Mapping the Human-Technology Partnership

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The Challenge

• The landscape of jobs and work is changing at unprecedented speed, driven by
  • **Technological advances**: artificial intelligence, robotics, global connectivity, flexible manufacturing, ...
  • **New models of work, careers, education**: gig economy, remote workforce, life-long learning, ...
  • **External forces**: globalization, pandemics, geopolitics, ...

• Historical opportunities, but many challenges
  • Mismatch of US education system and needs of employers
  • Threats to privacy and algorithmic bias
  • Tension between economic efficiency and robustness to “black swan” events
NSF FoW-HTF Program

- Joint program of the NSF directorates for
  - Engineering
  - Social, Behavioral, & Economic Sciences
  - Education & Human Resources
  - Computer & Information Sciences & Engineering

- One of NSF’s “Big Ideas”
  - Now in its 3rd year
  - $30 million @ year in awards
Future of Work at the Human Technology Frontier

Convergent research integrating future work, future technology, and future workers.

- **Future Workers**: Address the worker as an individual or in teams, including education & training
- **Future Technology**: Engineering & computer science technologies that will develop the human-technology partnership in future workspaces, including offices, classrooms, warehouses, farms, & factories
- **Future Work**: Considers a societal, economic, professional, occupational, industrial, or national context

The FW-HTF program occupies the intersection of these elements
Objectives

The specific objectives of the FW-HTF program are to ...

• **Facilitate convergent research** among engineering, computer science, learning sciences, research on education and workforce training, and the social, behavioral, and economic sciences;

• **Encourage the development of a research community** dedicated to designing intelligent technologies and work organization and modes;

• **Promote deeper basic understanding** of the interdependent human-technology partnership to advance societal needs; and

• **Understand, anticipate, and explore mitigation** of potential risks
Stakeholder Workshops

• Help NSF learn perspectives of industry, non-profits, workers, researchers, and other government agencies
• Outcomes of workshop will shape FoW-HTF and other programs
• Virtual workshops:
  • Restructuring the physical and virtual workspace
  • Exploring the human-technology partnership
  • Fostering reskilling, upskilling, and lifelong learning
  • Identifying ethical questions and the implications for policy

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Mapping the Human-Technology Partnership
Exploring the human-technology partnership

• For most jobs, technology will not simply replace humans, but will partner with them

• People and technology must both adapt

• Examples
  • As AI takes over many routine tasks, it can enable people to focus on non-routine, “high human touch” work
  • Flexible micro-manufacturing technology could enable reshoring of manufacturing – replacing many long-distance fragile supply chains
Kristian Kloeckl and collaborators at Northeastern University are designing methods for humans and robots to work collaboratively in the seafood processing industry, for increased worker productivity, safety, and job satisfaction.

Economic and ethical workforce practices are analyzed to guide the potential on-shoring of a $20 billion industry.
Panel and Discussion

• Lawrence Jeff Johnson
  • Director Research Department, International Labour Organization

• Rebekah Kowalski
  • VP, Manpower Manufacturing and Client Workforce Solutions, ManpowerGroup North America

• Mike Richey
  • Chief Learning Scientist, Boeing

• Martha Russell
  • Stanford Human Sciences and Technologies Advanced Research Institute
Breakout Sessions

• Small group facilitated discussions, followed by report back
• Opportunities and Challenges in Mapping the Human-Technology Partnership
• Questions
  • What new jobs will emerge, and what new skills will people need to acquire?
  • How can technology make the workplace better as well as more productive?
  • How should the mix of technology and labor be negotiated?
  • What will be future modes of interaction between people and technology?
Questions about today’s workshop?

Questions about the NSF Future of Work program?