



Work at the Human-Technology Frontier: Shaping the Future

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The World of Work is Changing

- On the cusp of a major transformation in work and the workplace
- Driven by combinations of
 - Artificial intelligence
 - Machine learning
 - The Internet of Things
 - Robotics
 - And more



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2008-2010 (www.atecenters.org)*

Work at the Human-Technology Frontier: Shaping the Future

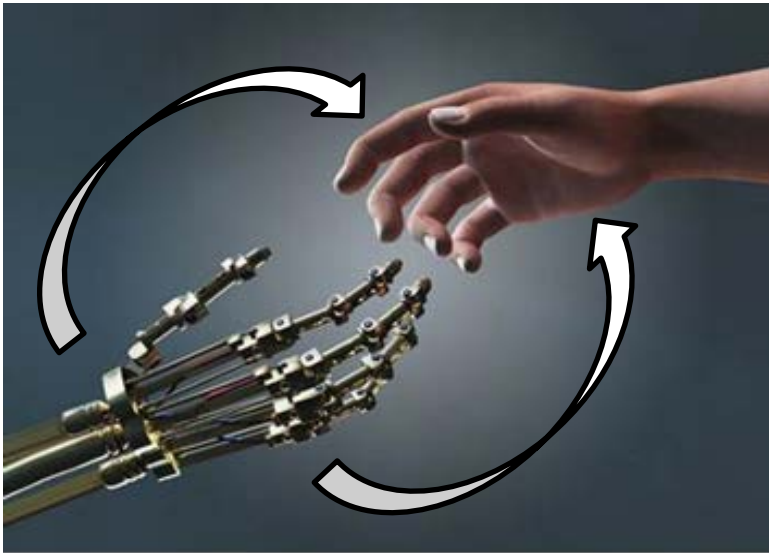
- Premise: emerging technologies and human-technology interactions are transforming the world of work and the lives of workers
- A bold initiative to catalyze interdisciplinary science and engineering research to...
 - understand the benefits and risks of emerging technologies;
 - create technologies to enrich lives in future workplaces and improve workplace efficiency, labor productivity, and economic growth; and
 - inform the education and lifelong learning of tomorrow's workforce



