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Networking and Information Technology Research and Development (NITRD) National Coordination Office (NCO)
National Science Foundation
2415 Eisenhower Avenue
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Subject: RFI Response and Proposal for National AI Resource Exchange (NAIREX) with Industry Partnership Framework

Docket ID No. NSF-2025-OGC-0001
Submitted electronically: https://www.regulations.gov.

Dear Mr. D'Souza,

In response to calls for input, such as the Request for Information for the 2025 National Artificial Intelligence (AI) Research and Development Strategic Plan which noted over 10,000 initial comments[1], various stakeholders have put forth key recommendations to bolster American AI competitiveness and address its societal impacts. A primary focus related to the public sector is strengthening AI infrastructure and talent through government investment, including the creation of a National AI Competitiveness Institute and regional hubs to provide startups and researchers with access to computing power and data[2] . This also involves developing a Federal Data Utility Hub to improve access to government datasets and fostering talent through public-private partnerships and training programs[3], along with fully funding the National AI Research Resource (NAIRR)[4] . Concurrently, significant concerns are raised about the substantial water consumption of AI data centers, necessitating innovation, comprehensive footprint assessments, the exploration and adoption of water efficient practices, and collaboration between AI developers and water resource managers to ensure water security[5] and conservation[6]. Furthermore, there is a recognized lack of research on concrete AI economic policies and a call to regulate cloud computing as a public utility to ensure fair and non-discriminatory access[7]. Respectfully submitted are additional components we believe will strengthen the AI Action Plan.

Representing a coalition of private entities, public water utilities, and advocacy organizations, we propose the voluntary National AI Resource Exchange (NAIREX) platform, paired with a Government Innovation Investment Fund (GIIF), to accelerate AI

[1] Information regarding the Request for Information on the Development of a 2025 National Artificial Intelligence.
[2] AH Capital Management, LLC's Response to the Request for Information on the Development of an Artificial Intelligence (AI) Action Plan
[3] Comment from the Special Competitive Studies Project (SCSP) on the Federal Data Utility Hub
[4] Information integrated from the SCSP Society Panel Interim Panel Report, December 2022 (PDF URL: https://www.scsp.ai/wp-content/uploads/2022/12/Society-Panel-IPR-FINAL.pdf)
[5] Comments from the Chief Executive Officer, Association of Metropolitan Water Agencies (AMWA) on AI and water security
[6] The Land Trust Alliance comment on data center water consumption
[7] The letter from "Open Markets" and the center for journalism and liberty regarding cloud computing as a public utility

adoption across state and local agencies in the critical infrastructure water sector. Leveraging expertise from public utility leaders, this strategy strengthens American competitiveness, enhances government efficiency, supports AI talent development, ensures public trust, and drives scalable AI implementation. This proposal also supports the broader national imperative to sustain U.S. leadership in artificial intelligence by strengthening foundational research capacity, enhancing public-sector innovation, and advancing strategic critical infrastructure resilience.

Current Status of AI Adoption

The U.S. Census Bureau's Business Trends and Outlook Survey[8] found that only 9.1% of educational services organizations and significantly lower rates in other public-adjacent sectors have adopted AI, with substantial geographic disparities. A 2025 Google/IDC study[9] of 161 federal Chief AI Officers found that while 50% of agencies report high AI maturity, significant implementation gaps remain. These findings align with EY's 2024 survey showing 51% daily AI usage but persistent barriers in governance (48%), infrastructure (30%), and training (33% gap).

Data Infrastructure as Digital Foundation

Government data infrastructure functions analogously to civil engineering infrastructure—both serve as foundational systems that enable higher-level services and applications. Just as roads, bridges, and utilities must be properly designed, maintained, and interconnected to support economic activity and public services, data infrastructure requires systematic integration and maintenance to support AI implementation.

Government agencies face significant challenges in AI implementation due to fragmented data management systems. Having to transition from existing legacy systems is the top barrier to incorporation of artificial intelligence or machine learning into organizations today, cited by 18% of developers actively working with AI or ML[10]. Similar to how aging physical infrastructure creates bottlenecks for transportation and utilities, fragmented data systems create barriers for information flow and processing capabilities.

