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Organization: The Association for the Advancement of Artificial Intelligence (AAAI)

General Comment

See attached file(s)

Attachments

AAAI RFI Response to OSTP RFI on AI R and D Strategic Plan

Association for the Advancement of Artificial Intelligence

2025 National AI R&D Strategic Plan --- RFI Response
Association for the Advancement of Artificial Intelligence

The Association for the Advancement of Artificial Intelligence (AAAI) is an international scientific society that works to advance understanding of the underlying mechanisms of thought and intelligent behavior that are embodied in machines. AAAI is composed of over 8,000 members who work in a wide array of research and development activities related to artificial intelligence (AI) across academia, government, and industry. AAAI is a 46-year-old organization that brings together AI researchers and practitioners to promote research on and responsible use of AI, increase public understanding of AI, inform the future directions of AI research and development (R&D), and encourage international collaboration.

AAAI is supportive of efforts to promote human and economic flourishing, as well as national security, as laid out in Executive Order (EO) 14179 on *Removing Barriers to American Leadership in Artificial Intelligence*.[1] Further, AAAI is supportive of efforts to get youth involved in STEM education and AI R&D, through programs like the proposed Presidential Challenge called out in EO 14277, *Advancing Artificial Intelligence education for American Youth.*[2] As the US strives for excellence in AI innovation, it must sustain support for fundamental AI R&D that serves as the foundation for revolutionary discoveries. To ensure that the US remains a leader in AI research and development (R&D), it must establish targeted efforts that promote innovation while ensuring that AI systems are reliable and secure. The following comments serve to inform the development of a strategic Plan for AI R&D, providing insight into the needs and policy priorities of the vast array of AI researchers, experts, and practitioners who make up AAAI.

Increase Resources for Fundamental AI Research
Fundamental research and scientific understanding are vital to the advancement of key technologies in any field of endeavor. Fundamental research is defined as research in science, engineering, or mathematics, the results of which ordinarily are published and shared broadly within the research community, and for which the researchers have not accepted restrictions for proprietary or national security reasons[3]. Fundamental AI research is necessary for future innovation as advancements and emerging technology development invariably rely on a comprehensive understanding of fundamental principles. The United States has already enabled significant technological advances in AI through federal funding, and this leadership should continue.

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[1] Removing Barriers to American Leadership in Artificial Intelligence – The White House
[2] Federal Register :: Advancing Artificial Intelligence Education for American Youth
[3] Export Administration Regulations, Part 734.8 (c), https://resources.uta.edu/research/_documents/rs_documents/734.pdf

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Examples include NSF's decades of investment in neural networks, stochastic modeling, and reinforcement learning[4], as well as the significant investment NSF has made in establishing AI Institutes, which advance foundational AI research, promote novel applications for trustworthy AI systems across merging sectors, and bolster the future STEM workforce.[5] Existing investments in novel AI R&D programming like the National AI Research Institutes must continue to be sustained and protected at NSF. As stated by the Director of the National Science Foundation, "The National AI Research Institutes are a critical component of our nation's AI innovation, infrastructure, technology, education and partnerships ecosystem. These institutes are driving discoveries that will ensure our country is at the forefront of the global AI revolution."[6] Under the first Trump Administration, $140 million was awarded to seven National AI Research Institutes working across a range of key AI R&D areas, including machine learning, precision agriculture, and synthetic manufacturing.[7] These investments supported revolutionary fundamental research and subsequent innovation across the country. Investments like these are key to ensuring a solid foundation is in place to spur transformative advancements in AI, fill in gaps that are not prioritized by industry, and protect US leadership in AI R&D. See the Appendix below for more details on these success stories from NSF and other federal agencies.

Further, NSF must see continued investment in its efforts to democratize AI research capabilities through the National AI Research Resource (NAIRR). The pilot of the NAIRR encompasses a partnership between 13 federal agencies, including NSF, and 26 non-federal partners, coupling government and industry funding to support access for the broad research and education community. The NAIRR connects our nation's researchers to the data, software, and training resources to participate in AI innovation.[8] Thirty-five projects were supported through NSF resources and advanced computing systems provided by the NAIRR, fostering new advancements in a wide range of AI-related areas, including medical imaging data, language model security, and synthetic data generation.[9] The NAIRR allows researchers across the country who may otherwise not have access to the necessary tools to conduct research that promotes safety, security, and human flourishing. NSF needs to be funded at adequate levels to continue its critical work to

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[4] NSF Impacts from Investments: Artificial Intelligence - National Science Foundation
[5] NSF announces 7 new National Artificial Intelligence Research Institutes | NSF - National Science Foundation
[6] NSF announces 7 new National Artificial Intelligence Research Institutes | NSF - National Science Foundation
[7] The Trump Administration Is Investing $1 Billion in Research Institutes to Advance Industries of the Future – The White House
[8] National Artificial Intelligence Research Resource Pilot | NSF - National Science Foundation
[9] NSF-led National AI Research Resource Pilot awards first round access to 35 projects in partnership with DOE | NSF - National Science Foundation

democratize AI R&D discoveries.

Continued research investments are crucial in the current age of AI to achieve even more substantial technological breakthroughs, solve complex problems, enhance education, and foster innovation. The advent of LLM technology has provided significant advances, but it has also exposed technical limitations that remain to be addressed and will benefit from cross-fertilization with techniques emerging within other AI subdisciplines. In the same way that previously underappreciated work in neural network models was later found to be instrumental to fundamental advances in the field, it is essential that future basic research funding cultivate different approaches, not just the most prominent or popular, to maximize opportunities for overall advancement in the field and the industries that emerge to apply these advances to achieve positive societal impact.

