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Call for Papers

Special Issue of *Information Systems Research*—Humans, Algorithms, and Augmented Intelligence: The Future of Work, Organizations, and Society

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... the main intellectual advances will be made by men and computers working together in intimate association. (Licklider 1960)

While artificial intelligence, machine learning, and other autonomic technologies are usually in the spotlight, many important problems are often solved through human beings and computers working cooperatively. The design of information systems has to focus as much on Intelligence Augmentation (IA), defined as computers enhancing human intelligence, as it would on Artificial Intelligence (AI), commonly defined as computers replacing human beings. Additionally, recent concerns about AI raised by pioneers like Stephen Hawking, Bill Gates, and Elon Musk raises major issues related to control in system design.¹ IA requires a focus on design that optimally combines the abilities of human beings with various AI technologies and algorithms. As such, designers of information systems have to increase their focus on interactions, control, and interface points such that the resulting system is efficient, effective, and addresses the issues of appropriate human control. Applications of IA are beginning to emerge in a number of domains such as cybersecurity, counter-terrorism, healthcare, and space exploration, among others. There are also several applications to the design of information systems. This Special Issue of *Information Systems Research* invites researchers to submit their best work to highlight how they are beginning to seamlessly integrate human and computer intelligence to solve interesting and important problems that impact the future of work, organizations, and broader society.

Background

In the 1960s, Engelbart and Licklider (both managed research programs at DARPA) pioneered the arguments for “human-computer symbiosis” (Licklider 1960).

A fundamental assumption behind the need for human-computer symbiosis is that computers and human brains have different problem-solving capabilities. As such, IA research pursues design ideas that are intended to optimize the combined computational potential of human beings and computers. One branch of IA very familiar to information systems researchers is Human Computer Interaction (HCI). One of the pioneers of the HCI approach, Terry Winograd, has commented on the tensions between the AI and the HCI camps, and the associated “rationalistic” and “design” perspectives that they represent (Winograd 2006). Some parts of AI attempted to model human beings as cognitive machines and sought to build human-like AI systems. HCI, on the other hand, focused on a design approach which emphasizes interpretation, human behavior, and experimentation. Winograd quotes David Kelley, the renowned design thinker, as saying: “Enlightened trial and error outperforms the planning of flawless intellect,” suggesting the importance of iteratively improving by modeling the interaction between humans and AI.

However, HCI is not the only perspective to human-computer symbiosis. Large scale computational problems often cannot be solved by either computer or humans alone—such problems are termed “human computation problems” (Von Ahn and Dabbish 2008). For instance, crowdsourcing strategies for many messy large-scale image or character recognition problems fall into this domain. Human computation problems rely on harnessing human processing power (i.e., common sense) to solve problems that computers are not yet good at solving. More interestingly, many early human computation problem-solving approaches have utilized gamification strategies that seem to be very well aligned with the HCI tradition of “design approach.”

Given the increasing role AI plays in society today, the White House issued an RFI in 2016 to solicit commentaries and feedback on the role of AI for current

and future needs of the economy. A report summarizing the responses to the RFI was released recently by the White House.² IBM's response to the RFI declared an emphasis on Augmented Intelligence in IBM's approach to AI—"We call our particular approach to augmented intelligence 'cognitive computing.' Cognitive computing is a comprehensive set of capabilities based on technologies such as machine learning, reasoning and decision technologies; language, speech and vision technologies; human interface technologies; distributed and high-performance computing; and new computing architectures and devices. When purposefully integrated, these capabilities are designed to solve a wide range of practical problems, boost productivity, and foster new discoveries across many industries."³ In contrast, Google's approach to AI, especially its search engine design, is also arguably more in the tradition of IA than AI.

Special Issue Focus

Recent developments in hardware, sensor, and networking technologies combined with significant growth in Internet of Things (IOT) devices has increased interest in combining them with AI technologies to develop completely autonomous systems, such as driverless cars. The design of these systems poses unique technical, organizational, societal, and ethical questions. The human-computer symbiosis has the potential to address some of these difficult issues.

IS researchers (including many authors in *ISR*) have embraced both AI and IA traditions. Recent publications in *ISR* have revived both the design and rational schools of thoughts in research papers, notes, and commentaries (see, for example, Gregory and Muntermann 2014, Dhar et al. 2014, Clarke et al. 2016, Meyer et al. 2014). However, there is still a lack of coherent discussion and an integrated body of literature on the direct implications of how IA and AI research can contribute to organizational and societal applications and to their impact on the future of work. This Special Issue of *Information Systems Research* is intended to begin a new dialog on the potential synergies between IA and AI within the context of IS research. Given the long tradition of IS researchers to cross disciplinary boundaries, we are confident of attracting a large number of high-quality submissions that will highlight the prevailing knowledge and research endeavors in the discipline and beyond. We hope to showcase the best research in this domain as part of this Special Issue.

Topics of interest include but are not limited to:

- Design approaches for effectively combining human and computer cognitive power.

- Applications and evaluation of human-computer symbiosis in various industry sectors, including healthcare, education, finance, cybersecurity, and transportation, among others.

- Generalizable modeling innovations and applications that bridge IA and AI concepts.

- Evaluation of theoretical predictions on how human beings and computers collaborate in solving large-scale computational problems.

- Social, behavioral, and economic implications of AI and IA, including how they may impact the nature and future of work, productivity, jobs, and industries.

- Theoretical predictions and evaluations of legal, policy, governance, and business models associated with applications of AI and IA systems in various industries and markets.

- Issues related to human control in the design of IA systems.

Timeline

Submission Deadline Extended:	January 15, 2019
Full Papers Due:	January 15, 2019
Initial Screening Decisions:	March 1, 2019
Round 1 Decisions:	June 1, 2019
Workshop:	July 27–28, 2019
1st Round Revisions Due:	December 1, 2019
Round 2 Decisions:	March 1, 2020

Endnotes

¹ <http://observer.com/2015/08/stephen-hawking-elon-musk-and-bill-gates-warn-about-artificial-intelligence/> (accessed February 3, 2017).

² <https://obamawhitehouse.archives.gov/sites/whitehouse.gov/files/documents/Artificial-Intelligence-Automation-Economy.PDF> (accessed February 2, 2017).

³ <https://www.research.ibm.com/cognitive-computing/ostp/rfi-response.shtml> (accessed February 2, 2017).

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