Credit: Shutterstock.com/Jesus Sanz

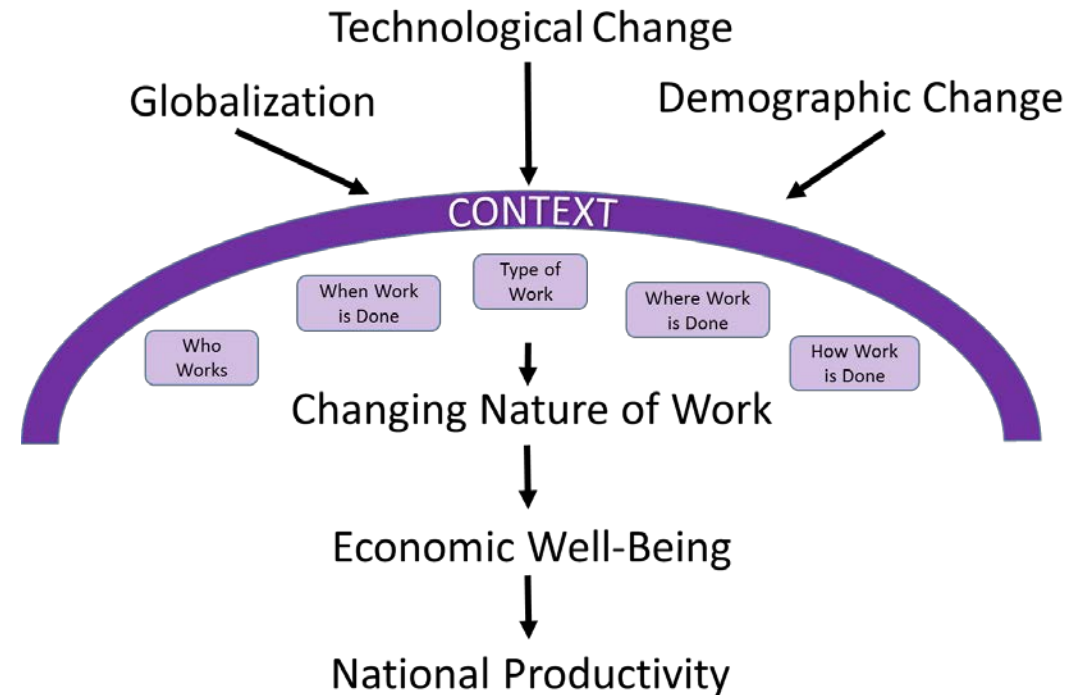
Emergence of the Idea

Humans, Technology, and Society: Complex Interactions Impacting the Future



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Work and Productivity in the 21st Century

