Title: Draft script for the 2018 FW-HTF solicitation (18-548)
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Date: 4/25/18; Revised: 4/26/18

1) Welcome to the {first / second} of two webinars on the National Science Foundation's solicitation number 18-548: Future of Work at the Human-Technology Frontier: Advancing Cognitive and Physical Capabilities. This solicitation reflects a significant NSF investment in "The Future of Work", one of 10 bold, long-term research ideas at the frontiers of science and engineering that were presented by NSF's director in 2016. The purpose of this webinar is to provide guidance and clarification for those of you who have submitted a Letter of Intent by the April 16th deadline, and who intend to submit a full proposal by June 4th, that will be responsive to the solicitation.

2) Through this solicitation, the National Science Foundation encourages the communities to respond to challenges and opportunities in the changing landscape of jobs and work. We are looking to support 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

3) The 2018 Future of Work Big Idea solicitation seeks projects that aim to understand, anticipate, and shape the implications of human-technology interactions on the changing landscape of jobs and work at the individual, institutional, corporate, and national levels.

Specifically, the solicitation seeks to 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.

4) Proposals that are responsive to the 2018 solicitation:

- must clearly establish the potential of the project to shape and improve the future of work;
- They must present a convincing plan for advancing the fundamental science and technology of augmenting human performance in cognitive, physical, and/or learning tasks;
- they must study human-technology interaction within the broader socio-economic framework of jobs and work; and

- they must be attentive to impacts that are equitable socially and economically, including issues of training and workforce development

5) Proposals must ALSO:

- include a **Collaboration Plan** that outlines how the project will leverage and integrate multiple disciplinary perspectives;
- and they must clearly state the research goals and define metrics of success.

Projects 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.

6) For fiscal year 2018, the Future of Work at the Human-Technology Frontier Solicitation invites proposals that will focus on one of two research themes. Theme 1 explores foundations for augmenting human cognition. We will describe Theme 1 in the following 2 slides; Theme 2 explores Embodied Intelligent Cognitive Assistants (or e-ICAs). We will describe Theme 2 in subsequent slides.

7) Theme 1: Foundations for Augmenting Human Cognition.

Theme 1 is motivated by the understanding that models of human cognition are foundational to advancing cognitive capabilities, including: social understanding and interaction; biases in judgment; attention; learning; memory; perception; emotion; and comprehension.

Theme 1 encourages research on augmentation of human physical abilities that interact with perceptual, cognitive, affective, and social abilities *in the context of work.*

Theme 1 encourages research examining how the mind may shape and be shaped by cognitive technology, including reciprocal interactions between technology and human skills and abilities

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

8) To be responsive to the 2018 Future of Work at the Human-Technology Frontier solicitation, Theme 1 projects:

- must address fundamental questions regarding human cognitive systems in the context of the future of work;
- They must lead to new knowledge in relevant science, engineering, and education fields;
- They may incorporate meaningful research in which hardware or software testbeds co-evolve with, and synergistically inform, augmentation of human cognition; although testbed development is not required;
- They 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, such as the augmentation of perception, learning, language understanding, interdisciplinary communication, decision making, planning, and collaboration.

9) Theme 2: Embodied Intelligent Cognitive Assistants

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)

Intelligent Cognitive Assistants, or 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.

10) Embodied ICAs can take different forms:

- Embodiment in discrete machines, such as robots, cars, and autonomous vehicles;
- Embodiment in wearable devices, such as clothing, exoskeletons, and protheses;
- Embodiment in the built environment, such as buildings, homes, classrooms, highways, and agricultural or industrial environments;
- Embodiment can also be virtual, as instantiated by avatars within virtual and augmented realities.

11) Theme 2 topics of interest include:

- Embodied intelligent cognitive assistants in the context of education and training, required to enhance worker viability in the future workplace;
    - The 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;
    - topics of security and reliability of human-machine interactions
- Theme 2 also involves explorations of:
    - which human capabilities can be delegated to the e-ICA;
    - how new capabilities of e-ICAs can best enhance specific jobs; and
    - how the introduction of e-ICAs can enhance job satisfaction, corporate profitability and the national economic health.

12) 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 $750,000-1,500,000 for a period of 3 to 5 years; and
- Large projects may be requested for a total budget ranging from $1,500,001-3,000,000 for a period of 3 to 5 years.

13) In all cases, solicitation 18-548 takes the notion of work very seriously. Successful proposals will take a transdisciplinary approach to addressing the augmentation of 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, keeping in mind that proposals responsive to the 2018 solicitation:

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

14) This concludes our presentation. We will now open the floor for questions and answers.

15) Thank you for your interest in exploring the Future of Work at the Human-Technology Frontier: Advancing Cognitive and Physical Capabilities.

We look forward to receiving your submissions by June 4th.

If questions remain, please contact a cognizant program officer, as listed in solicitation NSF 18-548.