparing the IS discipline to the advent of AI:** How could IS researchers contribute to preparing the IS discipline for taking advantage of AI development? How could IS researchers think about this beyond technology and focus on the management aspects of AI?
- **Operationalizing the human contribution to IS research:** Which human (body) characteristics will maintain human research to be different from AI-based investigations? How to operationalize and perhaps even quantify the role and impact of researchers' intuition in IS research projects – in designing research projects, collecting and analyzing data, and in assessing and interpreting research findings? How should IS researchers deal with the interconnectedness of AI – especially with AI starting to 'socialize' in digital networks?
- **Assessing the value of (human) IS domain knowledge:** What will the role of (human) domain knowledge – here knowledge of the IS discipline – be in future IS research projects? How can we better understand which domain knowledge humans will continue to contribute to impactful IS research?
- **Improving our understanding of and trust in the AI contribution:** What will it take to understand the AI 'black box'? How ot organize the research discipline so that IS researchers can all benefit from AI – as we now all benefit from various tools for data input that have followed "last millenium's" punch cards.
- **Benefitting from human irrationality:** How could we turn the negative connotation of human irrationality (compared to rational machine outputs) into the opportunity to differentiate for success? As rational machines do and suggest the same all the time, economic and social success requires being different.

Overall, the panel left IS researches with important food for thought and choices to make in order to stay relevant in the future and take joint responsibility in the future development with AI.

Claudia Loebbecke summarized with a small common denominator among panelists: AI is here and it will not go away. Neither teaching, consulting, nor researching on IS and AI will protect IS researchers from being impacted. Nevertheless, all of the above allows IS researchers to make educated choices from a position of strength:

> *"Sometimes, though, the professional outlook can become a disadvantage, preventing the very people who have the most at stake – the professionals themselves – from understanding major changes to the structure of their profession." [Shirky 2008, p. 58]*

References

Bourdieu, P. (1986). Distinction: A social critique of the judgement of taste. London, UK: Routledge.

Conner-Simons, A., & Gordon, R. (2019). Using AI to predict breast cancer and personalize care. MIT News. Retrieved from news.mit.edu/2019/using-ai-predict-breast-cancer-and-personalize-care-0507

Dewey, J. (1930). Human nature and conduct. New York, NY: Modern Library.

Dreyfus, H. (1972). What computers can't do: A critique of artificial reason. New York, NY: Harper & Row.

Fleming, P. (2019). Robots and organization studies: Why robots might not want to steal your job. Organization Studies, 40(1), 23-38.

Flow Machines. (2019). Flow machines: AI assisted music. Retrieved from www.flow-machines.com/

Frey, C., & Osborne, M. (2017). The future of employment: How susceptible are jobs to computerisation? Technological Forecasting and Social Change, 114(C), 254-280.

Graham, T. (2019). Art made by AI is selling for thousands – is it any good? BBC. Retrieved from www.bbc.com/culture/story/20181210-art-made-by-ai-is-selling-for-thousands-is-it-any-good

Halal, W., Kolber, J., Davies, O., & Global, T. (2017). Forecasts of AI and future jobs in 2030: Muddling through likely, with two alternative scenarios. Journal of Futures Studies, 21(2), 83-96.

Huggler, J. (2019). Computer is set to complete Beethoven's unfinished symphony. The Telegraph. Retrieved from www.telegraph.co.uk/news/2019/12/13/computer-set-complete-beethovens-unfinished-symphony/

Lee, K.-F. (2017). The real threat of Artificial Intelligence. The New York Times. Retrieved from www.nytimes.com/2017/06/24/opinion/sunday/artificial-intelligence-economic-inequality.html

Lewis, T. (2015). Don't let Artificial Intelligence take over, top scientists Warn. LiveScience. www.livescience.com/49419-artificial-intelligence-dangers-letter.html

Makridakis, S. (2017). The forthcoming Artificial Intelligence (AI) revolution: Its impact on society and firms. Futures, 90, 46-60.

Shirky, C. (2008). Here comes everybody: The power of organizing without organizations. New York, NY: Penguin Press.

Smith, A., & Anderson, J. (2014). AI, robotics, and the future of jobs. Pew Research Center. Retrieved from https://www.pewresearch.org/internet/2014/08/06/future-of-jobs/

Springer Nature. (2019). Springer nature publishes its first machine-generated book. Springer. Retrieved from www.springer.com/gp/about-springer/media/press-releases/corporate/springer-nature-machine-generated-book/16590126

Strickland, E. (2019). How IBM Watson overpromised and underdelivered on AI health care. IEEE Spectrum. Retrieved from spectrum.ieee.org/biomedical/diagnostics/how-ibm-watson-overpromised-and-underdelivered-on-ai-health-care

Winkie, L. (2019). Hear insane 24/7 livestream of AI-generated death metal. Revolver. Retrieved from www.revolvermag.com/music/hear-insane-247-livestream-ai-generated-death-metal