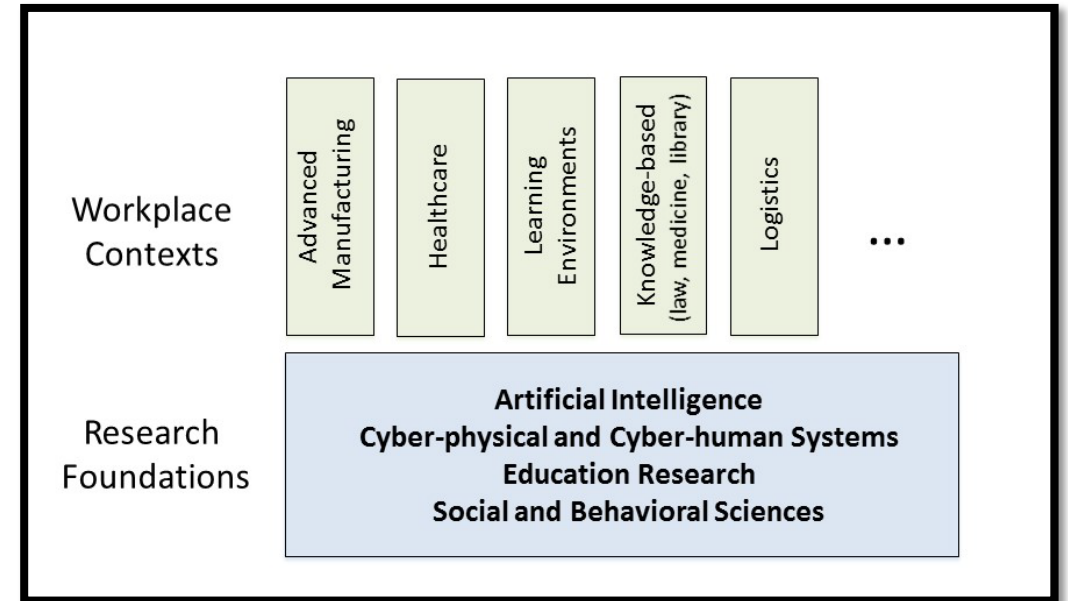


Imagine the Workplace of Tomorrow

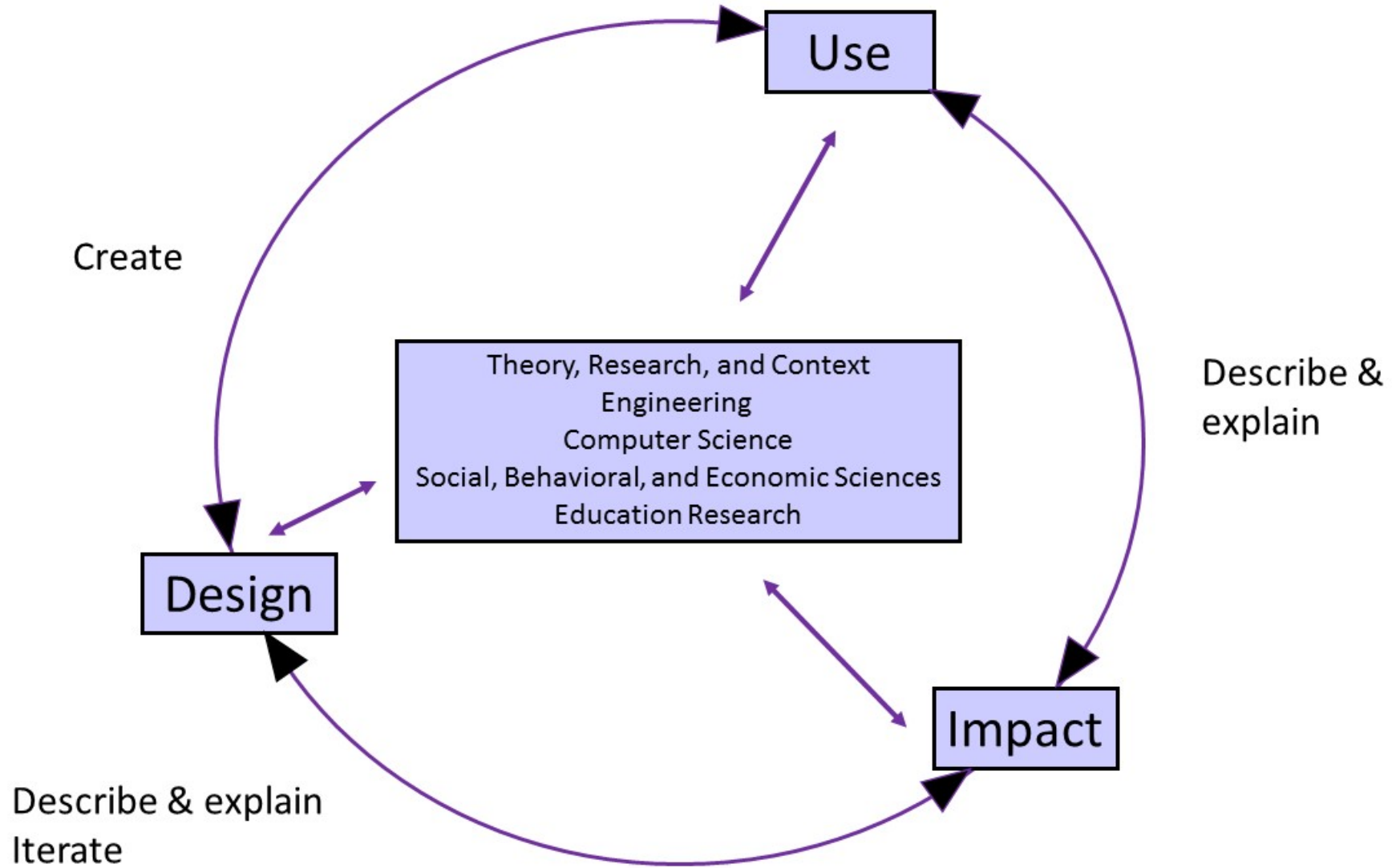
A seamless collaboration among humans and machines and cyberspace that requires:

- understanding of reciprocal human-technology interactions;
- systems that are tailored, optimized, and continuously adapted for humans; and
- education and lifelong learning to create the requisite work force

