NSF

Future of Work at the Human-Technology Frontier (FW-HTF)

30 April 2018
01 May 2018
NSF Goals

To respond to challenges and opportunities in the changing landscape of jobs and work by supporting **convergent research** to...

- Understand and advance the human-technology partnership
- Promote new technologies to augment human performance
- Illuminate the emerging socio-technological landscape and understand the risks and benefits of new technologies
- Foster lifelong and pervasive learning with technology
FW-HTF Technical Focus Areas

Understand, anticipate, and shape implications for the changing landscape of jobs and work at the individual, institutional, corporate, and national levels.

Advance the frontiers of science, technology, and education for,
• Augmenting human performance for workplace skill acquisition;
• Improving both worker quality of life and employer financial metrics;
• Enhancing the economic and social well-being of the country; and
• Addressing societal needs through research on learning and instruction in the context of augmentation.

_These are requirements of the FW-HTF solicitation!_
FY 2018 FW-HTF Proposals

• MUST establish the potential of the project to shape and improve the future of work
• MUST present a convincing plan for advancing the fundamental science and technology of augmenting human performance in cognitive, physical, and/or learning tasks
• MUST study human-technology interaction within the broader socio-economic framework of jobs and work, and be attentive to impacts that are equitable socially and economically, including issues of training and workforce development
FW-HTF: Other Required Elements

FW-HTF proposals...

• MUST include a **Collaboration Plan** that outlines how the project will leverage and integrate multiple disciplinary perspectives.

• MUST state the research goals and define metrics of success.

• WILL BE EVALUATED on the compelling and innovative FW-HTF research problems in the project scope, including potential contributions towards
  • transforming the frontiers of science and technology for human performance augmentation and workplace skill acquisition;
  • improving both worker quality of life and employer financial metrics;
  • enhancing the economic and social well-being of the country; and
  • addressing societal needs through research on learning and instruction in the context of augmentation.
FW-HTF: FY 2018 Research Themes

FY 2018 proposals focus on one of two themes...

• Theme 1: Foundations for Augmenting Human Cognition
• Theme 2: Embodied Intelligent Cognitive Assistants (e-ICAs)
Theme 1: Foundations for Augmenting Human Cognition

- Models of human cognition are foundational to advancing cognitive capabilities:
  - social understanding and interaction; biases in judgment; attention; learning; memory; perception; emotion; comprehension

- Encourages research on augmentation of human physical abilities that interact with perceptual, cognitive, affective, and social abilities in the context of work.

- Encourages research examining how the mind may shape and be shaped by cognitive technology.
  - including the reciprocal effects of technology and human skills and abilities

- The increasing imperative for retraining over the lifespan heightens the importance of understanding and enhancing how people and systems learn in educational settings, and how instruction can change to incorporate technologies.
Theme 1 Projects:

• MUST address fundamental questions regarding human cognitive systems in the context of the future of work,

• MUST lead to new knowledge in relevant science, engineering, and education fields.

• MAY incorporate meaningful research in which hardware or software testbeds co-evolve with, and synergistically inform, augmentation of human cognition.

• MAY address fundamental ways in which human cognition can be bolstered with technology in the context of how work and society can benefit from these improvements.
  • augmenting perception, learning, language understanding, interdisciplinary communication, decision making, planning, and collaboration
Theme 2: Embodied Intelligent Cognitive Assistants (e-ICAs)

Theme 2 focuses on the impact of a specific class of devices within the broader socio-economic framework of jobs and work. These devices are Embodied Intelligent Cognitive Assistants (e-ICAs)

- ICAs are electronic devices, external to the body, that are informed by and responsive to the architecture of the human brain for the purpose of enhancing human capabilities.
- ICAs utilize machine learning and artificial intelligence algorithms, advanced multimodal sensing and high-bandwidth communications capabilities.
- Embodied ICAs (e-ICAs) integrate perception and action in response to environmental and/or user stimuli.
- Theme 2 proposals MUST incorporate embodied-ICA devices and systems.
Theme 2: Embodied ICAs

• Embodiment in discrete machines: robots, cars, autonomous vehicles
• Embodiment in wearable devices: clothing, exoskeletons, protheses/orthoses
• Embodiment in the built environment: buildings, homes, classrooms, highways, agricultural & industrial environments
• Virtual Embodiment: avatars, virtual and augmented reality
Theme 2 Topics of Interest Include...

• e-ICA-enabled systems in the context of education and training, required to enhance worker viability in the future workplace.

• integration of contextual knowledge and artificial intelligence; learning across multiple timescales; operating with human partners through natural interactions involving intuitive interfaces; developing trust within human-machine interactions; aspects of security and reliability of human-machine interactions

• understanding which human capabilities can be delegated to the e-ICA; how new capabilities of e-ICAs can best enhance specific jobs; how the introduction of e-ICAs can enhance job satisfaction, corporate profitability and the national economic health
Two classes of FW-HTF proposals

Within each theme of the solicitation, there are two classes of proposals, differing in scope, duration, and team size:

• Small projects may be requested for a total budget ranging from $750,000 to $1,500,000 for a period of 3 to 5 years; and

• Large projects may be requested for a total budget ranging from $1,500,001 to $3,000,000 for a period of 3 to 5 years.
The FW-HTF Solicitation...

• ... takes the notion of work very seriously.

• Successful proposals will take a transdisciplinary approach to augmenting human cognition and/or physical abilities in the broader socio-economic framework of jobs and work.
  • Research on cognition alone, or on embodied ICA architectures alone, does not fit this solicitation.
  • Proposals with narrow behavioral or technological focus should be submitted to other existing programs at the National Science Foundation.

• Please read the solicitation carefully. If questions remain, please contact a cognizant program officer.

**NSF 18-548: Future of Work at the Human-Technology Frontier -Advancing Cognitive and Physical Capabilities (FW-HTF)**
Questions and Answers
Thank you for your interest in exploring the Future of Work at the Human-Technology Frontier: Advancing Cognitive and Physical Capabilities

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We look forward to receiving your submissions by June 4th. Please address additional questions to the cognizant program officer as listed in the solicitation.

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