

Performance Optimization in Human-AI Teams

Hosted by: Board on Human-Systems Integration (BOHSI)

This session builds on the first webinar in the Board on Human-Systems Integration's (BOHSI's) *Human-AI Teaming Webinar Series*, [*Future Trajectories of Human-AI Collaboration and Teaming*](#). This session will explore bidirectional performance optimization—how both humans and AI contribute to and enhance team outcomes. As AI systems become more adaptive and proactive across domains such as transportation, healthcare, and defense, the traditional view of autonomy as a binary is giving way to more dynamic configurations.

Rather than a simple trade-off between human control and AI independence, users must now adjust multiple interdependent factors, including degrees of AI autonomy, proactivity, and initiative. This webinar will examine how these configurations impact workload distribution, trust calibration, decision-support mechanisms, and intra- and inter-team interactions.

Key questions include:

- What does performance look like in human-AI teaming, and how it is measured?
- How do organizations define and fine-tune these parameters to align AI performance with human expectations and operational goals?
- As autonomy becomes more fluid, what does meaningful human oversight look like?
- How do we balance human supervisory roles with increasingly autonomous AI systems?

Thomas O'Neill graduated with a PhD in Industrial and Organizational Psychology from Western University and is currently Professor of Industrial and Organizational Psychology at the University of Calgary. He is the Arts-Engineering Chair in High Performance Teamwork and Engineering Education and Head of Industrial and Organizational Psychology. His interests are in sociotechnical systems, specifically the intersection of culture, technology, leadership and management, and behavior in team contexts. He has published over 100 peer-reviewed journal articles and partnered with organizations extensively to solve workplace challenges. He created ITP Metrics, which is a software platform for assessment, diagnostic, and development of high-performing teams in organizations with over 900,000 assessments taken worldwide.

Beau Schelble is an assistant professor in the Department of Industrial and Systems Engineering at the University of Tennessee at Knoxville and the founding director of the AI and Robotics for Collaborative Systems (ARCS) lab. His research focuses on understanding and optimizing collaborative systems comprised of both human and computational elements in areas such as cybersecurity, emergency response management, and command and control. Dr. Schelble specifically addresses this research by studying shared knowledge, information sharing, and situation awareness in human-AI teams, with the goal of creating trustworthy AI teammates that are resilient and effective in complex, high-stakes environments. Dr. Schelble's work has resulted in over 35 articles published in high-impact journals and conferences across the fields of human factors, systems engineering, and human-computer interaction, earning multiple best paper awards and nominations, while also being an active contributor to

professional societies, including the IEEE, HFES, ASEE, ACM, and IISE. He received a Ph.D. in Human-Centered Computing from Clemson University.

Julie Shah is the H.N. Slater Professor and Head of Aeronautics and Astronautics, faculty director of MIT's Industrial Performance Center, and director of the Interactive Robotics Group, which aims to imagine the future of work by designing collaborative robot teammates that enhance human capability. She is expanding the use of human cognitive models for artificial intelligence and has translated her work to manufacturing assembly lines, healthcare applications, transportation and defense. Before joining the faculty, she worked at Boeing Research and Technology on robotics applications for aerospace manufacturing. Prof. Shah has been recognized by the National Science Foundation with a Faculty Early Career Development (CAREER) award and by MIT Technology Review on its 35 Innovators Under 35 list. She was also the recipient of the 2018 IEEE RAS Academic Early Career Award for contributions to human-robot collaboration and transition of results to real world application. She has received international recognition in the form of best paper awards and nominations from the ACM/IEEE International Conference on Human-Robot Interaction, the American Institute of Aeronautics and Astronautics, the Human Factors and Ergonomics Society, the International Conference on Automated Planning and Scheduling, and the International Symposium on Robotics. She earned degrees in aeronautics and astronautics and in autonomous systems from MIT and is co-author of the book, *What to Expect When You're Expecting Robots: The Future of Human-Robot Collaboration* (Basic Books, 2020).

Julie Marble is the director of the Intelligent Human Machine Systems Division at the Applied Research Lab for Intelligence & Security (ARLIS), at the University of Maryland. Prior to joining ARLIS, she served as the executive director of the Institute for Experiential Robotics at Northeastern University; she has served as program officer at the US Office of Naval Research, as a program manager for the US Nuclear Regulatory Commission, Division of Research. Her research has focused on the role of people in complex, critical socio-technical systems such as human-robot interaction, human reliability analysis in nuclear and aviation safety, and human factors for cybersecurity. She focuses her research on human teaming with machines, computational theory of mind, and trust and ethics of autonomy, with a goal of ensuring that machines are sufficiently capable and adaptable teammates to promote adoption and reliance on these systems in complex and critical environments. Dr. Marble has led research across the DoD, Department of Energy, as well international research on human reliability analysis while at the Nuclear Regulatory Commission. She was a member of the NATO RTG on Human Factors and Cybersecurity. She has been a delegate to the International Atomic Energy Agency. Dr. Marble has over 70 publications, journal articles, and book chapters in these areas. Dr. Marble earned her Bachelor's degree from the University of Vermont, and her Ph.D. from Purdue University in Cognitive Psychology, after which she spent 5 years in Human and Robotic Systems at the Idaho National Lab, before going on to lead a small business focused on prognostics and diagnostics and intelligent decision systems.