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Panel

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Abstract

Academics and policymakers alike are concerned with the potential impact and repercussions of artificial intelligence on our lives and the world we live in. In the light of the inherent chasm between human intelligence and artificial intelligence logics, the inevitable need to integrate human and artificial intelligence into symbiotic forms is particularly challenging to Information Systems researchers and designers. This panel aims to explore meaningful research directions on human-artificial intelligence, which could lead to a better understanding of its impact and better designs. Building on their expertise in design, HCI, AI, and generative systems, the panelists will explore the following challenges:

- What is unique in the combination of human and artificial intelligence compared with systems that are solely based on one or the other?
- Can we and should we insist on a similar range of considerations when studying and designing systems based on human-augmented artificial intelligence as we do when studying and designing systems based solely on human intelligence?
- Can performance improvements expected of human-artificial intelligence, compared with AI, be effectively studied independently of considerations such as control and trust?

The panel will seek to evoke provocative ideas and generative thinking that can initiate research on the relationship between human and artificial intelligence in the IS discipline and perhaps also contribute to the general discourse thereof.

Keywords: Artificial intelligence, human intelligence, Automation, Algorithmic decision support systems, Human-centered design, trust, explanations, control

1 Introduction, Theme and Goals

With the backdrop of a growing reliance on intelligent machines based on cryptic neural nets (Faraj et al., 2018), there is growing interest in the study of the symbiosis between human and artificial intelligence (AI) (von Krogh, 2018). There are many definitions of intelligence. In this panel, we use the following working definition: intelligence, be it human or artificial, is the ability to comprehend, reason, learn and manipulate states and behaviors. In the past, effective design of human-machine systems considered the relative advantages of humans over machines, and vice versa, and allocated tasks accordingly in order to boost performance and to manage tasks that humans or machines could not perform alone. Recently, developers of human-machine systems that build on human and artificial intelligence are being required to expand their considerations beyond performance and to address micro-level issues such as control, accountability and trust, and macro-level issues such as the impact on the workforce. The relevance and significance of human systems that rely on AI have been underscored by the White House, which initiated a report on the topic that covers diverse approaches to leveraging AI and a range of consequences (White House, 2016). Furthermore, as demonstrated by the notorious 2010 Flash Crash, an oblivious attitude to the integration of AI in human systems may lead to wide-scale grave repercussions (Menkveld and Yueshen, 2018).

The IS field has traditionally looked beyond the development of technology to address the impact of technology on individuals, organizations, and society. The IS field has gradually expanded its view on value from economic cost-benefit focus to consider ethics, quality of life, environment, inequality and other social and environmental aspects that may be affected by the technology. Feelings, attitudes, and values play an increasingly important role in designing technology and evaluating its impact, as evident in the criteria used in studies of human-computer interaction (HCI). Furthermore, the HCI design tradition, in contrast to artificial intelligence, has relied on iterative design in order to capture unforeseeable and often unexplainable human behavior (Winograd, 2006). Subsequently, it begs the question of whether these broader aspects should direct the study of human-artificial intelligence.

In this panel, we will explore and debate the potential institutional, organizational, and technological approaches to bridging the divide between human and artificial intelligence through the design of innovative information systems that take affirmative steps toward combining human and artificial intelligence. We ask several interrelated and challenging questions:

- What is unique in the combination of human and artificial intelligence compared with systems that are solely based on one or the other? What, currently, are the differences between the two that must be bridged before they can be combined, e.g., differences in their semiotics and cognitive-affective elements?

- Can we and should we insist on a similar range of considerations when studying and designing systems based on human-augmented artificial intelligence as we do when studying and designing systems based solely on human intelligence?

- Can performance improvements in human-augmented artificial intelligence be effectively studied independently of considerations such as control and trust?

- There is currently uncertainty about changes in the way we understand, value and act in the AI induced changing world we live, with its changing value systems, e.g., how we regard privacy and trust. Is this uncertainty so great that it would be best to allow the technology to evolve further before attempting prescriptive design research and, for now, remain focused on the descriptive?

We hope to trigger an interest in several research directions on how to study the growing pervasiveness of human-artificial intelligence in everyday life.

2 Panel Structure

The panel is intended to generate varied responses to several specific questions. The panelists will begin with their view of the *current state* by addressing two initial questions:

- Under what conditions would you support the idea of combining human and artificial intelligence?

- How can the idea of combining human and artificial intelligence be implemented? What would be the expected benefits? Potential risks? And what would make the application more efficient and more effective?

After an open discussion induced by these framing questions, we take *a forward-looking turn* and focus on the implications of combining human and artificial intelligence to IS research and to the prospects of our community at large. We aim to trigger discussion about what should we do next, what to study and what to defer studying, and how we get this choreography right.

The panel is designed to stimulate an engaging discussion that not only appeals to a broad audience, but also provides practical insights and lively debate. The panel comprises a team of five researchers who have significant experience in various aspects of human-centric system design and artificial intelligence. All panelists will provide illustrations of their respective positions on publishing and draw insights from their own firsthand experience.

The panel will follow a roundtable discussion format in two steps, corresponding to the two sets of questions noted above, current and about forward-looking. Following an introduction by the moderator Dov Te'eni, the four panelists will be given about 5 minutes each to address the initial set of questions, for a total of 20 minutes. At this point, the audience will be invited to voice their opinions in response to the panelists' remarks, or question them about the topic. The topic is relevant for everyone regardless of research orientation or seniority, and we expect that many in the crowd will have something to contribute to the discussion. About 15 minutes will be allotted for the discussion.

