Carnegie Mellon University
Software Engineering Institute

U.S. Leadership in Software Engineering & AI Engineering: Critical Needs & Priorities 2023

JUNE 20-21, 2023 | **NATIONAL SCIENCE FOUNDATION** | **ALEXANDRIA, VA**

Agenda: Day 1

TIME	TOPIC/SPEAKERS/PANELISTS
8:30–9:30 a.m.	**Breakfast**
9:30–9:45 a.m.	**Introductions / Welcome** **Speakers:** **Dr. Paul Nielsen**, Director and CEO, Carnegie Mellon University Software Engineering Institute (CMU SEI) **Dr. Sol Greenspan**, Program Director, National Science Foundation (NSF) **Dr. Ram Sriram**, Chief, Software and Systems Division, National Institute of Standards and Technology (NIST)
9:45–10:00 a.m	**Overview of the National Agenda Study for Software Engineering Research & Development and goals of this workshop** **Speakers: Ms. Anita Carleton** and **Dr. Forrest Shull**, CMU SEI
10:00–10:15 a.m.	**Introductory Remarks – Software as a National Priority** **Speakers: Ms. Kamie Roberts**, White House Office of Science and Technology Policy (OSTP) / Networking and Information Technology Research and Development (NITRD) program **Dr. Joydip Kundu**, Deputy Assistant Director, NSF's Directorate for Computing and Information Science and Engineering (CISE)
10:15–11:00 a.m.	**Keynote** **Prof. Doug Schmidt, Cornelius Vanderbilt Professor of Engineering (Computer Science), Associate Provost of Research, and Data Science Institute Co-Director at Vanderbilt University**
11:00–11:20 a.m.	**Morning Break**
11:20–12:45 p.m.	**Lightning Talks Round 1**: Government Agency Challenges **Moderator: Dr. Forrest Shull**, CMU SEI **Speakers: Dr. Amy Henninge**r, Senior Advisor and Branch Chief for Advanced Computing, Department of Homeland Security (DHS); **Mr. Mike Conway**, Data Science Architect at National Institute of Environmental Health Sciences, National Institutes of Health (NIH); **Dr. Mike Lowr**y, Automated Software Engineering Area Lead at Ames Research Center, National Aeronautics and Space Administration (NASA); **Dr. Greg Shannon**, Chief Cybersecurity Scientist (INL) and Chief Science Officer (CyManII), Department of Energy (DOE); **Mr. Nelson Yang**, Senior Advisor for International Patent Business Solutions, U.S. Patent and Trademark Office; **Mr. Allan Dianic**, Director, Software Engineering, USD (R&E) **Speakers are asked to address the following questions.** • What is an example of the kinds of SW-enabled and/or AI-enabled systems and capabilities your Agency will need in the future? • How will these systems support critical national needs? • What are the gaps / risk areas you see today in being able to build or acquire those systems? • What R&D do you think we need to address those gaps / risks? What could the R&D community do to help?

12:45–1:30 p.m.	**Lunch & Networking**

1:30–3:00 p.m.	**Lightning Talks Round 2**: AI for Software Productivity, Sustainability, and Quality **Moderator: Dr. Ipek Ozkaya**, CMU SEI **Speakers:** **Dr. Baishakhi Ray**, Associate Professor, Columbia University; **Prof. Xiangyu Zhang**, Assistant Professor, Purdue University **Ms. Erica Dretzka**, Lead Data Strategist, Office of Personnel Analytics, Data Science, U.S. Department of Defense **Dr. Erik Meijer**, Senior Director of Engineering, Facebook **Dr. Claire Le Goues**, Associate Professor at School of Computer Science, Carnegie Mellon University **Dr. Brittany Johnson-Matthews**, Assistant Professor, George Mason University **Speakers are asked to address the following questions:** • What are parts of the software engineering lifecycle where AI could make more of a contribution? How does the whole lifecycle look different with AI in the mix? • What would it mean for AI to be a "trusted partner" in software engineering? How would we know it when we have it?