The parallel extends to implementation approaches: just as civil infrastructure projects require coordinated planning across multiple jurisdictions and utilities, effective data infrastructure requires cross-departmental integration. However, government agencies an

[8] Taking Stock of AI Adoption Across the U.S. Economy." *Analysis of U.S. Census Bureau Business Trends and Outlook Survey*. 2024. Available at: https://bipartisanpolicy.org/blog/taking-stock-of-ai-adoption-across-the-u-s-economy/
[9] AI Trends 2025 in Public Sector." *Federal Chief AI Officer Survey*. 2025.
[10] Evans Data Corporation. (2018). AI, ML and Big Data Development Survey. DevRelate.

implement isolated AI solutions without this integration[11,12] similar to building disconnected road segments that cannot form a functional transportation network.

Government data infrastructure limitations stem from three primary categories of challenges that mirror those found in civil infrastructure projects: technical constraints, organizational coordination barriers, and financial resource limitations.

Technical Infrastructure Limitations

Government systems face compatibility and capacity constraints similar to aging civil infrastructure that cannot accommodate modern transportation demands. Each year, the U.S. government spends over $100 billion on information technology. Most of that will be used to operate and maintain existing systems[13], with the federal government's 10 legacy systems most in need of modernization cost about $337 million a year to operate and maintain[14].

Like bridges built to outdated load specifications that cannot support modern traffic volumes, legacy data systems often cannot interface with modern AI platforms, utilize inconsistent data formats across agencies, and lack sufficient processing capabilities for AI workloads. This creates the digital equivalent of infrastructure bottlenecks where data flow is constrained by the capacity of the weakest system components.

Organizational Structure Challenges

Inter-departmental coordination presents significant obstacles, analogous to the challenges faced when multiple municipalities, state agencies, and federal entities must coordinate on regional infrastructure projects. Data silos occur when data is kept within a singular location, leading to inconsistent and incomplete data across departments and agencies[15]. Studies indicate that 72% of respondents reported that security data and IT operational data are siloed in their organizations[16].

Just as transportation infrastructure requires standardized engineering specifications and coordinated planning to function as an integrated network, data infrastructure requires standardized governance frameworks and cross-agency coordination. The absence of

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[11] Lehman, Geno, Prabhu Chandrasekeran, Kevin Johnson, Mark Loria, Carla Cherchi, and Zdenko Vitasovic. (2022). Definition, Framework, and Maturity Assessment for Intelligent Water Systems: A Review of Existing Frameworks and Maturity Models. Technical Report 5039. Denver, CO: The Water Research Foundation.
[12] Badruzzaman, Mohammad, Carla Cherchi, Robin Grenfell, Joseph G. Jacangelo, Mohan Gunaratnam, Simon Bunn, and Matthew Gordon. (2020). Managing Water and Wastewater Utility Data to Reduce Energy Consumption and Cost. Research Report 4668. Denver, CO: Water Research Foundation.
[13] U.S. Government Accountability Office. (2023). Information Technology: Agencies Need to Continue Addressing Critical Legacy Systems. GAO-23-106821.
[14] U.S. Government Accountability Office. (2019). Information Technology: Agencies Need to Develop Modernization Plans for Critical Legacy Systems. GAO-19-471.
[15] Nextgov/FCW. (2024, December 27). Breaking data silos to achieve AI readiness.
[16] Blink Ops. (2024). The Impact of Data Silos on AI and Security Operations.

these standards creates the equivalent of incompatible railway gauges—technically functional components that cannot work together as a unified system.

Financial Resource Constraints

Modernization requires substantial capital investment that exceeds available budgets, similar to the funding challenges faced in updating aging physical infrastructure. The cost to the UK government of maintaining legacy IT is estimated to be around 50 percent (or £2.3 billion) of its current IT spending[17]. In May 2022, the Technology Modernization Fund (TMF) received over 130 proposals requesting more than $2.5B under the American Rescue Plan[18], demonstrating demand that exceeds available funding.