Framework of foundational, use-inspired research in specific work contexts



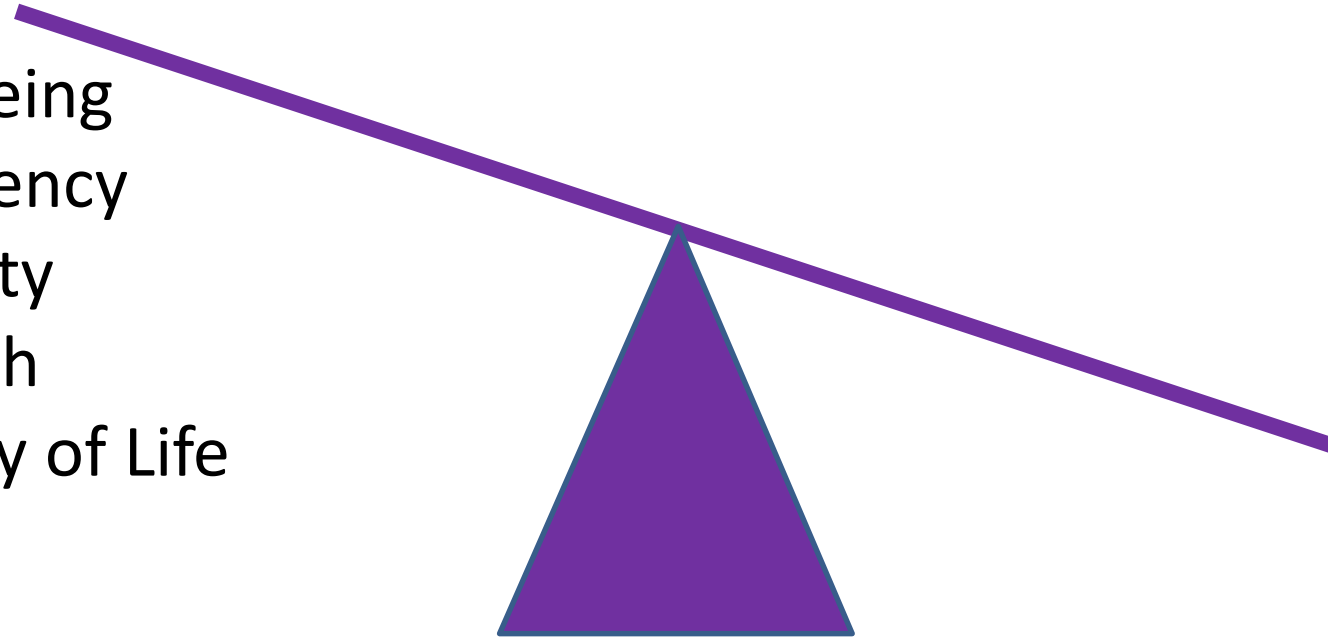
The Design, Use, Impact Cycle



I. Understand the Risks and Benefits of New Technologies

Benefits

- Education
- Health & Well-Being
- Workplace Efficiency
- Labor Productivity
- Economic Growth
- Improved Quality of Life



Risks

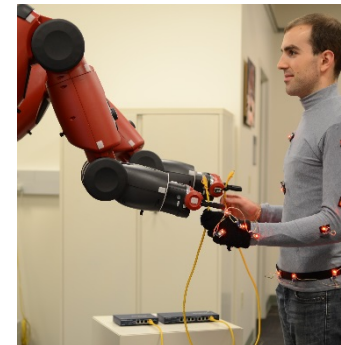
- Loss of Privacy
- Breach of Confidentiality
- Isolation
- Job loss

II. Create Technologies to Enrich Lives in Future Workplaces

- How can research in artificial intelligence and cyber-physical systems be integrated with the knowledge from cognitive, behavioral, and social sciences to develop technologies that improve quality, efficiency, and productivity in the workplace?



Credit: *©Blue River Technology*



Credit: *Aaron Bestick, UC Berkeley*

III. Inform the Education and Lifelong Learning of Tomorrow's Workforce

- What skills and abilities do traditional industries need during this time of technological change? How can we train people to meet new workforce needs?
- What are the cognitive, social, and neural mechanisms underlying insight, interpretation, diligence, persistence, and cooperation? How can these behaviors be learned?
- How can we understand the developing strengths and needs of the economy in order to anticipate where new skills will be needed and where jobs will emerge?