3:00–3:30 p.m.	**Afternoon Break**

3:30–5:00 p.m.	**Breakout Groups Discussion** Having heard about some anticipated future needs, and potential avenues of AI research that could help address the associated engineering challenges, participants will choose one of the following discussions to join. Each breakout group will request a volunteer to capture notes and report highlights back to the plenary. • **Group 1: Important Research Focus Areas.** Moderated by Dr. Tom Longstaff, Chief Technology Officer, CMU SEI**.** This session will discuss questions around the fundamental research efforts and breakthroughs that need to be prioritized to boost U.S. leadership in important domains. • **Group 2: Societal Impacts.** Moderated by Mr. John Roberts, Deputy Director of CMU SEI's Software Solutions Division. This session will touch on what it means to do responsible computing research on these topics, potential workforce issues and impacts, and related considerations such as privacy and bias in AI / software systems. • **Group 3: Transitioning Outcomes / Partnering.** Moderated by Ms. Eileen Wrubel, CMU SEI Technical Director for Transformation Software Acquisition Policy and Practice. This session will examine models of working together among government, academia, and industry stakeholders, and whether new approaches are needed to enable innovative solutions to have the needed impacts on national priorities.

5:00–5:30 p.m.	Outbriefs from the breakout groups

5:30 p.m.	**Join us for a SEI-sponsored networking reception with heavy hors d'oeuvres and cocktails at Delia's Mediterranean Grill & Brick Oven Pizza, a 2-minute walk from the NSF Building.**

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Agenda: Day 2

TIME	TOPIC/SPEAKERS/PANELISTS
8:30–9:30 a.m.	**Networking Breakfast**
9:30–9:45 a.m.	**Recap of previous day** **Dr. Forrest Shull**, CMU SEI
9:45–10:45 a.m.	**Keynote Speakers** **Dean William Sanders, College of Engineering, Carnegie Mellon University** **Dr. Tom Zimmermann, Microsoft Research**
10:45–11:00 a.m.	**Morning Break**
11:00–12:15 a.m.	**Lightning Talks Round 3: Software Engineering Research Areas and Gaps** **Moderator: Ms. Anita Carleton**, CMU SEI **Speakers: Dr. Sebastian Elbaum**, Professor of Computer Science, University of Virginia; ACM and IEEE Fellow; **Dr. Prem Devanbu**, Distinguished Research Professor, University of California, Davis; ACM Fellow; **Dr. Andrian Marcus**, Professor, The University of Texas at Dallas; **Dr. Denys Poshyvanyk**, Professor, College of William and Mary; **Dr. Hyrum Wright**, Senior Staff Software Engineer, Google; **Dr. Bill Scherlis**, Special Advisor to the Vice President of Research, Carnegie Mellon University; prior DARPA Office Director, Information Innovation Office **Speakers are asked to address the following questions:** • What are your proposals for the really transformational Research & Development thrusts that will help engineer the software- and AI-intensive systems of the future? • What are key industry trends, solutions, and emerging capabilities?
12:15–1:00 p.m.	**Lunch & Networking**
1:00–4:30 p.m.	**Breakout Groups Discussion** Having heard additional ideas from software engineering researchers about anticipated future directions and outcomes, participants will break up into discussion groups. Participants are asked to join a group on a different topic than on Day 1. Each breakout group will request a volunteer to capture notes and report highlights back to the plenary. • **Group 1: Important Research Focus Areas** • **Group 2: Societal Impacts** • **Group 3: Transitioning Outcomes / Partnering**
2:30–2:45 p.m.	**Afternoon Break**
2:45–3:15 p.m.	**Outbriefs from the breakout groups**
3:15–4:00 p.m.	**Observations and Key Take-aways from Participants** **Moderated by**: **Dr. Tom Longstaff,** CTO, CMU SEI; **Dr. Dionisio De Niz**, Technical Director for Assuring CyberPhysical Systems, CMU SEI
4:00 p.m.	**Workshop Adjourns**