This mirrors the infrastructure funding gap observed in civil engineering, where the American Society of Civil Engineers estimated a $2.6 trillion investment need for U.S. infrastructure through 2029. Like deferred maintenance on bridges and roads that leads to higher long-term costs, postponing data infrastructure modernization results in escalating technical debt and increased operational expenses.

Impact on AI Implementation

- Data management deficiencies create measurable barriers to AI adoption:
- Data Quality Issues: Only 12% of organizations report having data of sufficient quality and accessibility to support effective AI implementation[19]. Poor data quality directly affects AI system reliability and performance.
- Compliance and Governance Concerns: Inadequate data systems increase regulatory compliance risks, making agencies hesitant to deploy AI solutions without confidence in underlying data integrity.
- Limited Scalability: Fragmented systems prevent agencies from implementing enterprise-wide AI solutions, restricting projects to isolated, departmental applications.

Infrastructure Investment Paradigm

The relationship between foundational infrastructure and advanced capabilities is well-established in civil engineering. Modern transportation systems, telecommunications networks, and utility grids all require robust, interconnected infrastructure to support advanced services. Similarly, AI applications require integrated data infrastructure as a prerequisite for effective implementation.

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[17] AWS Public Sector Blog. (2024, October 15). Transforming government: 4 approaches to overcome legacy exit challenges.
[18] Macro Solutions. (2023, September 26). How the Federal Government Can Accelerate Legacy System Modernization.
[19] AIM Research Council. (2024, December 4). Overcoming Data Silos and Integration Barriers in Enterprise AI Implementation.

International examples demonstrate this infrastructure-first approach. The UK's January 2025 AI Opportunities Action Plan includes provisions for expanding public compute resources by 20x by 2030, coupled with data integration initiatives—similar to how major infrastructure projects combine capacity expansion with system integration. Estonia has implemented over 50 AI use cases through its Bürokratt virtual assistant, supported by cross-government data integration platforms that function like a unified digital utility grid.

Service Delivery Infrastructure Effects

Data management disparities affect service delivery capabilities across different agency types and geographic regions, like how infrastructure disparities create unequal access to transportation, utilities, and telecommunications. Smaller agencies and rural municipalities typically have limited technical capacity for data infrastructure modernization, which restricts their ability to implement AI solutions compared to larger, better-resourced organizations.

This creates a digital infrastructure divide analogous to the rural-urban infrastructure gaps observed in broadband access, transportation networks, and utility services. Just as communities with poor physical infrastructure face economic disadvantages, agencies with inadequate data infrastructure cannot leverage AI capabilities to improve service delivery efficiency and effectiveness.

Proposed Voluntary Solution: National AI Resource Exchange (NAIREX)

NAIREX addresses critical barriers preventing water utilities from successfully implementing AI—specifically the lack of trust in AI systems for critical infrastructure, inadequate integration between operational technology and modern data platforms, shortage of AI expertise in utility operations, and limited knowledge sharing between water systems. As a centralized platform housed within the National Science Foundation with dedicated funding through a Government Innovation Investment Fund (GIIF), NAIREX provides both the tools and governance framework that water utilities need to deploy AI safely and effectively for operations, maintenance, and service delivery.

Think of NAIREX as a comprehensive AI support system that helps water utilities move from isolated, risky AI experiments to coordinated, trustworthy AI implementation. The pilot platform[20] serves as both a technical resource center and a coordination hub that connects utilities, shares best practices, and ensures AI deployments meet water sector standards for reliability, safety, and regulatory compliance.

[20] NAIREX Online Platform Pilot. https://nairex.replit.app/

How NAIREX Works: Five Core Functions for Water Utilities

1. Investment Tracking and Performance Dashboard

Unified Investment Dashboard creates a water sector-wide view of AI initiatives, tracking what utilities are spending on AI technologies, which applications are working for water treatment and distribution, and what outcomes they're achieving in energy reduction, operational efficiency, and service reliability. This builds on existing utility technology inventories but provides a centralized location for cross-utility learning and prevents duplication of costly pilot projects. The dashboard also tracks GIIF-funded projects to ensure accountability and measure progress toward sector-wide AI adoption goals.

