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Office of Science and Technology Policy

Networking and Information Technology Research and Development (NITRD)
National Coordination Office (NCO)
National Science Foundation

Re: RFI Response – Development of a 2025 National Artificial Intelligence (AI) Research and Development (R&D) Strategic Plan (Docket ID No. NSF-2025-OGC-0001)

29 May 2025

IEEE-USA is pleased to submit these recommendations in response to the Office of Science and Technology Policy's (OSTP) request for comments on the 2025 update to the *National Artificial Intelligence Research and Development Strategic Plan*. This update presents an essential opportunity for the U.S. government to address the now more fully realized-impacts of artificial intelligence (AI) and automated decision systems (ADS), and for the White House to provide urgently needed guidance grounded in current realities.

The widespread adoption of AI/ADS across all sectors—financial services, healthcare, education, housing, and beyond—directly affects every American. These systems shape decisions, collect and analyze vast amounts of data, and operate with limited transparency and accountability, often offering individuals little meaningful control or choice. Their impact extends to domestic as well as national security and global geopolitical dynamics.

Since the release of the first national AI strategy in 2019, AI/ADS technologies—and our understanding of their potential and real-world risks—have expanded significantly. This growth demands a robust governance framework that balances innovation with security, efficiency, and civil liberties. The updated strategy should leverage this evolving body of knowledge to promote extraordinary innovation, safeguard individual rights, and minimize harm.

We commend the Administration's efforts to modernize the national strategy and encourage further development in two key areas:

1) Aligning the strategy with current realities, based on lessons learned from the deployment of AI/ADS in high-impact domains.
2) Anticipating future developments, ensuring that new opportunities are responsibly harnessed and emerging risks are effectively addressed.

Contrary to the belief that regulation and innovation are incompatible, IEEE-USA's experience across global technology and business sectors suggests otherwise. Science-informed, pragmatic regulation fosters market growth, boosts investor and consumer confidence, and enhances security. In contrast, a regulatory vacuum introduces unpredictability, increases business risk, and ultimately suppresses innovation by incentivizing overly cautious strategies.

AI regulations must be based on validated scientific and technical foundations, supported by widely accepted standards, and designed to ensure predictable compliance and business conditions. Only then can the U.S. sustain globally competitive, responsible AI innovation.

Executive Order 13859, Maintaining American Leadership in Artificial Intelligence (2019), initiated a thoughtful approach toward this goal. We urge the Administration to expand on this momentum by pursuing well-informed regulatory frameworks and advocating for companion federal legislation. Establishing a clear and uniform compliance environment will empower American innovators to drive groundbreaking advancements in AI while ensuring trust and safety.

Finally, a strong and comprehensive national AI governance strategy will guide federal policymaking, provide clarity for states, and help avoid fragmented or contradictory regulations that may pose legal, economic, or constitutional challenges. To be truly effective, the updated plan must address not only technical research but also the broader legal, economic, and societal implications of AI/ADS systems—ensuring they are safe, secure, and aligned with values regardless of their complexity.

IEEE-USA thanks the OSTP for considering these comments in the Office's revisions to the National AI Strategic Plan. We welcome any further discussions and if you have any questions, please do not hesitate to contact Erica Wissolik at (202) 360-5023 or e.wissolik@ieee.org.

IEEE-USA represents approximately 150,000 engineers, scientists, and allied professionals in the United States, many of whom are actively conducting research and development into artificial intelligence, software engineering, cybersecurity, and advanced computing, as well as other foundational and emerging technologies. We are the American component of the IEEE – the largest organization of technology professionals in the world, representing more than 400,000 engineers, scientists, and allied professionals worldwide.

In addition to IEEE-USA's recommendations submitted in response to the *Request for Information on the Development of an Artificial Intelligence (AI) Action Plan*, our complimentary and subsequent recommendations are:

I. **Accelerate novel hardware R&D:** Focus research and development efforts on developing advanced and novel semiconductor technologies for enabling new hardware or wetware for AI/ADS, including research into neuromorphic processing units. Neuromorphic processing units are hardware systems which emulate biological neural networks, with the goal of offering advantages over traditional von Neumann architectures[1] in terms of energy efficiency.

By leveraging neuromorphic computing, researchers can design AI/ADS that perform tasks such as pattern recognition, machine learning, and decision-making at the edge, reducing compute and energy requirements. To support this research, it is essential to provide multi-year support for collaborative initiatives across academia, government, and private industry.