We will then move to the forward-looking phase of the discussion. Panelists will be asked to predict the effects of combining human and artificial intelligence on IS research and practice in general. Again, panelists will be given 5 minutes each, for a total of 20 minutes. Questions from the audience will again be solicited in the final 15-20 minutes. The moderator will summarize the main points and facilitate audience participation.

The particular set of forward-looking issues will depend on the dynamics of the first step, but we will tentatively begin with the following diverse opinions:

Opinion 1: Research currently focuses on effectiveness and efficiency considerations when designing systems that integrate human-artificial intelligence with human control, e.g., by testing continuously, to ensure continuous improvement. While AI can bring more efficiency, effectiveness, and rationality, it will be important to understand its impact on more human-focused goals, such as privacy, fairness, and sustainability. As we move toward more AI-based societies, and increasing use of human-AI hybrids, methods and ways of identifying, designing, and implementing a full range of socio-technical system goals are required.

Opinion 2: We need to design machines that can not only learn, but also explain and justify their suggestions and actions. Explaining may seem inefficient, but it is a highly needed design requirement. At least in this phase of human-smart machine interaction, we cannot ignore the need to trust the output of machines, hence the need for explanations. Without trust, the systems will not be used to their full potential, e.g., medical diagnosis and prognosis.

Opinion 3: Technology is gradually, yet incessantly evolving, with changes related to privacy and trust, so that we will first need to determine what criteria are relevant in the new age. Trust in technology grows over time and experience - and AI is no different. What requires much justification, explanation, and recourse to human intervention today may require less five years hence, and none a decade down the road.

Opinion 4: Communication involves three semiotic layers, namely syntax, semantics, and pragmatics. Whilst human interaction intertwines all of three layers, AI systems are strong on the syntactic and semantic layer but often ignore the pragmatic layer, which is difficult to represent yet vital for understanding in complex processes such as negotiations and learning. A symbiosis of the human and the artificial requires each of them to communicate and cooperate in a meaningful and rich way,

pragmatics need to be modelled and implemented, and the concept of communication needs to be revisited.

In summary, we seek to evoke provocative ideas and generative thinking with regard to the future of combining human and artificial intelligence. At a minimum, we hope that the panel will stimulate new insights about the *modus operandi* of artificial intelligence utilization and the potential role of information technology in its development.

3 Panelists

Michel Avital is Professor of Digitalization at Copenhagen Business School. He studies how information technologies are developed, applied, managed and consumed. He currently examines blockchain-enabled transformation, innovation, and business models. He has published over 100 articles on topics such as blockchain technology, sharing economy, big data, open data, open design, generative design, creativity, innovation, green IT and sustainable value. He is an editorial board member of seven leading IS journals and serves in various organizing capacities in major international conferences on digital technology and organization studies. Michel is an advocate of open access and an avid proponent of cross-boundaries exchange and collaboration. Further information: http://avital.net

Alan R. Hevner is a Distinguished University Professor and Eminent Scholar in the Information Systems and Decision Sciences Department in the Muma College of Business at the University of South Florida. He holds the Citigroup/Hidden River Chair of Distributed Technology. Dr. Hevner's areas of research interest include design science research, information systems development, software engineering, distributed database systems, healthcare systems, and Internet of Things computing. He has published over 250 research papers on these topics and has consulted for a number of Fortune 500 companies. Dr. Hevner is a Fellow of the American Association for the Advancement of Science (AAAS) and a Fellow of the Association for Information Systems (AIS). He is a member of ACM, IEEE, and INFORMS. Additional honors include selection as a Parnas Fellow at Lero, the Irish software research center, a Schoeller Senior Fellow at Friedrich Alexander University in Germany, and a recipient of the Design Science Research Lifetime Achievement Award. From 2006 to 2009, he served as a program manager at the U.S. National Science Foundation (NSF) in the Computer and Information Science and Engineering (CISE) Directorate.

Mareike Schoop is University Professor of Information Systems at Hohenheim University. She holds a PhD from the University of Manchester, UK, and a Habilitation from RWTH Aachen University for which she received the Friedrich-Wilhelm Award. She was a Visiting Professor at the University of Oxford, UK, and at Vienna University of Technology, Austria. Her research focuses on organizational communication and information management. In particular, she is interested in digital negotiations, decision support and analysis, predictive analytics, digitalization of learning, gamification of interaction processes, and knowledge representation. Her research has been widely published and has been funded by the European Commission, the German Science Foundation (DFG), and the Federal Ministry of Education and Research. She serves as editor of *Group Decision and Negotiation* and of *it-Information Technology*.

David G. Schwartz is Professor of Information Systems, and former vice-chairman, at the Graduate School of Business Administration of Bar-Ilan University, Israel. He is chairman of the Business School's Doctoral Program and co-founded the Entrepreneurship Program that he continues to lead. David has published over 120 research papers, books, book chapters, and editorials in the field of information systems and technologies. His books include Cooperating Heterogeneous Systems; Internet-Based Knowledge Management and Organizational Memory; and the Encyclopedia of Knowledge Management, now in its second edition. From 1998 to 2011 he served as editor-in-chief of the journal *Internet Research* and is currently an Associate Editor of the *European Journal of Information Systems*. David is chair (2017-2019) of IL-AIS, the Israel chapter of the Association for Information Systems. His main research interests are mHealth, Cybersecurity, Knowledge Management, Social Network Analysis, and Computer-mediated Communications.

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 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 was awarded AIS fellowship in 2008 and the AIS LEO Award in 2015.

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