2. Industry Collaboration and Centers of Excellence

Public Partnership Framework establishes formal relationships with water technology companies, AI vendors, and creates Centers of Excellence where utility operators and technology experts work together to solve water-specific AI challenges. These Centers of Excellence serve as regional hubs that provide training, technical assistance, and ongoing support for water utilities implementing AI solutions. This ensures water utilities have access to cutting-edge AI capabilities for applications like predictive maintenance, water quality monitoring, and energy optimization while maintaining utility sector standards for reliability and safety.

3. Phased Funding for Local Implementation

National Utility Organization Network provides both financial support and technical resources through GIIF's staged funding approach:

- Seed Stage ($250K-$500K): Proof-of-concept funding for water utilities to pilot AI applications like real-time anomaly detection in water quality or predictive maintenance systems
- Series A ($1M-$3M): Implementation funding for utilities that demonstrate successful pilots, supporting full deployment of AI solutions across their operations
- Series B ($5M-$10M): Scaling funding to expand successful AI applications across multiple utilities or entire regional water systems

This funding comes with standardized AI implementation patterns, testing environments for utility applications, step-by-step playbooks for integrating AI with SCADA and other operational systems, and hands-on technical assistance specifically designed to help smaller water utilities, rural water systems, and under-resourced municipalities implement AI successfully.

4. Secure Data Sharing and Trust Framework

Data Trusts enable water utilities to share operational data, water quality measurements, and system performance information for AI training and improvement while maintaining strict privacy, security, and competitive confidentiality controls. This solves the data access problem that prevents many water sector AI applications from reaching their full potential, particularly for predictive analytics and system optimization[21].

The platform also incorporates comprehensive trust-building measures specifically designed for critical water infrastructure. NAIREX establishes standardized reliability metrics that provide consistent benchmarks for evaluating AI applications across the water sector, ensuring that utilities can confidently compare and assess different AI solutions based on proven performance criteria.

To protect against potential cybersecurity threats, NAIREX operates a Red Teaming Collective that continuously tests AI systems against potential attacks on water infrastructure. This proactive security approach identifies vulnerabilities before they can be exploited, providing utilities with confidence that their AI systems can withstand both technical failures and deliberate attempts at disruption.

Transparency remains central to building public confidence in water system AI applications. The Public Trust Dashboard reports water system AI performance openly, allowing communities to see how AI technologies are improving their water services while maintaining accountability for any issues that arise. This transparency helps build the public support necessary for utilities to invest in and deploy AI technologies effectively.

NAIREX implements rigorous staged testing protocols that ensure AI systems progress methodically from laboratory environments to full operational deployment with continuous monitoring at each phase. This careful progression minimizes risks to critical water infrastructure while building confidence in AI reliability through demonstrated performance under increasingly realistic conditions.

Finally, the Reliability Certification Program establishes "utility-grade" AI standards that provide clear criteria for AI systems operating in water infrastructure environments. This certification process ensures that only AI applications meeting the highest standards for reliability, safety, and performance are approved for deployment in critical water systems, giving utilities and regulators confidence in the technology's readiness for operational use.

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[21] Badruzzaman, Mohammad, Carla Cherchi, Robin Grenfell, Joseph G. Jacangelo, Mohan Gunaratnam, Simon Bunn, and Matthew Gordon. (2020). Managing Water and Wastewater Utility Data to Reduce Energy Consumption and Cost. Research Report 4668. Denver, CO: Water Research Foundation.

5. Resource Leveraging and Workforce Development

Existing Network Partnerships work with established water sector organizations (like EPA's drinking water technical assistance programs, American Water Works Association, and Water Research Foundation) to extend AI support through proven delivery mechanisms. GIIF funding enables comprehensive AI training modules delivered through these existing networks, equipping water utility operators, engineers, and administrative staff with the skills needed to adopt and utilize AI tools effectively.

This addresses the critical skills gap in the water sector while maximizing the impact of existing relationships and expertise rather than building entirely new support systems.

