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Request for Information (RFI) on an Implementation Plan for a National Artificial Intelligence Research Resource: Responses

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RFI Public Response For:

National Artificial Intelligence Research Resource – NAIRR

Response: National AI Research Resource” in the subject line of the message. Attn: Wendy Wigen, NCO,
2415 Eisenhower Avenue, Alexandria, VA 22314, USA.

Bottom Line Up Front

“People who are really serious about software should make their own hardware” - Alan Kay

Artificial Intelligence curricula is available worldwide and on the internet. Where there is AI education there are compute resources. Though those resources may need to be bolstered, it is not a comparatively critical problem.

There is a broad and growing open source software community on the internet that provides foundational libraries for AI software development. These resources provide a substantial head start for anyone in the world wishing to engage in AI research or product development.

It is widely projected that a majority of AI systems and products will operate at the network edge, if connected at all. Latency, power and cost will be at a premium for competitive capability.

While AI software development has an organically growing worldwide foundation, mission optimized AI hardware investment is significantly lacking. This is the area where a protected national investment could create a strategic advantage for the country.

Fabrication of advanced microelectronics is expensive, especially compared to software. However, the payback in terms of capability and value versus software on standard hardware is more than worth it.

Fortunately, there are proven alternatives to taking every new custom hardware solution through physical realization for evaluation. Hardware accurate digital twins are a by product of the commercial best practices in microelectronics design. This type of digital twin can provide highly accurate analysis to project manufactured device characteristics. It is the link between electronic design automation (EDA) tools and the semiconductor manufacturers via process design kits (PDKs) that creates the accuracy. This link is the basis on which the entire commercial fabless industry has been based.

Cadence, the world leader in hardware accurate digital twins, would be happy to provide briefings to explain and discuss the technology.

Cadence is the only EDA vendor with trusted supplier accreditation.

Cadence has worked with the Air Force Research Lab (AFRL) and the Defense Micro-Electronics Activity (DMEA). Those organizations have been accumulating capability and expertise in commercial best practices and hardware accurate digital twins. They would be excellent candidates to act as the initial administrators and governors of a NAIRR for custom hardware.

Making government IP access rights a condition of the access to the NAIRR would ensure that the country would be a long-term beneficiary of this investment.

Google: AI education resources = > About 862,000,000 results (0.54 seconds)

As outlined in § 5106(b) of Public Law 116–283, the implementation roadmap developed by the Task Force should include the following:

A. Goals for establishment and sustainment of a National Artificial Intelligence Research Resource and metrics for success

Goal of program, in part, should be establishment of an innovation pipeline that feeds our national defense needs. Core success metric should be deployed national security capability with, at least in part, their origin in the NAIRR.

B. A plan for ownership and administration of the National Artificial Intelligence Research Resource, including: i. An appropriate agency or organization responsible for the implementation, deployment and administration of the Research Resource; and ii. A governance structure for the Research Resource, including oversight and decision-making authorities;

Ownership for the NAIRR and its accumulated IP and IP access rights should be within the DoD. The Air Force Research Lab (AFRL) and the Defense Micro-Electronics Activity (DMEA). Those organizations have been accumulating capability and expertise in commercial best practices and hardware accurate digital twins. They would be excellent candidates to act as the initial administrators and governors of a NAIRR for custom hardware.

C. A model for governance and oversight to establish strategic direction, make programmatic decisions, and manage the allocation of resources

While national security priorities should be foremost, other major government departments with competent scientific staff should be a part of a multi-department governing board.

D. Capabilities required to create and maintain a shared computing infrastructure to facilitate access to advanced computing resources for researchers across the country, including provision of curated data sets, compute resources, educational tools and services, a user-interface portal, secure access control, resident expertise, and scalability of such infrastructure;

Shared compute resources are not an essential element of the NAIRR. Every major educational and research center already is equipped with compute resources. For many organizations that claim a paucity, it is a matter of prioritization.

E. An assessment of, and recommended solutions to, barriers to the dissemination and use of highquality government data sets as part of the National Artificial Intelligence Research Resource

There is an established multi-branch hardware emulation center at AFRL. The commercial electronics industry has shown how such a capability can be successfully scaled. Data sets and IP need to go through a rigorous screening process (with limitations of that process know and noted). The DoD should be granted full access rights to all of the data and IP registered.

F. An assessment of security requirements associated with the National Artificial Intelligence Research Resource and its management of access controls

There should be at least a two-level security scheme for incoming data (open and ITAR). It seems advisable to instill provisions for higher levels of classification and screening that leverage the same infrastructure investment.

G. An assessment of privacy and civil rights and civil liberties requirements associated with the National Artificial Intelligence Research Resource and its research

N/A

H. A plan for sustaining the NAIRR, including through Federal funding and partnerships with the private sector

Over time, the savings to the DoD in overall system development and lifetime cost should be worth billions of dollars. A percentage of those savings could be applied to the sustainment (and expansion costs). A royalty scheme for commercially successful products whose basis IP was developed in the NAIRR could be an additive element (need caution here to not squelch business viability).

I. Parameters for the establishment and sustainment of the National Artificial Intelligence Research Resource, including agency roles and responsibilities.

Would encourage an initial structure and governance based on on-going infrastructure development within the DoD, then evolve as viability and path forward becomes clear.

1. What options should the Task Force consider for any of roadmap elements A through I above, and why? [Please take care to annotate your responses to this question by indicating the letter(s) of the item (A through I in the list above) for which you are identifying options.]