About the Authors

Six panelists in alpbetical order:

Omar El Sawy is the Kenneth King Stonier endowed Chair in Business Administration and Professor of Information Systems in the Data Sciences & Operations Department of the Marshall School of Business at the University of Southern California. His PhD is from Stanford Business School. His expertise is in digital business strategy in dynamic environments and digital platform ecosystems. In 2008, he was inducted as Fellow of the Association for Information Systems for his research contributions. He has become recently interested in the broader management aspects of AI in digital platform ecosystems. In 2018, he joined the Scientific Advisory Board of the AI in Management (AIM) research center at EM Lyon Business School in France. His AI somewhat-dormant DNA roots stem from a 1979 computer science graduate course in expert systems at Stanford University taught by E. Feigenbaum.

Atreyi Kankanhalli is Provost's Chair Professor of Information Systems and Analytics at the School of Computing, National University of Singapore. She obtained her B.Tech. from IIT Delhi, MS from RPI, and PhD from the National University of Singapore. She is currently a Senior Editor of MIS Quarterly and has served in editorial roles at MIS Quarterly, Information Systems Research, Journal of the Association for Information Systems, and other journals. She has also served as Program Co-Chair for PACIS and ICEGOV, and has received several awards for her research. She conducts research on online communities and digital collaboration, digital innovation and transformation particularly in sectors such as government and healthcare. Prior to her academic career, she worked in industrial R&D for a number of years.

Claudia Loebbecke holds the Chair of Media and Technology Management at the University of Cologne, Germany. In 2005-2006, she was elected Association for Information Systems (AIS) President, which named her AIS Fellow in 2012. She received a Master Degree and a PhD in Business Administration from the University of Cologne, Germany, and an MBA from Indiana University in Bloomington, IN. In 2018, she completed the MIT's Executive Education Course 'Artificial Intelligence: Implications for Business Strategy'. Claudia was seven years Senior Editor of ISJ und twelve years of JSIS and serves on several editorial boards. Her research focuses on the impact of digitization and new technologies such as blockchain technology and artificial intelligence on business models and management especially in sectors such as media, telecommunications and in tech start-ups.

M. Lynne Markus is the John W. Poduska, Sr. Professor of Information and Process Management at Bentley University and an associated researcher at MIT's Center for Information Systems Research. She has published extensively in the areas of digital business and interorganizational governance, enterprise systems and business processes, electronic communication and knowledge reuse, and organizational change management. Her current research interests include digital innovation in the financial and health sectors, the responsible use of data and algorithms, and the changing nature of work. Markus was named a Fellow of the Association for Information Systems in 2004 and received the AIS LEO Award for Exceptional Lifetime Achievement in Information Systems in 2008.

Dov Te'eni is the Mexico Chaired Professor of IS and Associate Dean for Research at Tel Aviv University, Coller School of Management. His areas of research include human-computer interaction, communication in organizations, visualization, generativity and knowledge management. He has organized several AIS conferences and served as AIS president. In Israel, he served as chair of MEITAL (the national coordinator of e-learning in higher education) and as chair of the Advisory Committee for Lehava (the National Digital Divide Initiative). Dov Te'eni is currently the editor in chief of the European Journal of IS (EJIS) and works with the editorial board to create an effective platform for interesting and influential conversations. Dov Te'eni was awarded AIS fellowship in 2008 and the AIS LEO Award in 2015.

Stefan Wrobel is Professor of Computer Science at University of Bonn and Director of the Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS where almost 300 researchers work on AI, Machine Learning, Big Data and Digitization. His work is focused on the central algorithmic questions of Artificial Intelligence and Machine Learning, the interaction of analytics algorithms with humans as well on the data ecosystems that make AI possible. He has published extensively in these areas and is on the editorial Board of several leading academic journals in his field. He is the speaker of the 'Fraunhofer Big Data and Artificial Intelligence Alliance', director of the 'Fraunhofer Center for Machine Learning', and one of the speakers of the German National Competence Center Machine Learning Rhine-Ruhr ML2R.

Furthermore, the panelists appreciate the co-authorship of

Astrid Obeng-Antwi is a first-year PhD student in Media and Technology Management at the University of Cologne, Germany, where she has worked as Research Assistant (2018-2019). She holds a MSc in Business Administration from the University of Cologne, Germany, for which she wrote her thesis investigating the impact of Artificial Intelligence on contracts. Her current work focuses on the impact of Artificial Intelligence on business, society, and media.

Pernille Rydén, PhD in Strategic Cognition, is an Associate Professor of Strategic Management at the Technical University of Denmark (DTU) where she serves as Head of Studies for Engineering Business Administration. With more than 20 years of experience in cognitive psychology, marketing, and management, her research involves business-consumer interaction, healthcare innovation, social media storms, real-time management, culture, and ethics.