

AI RFI Responses, October 26, 2018

Update to the 2016 National Artificial Intelligence Research and Development Strategic Plan RFI Responses

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October 26, 2018

Mr. Faisal D'Souza
National Coordination Office
National Science Foundation
Alexandria, Virginia 22314

Dear Mr. D'Souza,

Amazon Web Services (AWS) welcomes the opportunity to provide comments regarding updates to the *2016 National Artificial Intelligence Research and Development Strategic Plan*. As a leader in artificial intelligence and machine learning (AI/ML), AWS enables organizations of all sizes and types—ranging from small start-ups to large government agencies—to develop and deploy AI/ML capabilities in truly innovative and impactful ways.

AWS is committed to helping AI/ML technologies flourish and benefit the country and all of society. As such, we fully support efforts to revise the *2016 National Artificial Intelligence Research and Development Strategic Plan*. The comments and recommendations we present here were developed with the intent of helping the National Science Foundation (NSF) further advance this critically important technology.

In summary, we recommend NSF update the strategic plan in the following three ways:

1. establish clear priorities for federal AI/ML research and development;
2. clarify the government's vision and guidance for acquiring and making available tools and capabilities necessary for AI/ML research and development; and
3. outline key assumptions around the future direction of analogous policies impacting AI/ML.

Establish clear priorities for federal AI/ML research & development.

The current strategic plan offers a broad statement on areas of interest, but does not delineate national priorities for research and development on specific challenges with, and applications of, AI/ML. On page 7, the plan states that the Federal government should “emphasize AI investments in areas of strong societal importance that are not aimed at consumer markets -- areas such as AI for public health, urban systems and smart communities, social welfare, criminal justice, environmental sustainability, and national security, as well as long-term research that accelerates the production of AI knowledge and technologies.” Further illustrating the lack of clear priorities in the existing strategy, it refers to 3-D printing on page 8 as an

example of a beneficial AI-related advancement, and genomic sequencing as another on page 10. However, it is unlikely that 3-D printing and genomic sequencing are of equal importance and priority to the federal government.

AWS therefore proposes the following overarching areas and supporting examples as a starting point for delineating priorities for federal research and development:

- continue investment into areas of market failure;
- investment in AI-first infrastructure; and
- build cross-disciplinary communities for the future of AI/ML.

Continue investment into areas of market failure.

The U.S. Government should continue investing in areas that are important for maximizing societal good and maintaining the country's competitive advantages. AI/ML applications in healthcare and education should be two top-priority areas warranting greater federal investment.

In the healthcare space, the U.S. government should consider ways to apply AI/ML research and development to address challenging medical conditions, such as Alzheimer's. Furthermore, federal support could also be given to AI/ML research and development for detecting and mitigating healthcare fraud & abuse, advancing precision medicine, and enabling and reducing the cost of drug discovery.

Regarding education, the country's teaching and learning techniques must be modernized to nurture and grow the workforce of the future. AI for education offers significant potential for personalized learning; the federal government is well-positioned to further research and development in this area.

Invest in AI-first infrastructure.

The federal government should invest more heavily in building and modernizing infrastructures to enhance the potential for AI/ML to have positive impacts on society. In the future, more tasks will be completed by people, with assistance from machines and AI. However, the Nation's existing infrastructure is not conducive to machines and AI augmenting persons' abilities, and limits the ability for machines and AI to assist people in completing tasks.

Build cross-disciplinary communities for the future of AI/ML.

Funding should be prioritized for multi-disciplinary research teams and long-term AI/ML research and development programs (e.g., 10-year programs with intermediate milestones). Multi-disciplinary research and development is essential to advancing AI/ML. Currently, AI is largely dependent on data-driven ML. Though huge advances have been made in AI with data-driven ML, AI will likely plateau or "hit a wall" without research and development on building

human-like reasoning abilities for AI. Developing human-like reasoning abilities for AI requires collaboration across multiple disciplines like neuroscience, brain imaging, sociology, and ML research. In this same vein, the *National Artificial Intelligence Research and Development Strategic Plan* should stress the need to leverage the unique strengths of, and reinforce collaboration among, government, academia, and the private sector to advance AI/ML research and development.

Clarify the government's vision and guidance for acquiring and making available tools and capabilities necessary for AI/ML research and development.

The strategic plan could be improved by adding a clear vision and direction on investment into key enablers of AI/ML research and development in government. For example, data sharing and access to large data sets are essential to AI/ML research and development; commercial cloud is essential in this regard. Furthermore, we encourage NSF to clarify how this strategy will benefit from and be aligned with existing policies, strategies, and initiatives regarding the acquisition of enabling technologies and resources, such as the Administration's IT modernization agenda.¹

Outline key assumptions around the future direction of analogous policies impacting AI/ML.

Analogous policies on important issues, like privacy and cybersecurity, are not adequately addressed in the current strategic plan. Legislation, regulation, and technological innovation in those spaces could impact AI/ML research and development. It is critical that policy regarding privacy be developed in such a way that does not hamper AI/ML research and development. We therefore encourage NSF to articulate in the strategic plan how ongoing work across the government that may affect AI/ML research and development (e.g., NIST's privacy framework) will be coordinated and aligned with the Nation's AI/ML vision, goals, and priorities.

AWS is grateful for the opportunity to respond to this request for comment, and we are prepared to support NSF in updating and implementing the *National Artificial Intelligence Research and Development Strategic Plan*. Moreover, we stand ready to serve as a partner to the entire federal government in maximizing the benefits of AI/ML while minimizing its risks.

Respectfully,

Steven Block
Senior Manager, Public Policy
Amazon Web Services

¹ See the *Report to the President on Federal IT Modernization*, available at <https://itmodernization.cio.gov/assets/report/Report%20to%20the%20President%20on%20IT%20Modernization%20-%20Final.pdf>.