This long-term investment will enable sustained progress in understanding and optimizing these advanced semiconductor technologies. Additionally, fostering partnerships between hardware designers and AI/ADS developers will accelerate the translation of research into practical applications.

II. **Create a synthetic data[2] proving ground:** America's AI systems are starved for training data. The real-world data that make AI models smart—medical files, credit histories, manufacturing logs—are locked down by privacy law and costly licensing. This leads to U.S. innovators—especially small firms and start-ups—being relegated to the sidelines. Thus, IEEE recommends:

a. **Directing NIST and NSF, in partnership with leading U.S. companies, to launch a synthetic data proving ground**, a public-private testing range where any American company or university can test its synthetic data. This provides a low-cost, high-impact solution that unleashes American ingenuity, protects U.S. citizens, and keeps the U.S. on top in the global AI race. Standardizing privacy locks and certifying high-quality synthetic data could shrink the information asymmetry that now favors data-rich giants and hostile actors so that every trusted U.S. innovator can participate in developing and building AI systems. Examples of such sandbox environments include:

- the U.S. FDA's Digital Health Software Pre-certification Program, which pilots regulatory models for software as a medical device (SaMD) including AI/ML-enabled tools;
- the UK Financial Conduct Authority's (FCA) AI Sandbox, which enables innovators to test AI solutions under close supervision, fostering safe experimentation while ensuring regulatory alignment;
- the Singapore IMDA AI Verify Foundation, a testing framework for AI systems focused on transparency, fairness, and robustness; and

[1] The term "von Neumann architecture" has evolved to refer to any stored-program computer in which an instruction fetch and a data operation cannot occur at the same time.

[2] Computer-generated records that mimic real patterns without exposing a citizen's identity. Why synthetic data matters? https://mitsloan.mit.edu/ideas-made-to-matter/what-synthetic-data-and-how-can-it-help-you-competitively)

- digital twin simulations, such as the European Digital Twin of the Ocean.

b. **Expanding the NAIRR initiative by embracing a data management model based on improved data management and integration for AI/ADS training and development**, for example via the use of data fabrics. Data fabrics are modern data architectures that streamline the integration of data from various sources, including cloud and on-premises environments, to support AI and other workloads. Optimizing data management and integration will enable synthetic proving grounds.

III. **Require third-party AI/ADS validation:** To ensure safe, reliable, and trustworthy deployment of AI/ADS systems, particularly in high-risk sectors such as healthcare, finance, critical infrastructure, and public services, IEEE-USA recommends **a national framework to formalize independent third-party validation of AI systems, aligned with best practices in software and systems assurance**.

a. *Adopt technical standards.* For example, IEEE1012 – the Standard for System, Software, and Hardware Verification and Validation (V&V) – provides a robust lifecycle-based methodology for planning, conducting, and documenting software and system verification and validation. Leveraging IEEE1012 can serve as a cornerstone for certifying AI/ADS systems against defined use cases, performance benchmarks, and risk profiles. Application of the standard will support:

- early detection of system design flaws and bias in model development,
- verification of data integrity, model performance, and explainability metrics, and
- independent assessments that reinforce stakeholder trust and market accountability.

b. *Encourage certification models involving independent assessors.* Public-private partnerships should be fostered to scale voluntary third-party certification programs. These assessors should be trained and accredited based on:

- industry developed standards such as IEEE's P7000 series of AI standards,
- transparency and accountability practices (e.g., IEEE 7001 for model transparency and IEEE 7003 for algorithmic bias), and
- guidelines emerging from the NIST AI Risk Management Framework.

c. *Establish Post-Market Surveillance and AI Drift Detection Programs*. To complement pre-deployment validation, federal strategy must include Post-Market Surveillance (PMS) mechanisms. These mechanisms should be:

- mandated for all federally funded or high-risk AI/ADS deployments,
- modeled on successful surveillance systems from healthcare (e.g., MDSAP, FDA's MedWatch, EUDAMED),
- adapted for AI lifecycle management, and
- enhanced with AI-specific feedback loops, including drift detection, adversarial behavior monitoring, and retraining thresholds aligned with respected regulatory & standard framework.