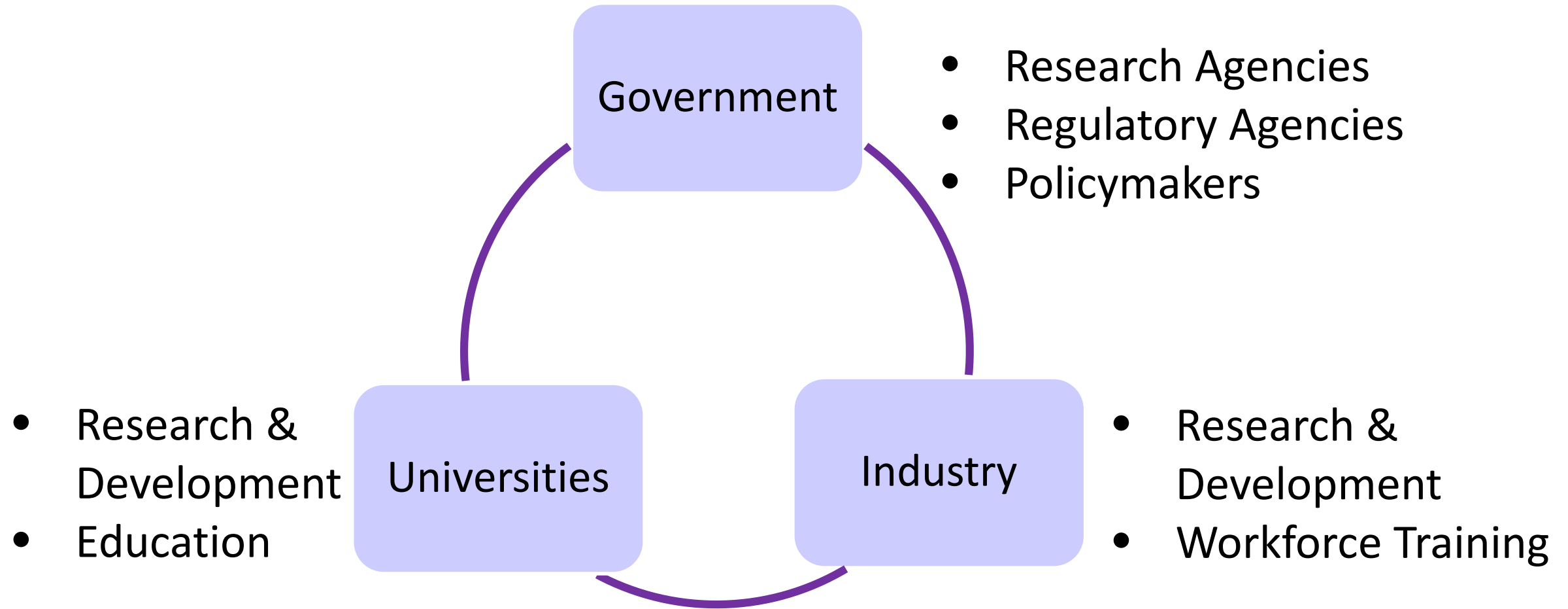


Credit: ATE Centers
Impact 2011 (www.atecenters.org)



Credit: Photo courtesy of Dr.
Calvin Lin, Professor of Computer
Science, University of Texas, Austin

Government-University-Industry Partnerships: Each has a Key Role to Play



Next Steps for Work at the Human-Technology Frontier: Shaping the Future

- NSF assembling a cross-directorate working group to develop the idea
- SBE, ENG, EHR, & CISE are major players
- Seeking input from research communities
 - NSF Directorate Advisory Committees
 - Meeting with scientific disciplinary professional organizations
 - Potential planning activities (e.g., workshops)
 - Listening to you



Shaping the Future

“In the end, it all comes down to people and values. We need to shape a future that works for all of us by putting people first and empowering them. In its most pessimistic, dehumanized form, the Fourth Industrial Revolution may indeed have the potential to “robotize” humanity and thus to deprive us of our heart and soul. But as a complement to the best parts of human nature—creativity, empathy, stewardship—it can also lift humanity into a new collective and moral consciousness based on a shared sense of destiny. It is incumbent on us all to make sure the latter prevails.”

- Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, 2016



Thank you.

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