Funding and Sustainability Model

NAIREX operates through a fundamentally different funding approach than traditional government programs. The $150 million Government Innovation Investment Fund represents a three-year commitment designed not as a one-time expenditure, but as a revolving fund that grows stronger over time. By reinvesting 5-8% of service fees from successful engagements, the fund creates a sustainable ecosystem where early successes fuel future innovations across the water sector.

This model transforms how water utilities access AI implementation support. Rather than competing for limited research grants that may never reach operational deployment, utilities gain direct access to staged funding specifically designed for real-world AI applications. The revolving fund structure ensures that as utilities achieve success and begin generating efficiency savings, a portion of those benefits flows back to support the next generation of AI adopters, creating a self-reinforcing cycle of innovation and improvement.

The fund operates with clear accountability built into its foundation. GIIF commits to achieving 50+ water utility AI adoptions while generating measurable cost savings and efficiency improvements across the sector. A mandatory third-year assessment will evaluate these outcomes and determine whether the program merits reauthorization and scaling based on demonstrated impact in improving water utility operations nationwide.

Transforming Water Utility Operations

NAIREX fundamentally transforms how water utilities approach AI adoption, moving from fragmented, high-risk experimentation to coordinated, supported implementation tailored specifically to water sector needs. Instead of utilities struggling in isolation to develop AI capabilities, they gain access to a comprehensive ecosystem of proven solutions, expert guidance, and peer learning opportunities.

Water utilities working with NAIREX benefit from proven AI solutions for operational optimization that come with demonstrated return on investment, removing much of the

uncertainty that currently prevents adoption. Expert guidance helps utilities integrate AI with their critical infrastructure systems safely and effectively, while secure data sharing capabilities enable sector-wide learning and continuous improvement of AI applications.

The platform provides transparent tracking of results and performance benchmarks, allowing utilities to learn from each other's successes and challenges. Unlike traditional research programs, NAIREX offers direct funding support for implementation rather than just theoretical development, while comprehensive training programs build internal AI capabilities that persist long after initial deployment.

Throughout this transformation, NAIREX ensures that AI implementations maintain the reliability and safety standards essential for public water systems and regulatory compliance. The platform successfully bridges the critical "implementation gap" that has prevented water utilities from translating promising AI research into operational improvements, providing the integrated funding, expertise, and governance framework needed for successful sector-wide AI adoption that serves communities reliably and efficiently.

AI and Water Use

In addition to the development of NAIREX we encourage the NSF to consider the connection between AI use and water use. Water and AI are inextricably linked as water is one of the most used media for cooling data center servers. As the number of data centers and AI use have grown over the last decade water use associated with data centers has tripled[22]. We recommend the AI Action Plan include a focus on expanding the understanding of AI's impact on water supplies that includes outreach to water providers across the nation. We also encourage the exploration and adoption of water efficient practices at data centers.

Conclusion

NAIREX and GIIF address uneven AI adoption (51% daily use, per EY) by tackling governance (48%), infrastructure (30%), and training (33% gap) barriers. NAIREX's platform and reliability framework ensure trustworthy AI, while GIIF's $150M fund, with a five-year sunset, drives 50+ agency implementations, $500M in savings, and 75% playbook adoption. Scaling via agency contributions and private partnerships mitigates funding gaps, aligning with U.S. AI leadership goals. We welcome discussion to refine this for the 2025 National AI R&D Strategic Plan. Finally, while rooted in domestic infrastructure priorities, NAIREX positions the U.S. as a leader in safe, trusted, secure, and scalable public-sector AI. Its transparent governance and emphasis on reliability could inform international best practices and help shape U.S.-led global standards for AI in critical infrastructure domains.

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[22]" Thirsty for power and water, AI-crunching data centers sprout across the West." Stanford University, April 8, 2025 https://andthewest.stanford.edu/2025/thirsty-for-power-and-water-ai-crunching-data-centers-sprout-across-the-west/

Respectfully submitted,

Coalition of California Clean Water Utilities



Marwan Khalifa, Interim Executive Director,

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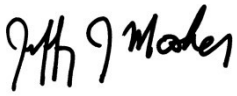


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