By integrating IEEE 1012 V&V standards, regulatory sandboxes, third-party certification, and post-market AI monitoring, the U.S. can build a responsible AI innovation ecosystem that ensures safety and sustained public trust while enabling global competitiveness.

IV**. Support transformation of the workforce:** In addition to the education and worker skills recommendations we previously submitted to the White House,[3] **IEEE-USA recommends that the federal government encourage studying how long-term sustained collaboration with AI/ADS can enable human wellbeing** (behavioral, emotional, cognitive), creativity, emotional resilience, judgment, and professional identity over time.

a. *Translate the findings into action-oriented curricula* for K-12, community colleges, trade schools, universities, and mid-career up-skilling—teaching AI literacy, meta-cognition (thinking about one's own thinking), and rapid continuous re-training, preparing an "AI-ready" labor force.

b. *Issue voluntary, evidence-based best-practice playbooks* so teachers, employers, and toolmakers can:

- boost positives—innovation and productivity;
- check negatives—skill atrophy, over-dependence, and loss of agency; and
- harden minds against manipulation by advising on healthy levels of cognitive off-loading.

V. **Promote transparency, human agency, and accountability in the design and use of systems that deploy AI/ADS:** To comprehensively address the challenges in creating and deploying AI/ADS systems, federal resources **should prioritize the creation of robust verification and validation procedures to ensure these systems operate as intended**. This involves developing tiered transparency standards aligned with IEEE 7001 guidelines, starting at Technology Readiness Level (TRL)-6+, to provide clarity on how AI systems will be understood, designed, developed, integrated, tested, evaluated, deployed, and transitioned out of use.

Alongside these standards, require the use of machine-readable "Model Cards" and "Data Cards" for all federally funded AI systems to enhance interpretability and accountability during deployment. To further support transparency, federal programs should fund open-source provenance tooling to enable continuous post-deployment audits, ensuring that users can assess system performance and trustworthiness over time. Additionally, transparent standards must be designed to encourage the sharing of innovations, foster a level playing field among stakeholders, and build trust by making information on AI systems available to consumers, deployers, and the public.

This approach ensures that all stakeholders have access to critical information about AI systems that significantly impact their lives or businesses. While current strategic plans may mention interpretability, they lack measurable levels of transparency, audit hooks, and supply-chain traceability once systems are fielded. To address this gap, it is essential to establish clear metrics for transparency levels, implement actionable audits at each TRL level, and ensure that US vendors, particularly small businesses, have predictable liability expectations, which can accelerate domestic deployment and innovation in AI/ADS.

Lastly, engage Ethics in Action and IEEE P7000™ working group experts from the series of standards already produced and those under development for support and guidance. The IEEE P7000 series addresses specific issues (such as accountability, fairness, privacy, safety, security) at the intersection of technological and ethical considerations.

IX. **Provide for public input on the governance of systems that deploy AI/ADS: Increase investment in public education** so that laypersons, (1) generally understand how AI/ADS function and are aware of the

[3] IEEE-USA response to NITRD and White House OSTP Request for Info on *Request for Information on the Development of an Artificial Intelligence (AI) Action Plan.*

prevalence of their use across private and public sectors and communication platforms, and (2) develop awareness of the potential impacts of systems that deploy AI/ADS and uses of those systems (promoting citizen resiliency). Additionally, develop mechanisms for soliciting multi-stakeholder and diverse public input on the governance of systems that deploy AI/ADS, particularly from marginalized or vulnerable communities.

Engage IEEE-SA Working Group members who developed IEEE 3119™ *Standard for the Procurement of Artificial Intelligence and Automated Decision Systems* which aims to address the needs of government workers, policymakers, and technologists. The IEEE 3119 Working Group intends to establish a uniform set of definitions and a process model for the procurement of AI and ADS by which government entities can address socio-technical and responsible innovation considerations to serve the public interest. The process requirements include a framing of procurement from an IEEE *Ethically Aligned Design* (EAD) foundation and a participatory approach that redefines traditional stages of procurement as: problem definition, planning, solicitation, critical evaluation of technology solutions (e.g., impact assessments), and contract execution. IEEE 3119:

a. establishes a uniform set of definitions and process requirements that address the socio-technical and responsible innovation challenges in the procurement of AI/ADS,

b. helps to support agencies adapt their processes for procuring AI/ADS systems responsible for the public interest, and

c. promotes ethically aligned values and robust public engagement in the process model.