Overall, NSF invests approximately $500 million in AI R&D, which must continue to maintain US leadership.[10] NSF must continue to receive adequate funding to ensure it can explore new discoveries in emerging technologies and train the new technology workforce. AAAI was pleased to see President Trump propose in the FY 2026 President's budget request to maintain AI and quantum research funding at the FY 2025 level[11], but further investment is needed to keep up with the pace of innovation. AAAI and its members are concerned that this critical work may be at risk, as the Administration has proposed cutting funding in half for the Agency overall.[12] NSF programming provides integral support for AAAI members, which include faculty, researchers, and students, to conduct cross-cutting revolutionary advancements in AI development. Despite the tremendous progress over the last decade, further disruptive advances concerning reasoning capabilities, autonomy, and agency are expected. Such advances generally come from smaller academic research teams exploring a range of directions.

In 2021, President Trump called to double investments in nondefense AI R&D, noting that the President's budget would prioritize substantial investments in industries of the future.[13] The current Administration should continue to prioritize historic investment in critical technologies like AI that ensure our national security and scientific leadership. Robust support must be provided for innovation across the full spectrum of AI R&D, as fundamental AI research is critical to the creation and deployment of AI systems that provide revolutionary and trustworthy societal solutions.

We recommend the following AI policy actions:

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[10] Federal AI and IT Research and Development Spending Analysis | Federal Budget IQ
[11] Fiscal-Year-2026-Discretionary-Budget-Request.pdf
[12] Fiscal-Year-2026-Discretionary-Budget-Request.pdf
[13] President Trump's FY 2021 Budget Commits to Double Investments in Key Industries of the Future – The White House

- Include increasing federal investment in AI R&D in the President's Budget Request every year. This includes significant investment in NSF to continue to support AI students, researchers, and developers across the country.
- Support the NSF NAIRR and publicize the benefits it brings to the U.S. economy, academia, industry, non-profit, and government sectors.
- Establish a national award to incentivize and recognize AI technology advances.
- Request funding for graduate student research fellowships to attract, cultivate, and promote the best AI talent.
- Request funding for partnerships between universities and industry to increase the real-world impact of academic innovations.
- Prioritize funding for fundamental AI R&D programs at NSF, DOD, and DOE to ensure the foundation is set to support novel advancements, and the AI practitioners and researchers of the future.
- Establish a federal program to ensure AI technologies move from lab to market in 3-5 years.

Appendix: Artificial Intelligence Innovations enabled by Federal Funding

- *Deep Learning* - The basic neural network (NN) architecture and back propagation learning algorithms that underlie the currently dominating *Deep Learning* approach to development of AI models were first invented in the mid 1980s by Geoff Hinton and others[14] with the support of block grants for foundational computer science and AI research provided by DARPA to various academic institutions. These algorithms were found to perform relatively poorly at the time due to their inability to scale to any problem of practical interest, and it wasn't until years later when advances in computer hardware overcame the scalability problem and unleashed the power of Deep Learning. Geoff Hinton and his colleagues Yann LeCun and Yoshua Bengio received the Turing Award in 2018 for these contributions. In 2024, Hinton was also awarded the Nobel Prize in Physics jointly with John Hopfield for this same foundational work.[15]

- *Autonomous Driving* – Today's vast autonomous driving industry similarly owes its existence to basic scientific research carried out in US academic institutions with significant investment of federal research funds. Over the period from 2004-2007, DARPA sponsored a series of 3 autonomous driving competitions, starting with an off-road race through the desert and culminating with an urban driving competition, that resulted in accelerated

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[14] D.E. Rumelhart, G.E. Hinton, R.J. Williams, "Learning representations by back-propagating errors", *Nature,* 323, 533-536, 1986

[15] https://www.nobelprize.org/prizes/physics/2024/press-release/

innovation and maturation of techniques that now underpin today's autonomous driving industry.[16]

- *Personal Assistants* – Over the 5-year period from 2003 - 2008, the DARPA Personalized Assistant that Learns (PAL) program brought together over 300 researchers from 25 of the top university and commercial research institutions with the goal of building a new generation of cognitive assistants that can reason, learn from experience, be told what to do, explain what they are doing, reflect on their experience and respond robustly to surprise. Technologies created under this program provided the foundation for Apple's Siri assistant, and this innovation has triggered broad growth in personal assistant technologies.

- *Reinforcement Learning* – The explosion of Large Language Models (LLMs) on the AI scene over the past couple of years and companies with LLM offerings like OpenAI, Anthropic, Meta, Microsoft, and others also owe their success to earlier innovation of federally funded basic AI research in deep learning. In addition, Reinforcement Learning (RL), a key learning mechanism for adapting and optimizing LLMs, was originally developed by Andrew Barto and Richard Sutton under funding from the Air Force Office of Scientific Research and the Air Force Research Lab in the early 1980s, and like Deep Learning techniques was not fully appreciated until computer hardware advances allowed broader application. Just this past week, Barto and Sutton received this year's Turing Award.[17]

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AAAI Past President

[16] https://www.darpa.mil/news/2014/grand-challenge-ten-years-later
[17] https://www.nytimes.com/2025/03/05/technology/turing-award-andrew-barto-richard-sutton.html

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