Artificial Intelligence & Technology Office

FY22 Program Plan
and FY23 Forecast

Executive Summary

The Department of Energy (DOE) has the mission of ensuring America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions. Artificial Intelligence (AI) (which encompasses machine learning (ML) for this program plan) is poised to be the most transformative technology of this, or perhaps any, generation in American history. Therefore, DOE must exercise its world-leading science and technology enterprise to propel the Department into a leadership position, capturing this opportunity for the American People.

This agile program plan is the Artificial Intelligence and Technology Office's (AITO) strategic operating model for the fourth quarter (Q4) of the fiscal year (FY) 2021 through Q4, FY 22. The plan evolves prior year activity concentrating on a department-wide, cross-cutting portfolio alignment of AI/ML investments to maximize impacts. In addition, the program plan leverages strategic partnerships, particularly the National Artificial Intelligence Initiative Office (NAIIO) and international relationships, as central enablers of AI outcomes and impacts that exemplify the mission of the administration and DOE. Successful implementation of this program plan will provide national leadership in AI tools, technologies, policies, and emerging capabilities in FY 23 and beyond.

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VISION

Transform the Department of Energy into a world leading AI enterprise by accelerating research, development, delivery, demonstration and adoption of responsible and trustworthy AI.

MISSION

Accelerate AI/ML-enabled capabilities through strategic portfolio alignment, scaling department-wide use cases that advance the agency's core missions, advocating for program offices. In addition, providing advice on trustworthy AI/ML strategies; and expanding public, private and international partnerships, policy, and innovations – all in support of National AI leadership and innovation.
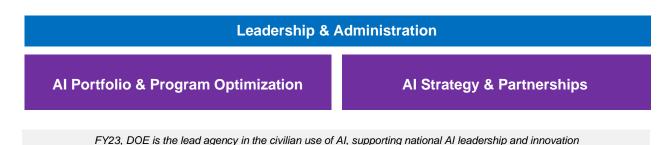
SELECT FY21 ACCOMPLISHMENTS

- Artificial Intelligence Exchange – DOE AI Project Investment Inventory System Improvements
- Consortium (First Five) – Wildfire prediction system
- DOE AI Executive Training
- Data Science Capstone – Energy & Environmental Justice
- Advisory Services
  - o OMB M-21-06: Regulation of Artificial Intelligence Applications
  - o EO 13960: Promoting the Use of Trustworthy AI in the Federal Government
- DOE AI Risk Management Playbook
- Conversational AI Risk Mitigation Analysis
- DOE AI Strategy – Cross-cutting Listening Sessions and Workshop Planning
- DOE AI Green Jobs Roundtable & Listening Session
- DOE International Partnership Framework established - commenced with NIST, NSF, India, Netherlands
- DOE AI Intelligence Briefings
- White House partnership – AI Workforce Development and numerous task forces

ORGANIZATION AND MISSION DELIVERY

Delivering on AITO's mission and vision consists of two (2) primary missions:

1. AI Portfolio and Program Optimization - Conducts strategic portfolio analysis and alignment of AI/ML investments, ensuring alignment with national security priorities, and facilitates department-wide trustworthy AI by conducting ongoing advisory and advocacy services to the program offices.

2. AI Strategy and Partnership Development - Builds and ensures robust partnerships and customer excellence across internal, external, and international boundaries and addresses strategic communications for the office. Leadership and administration are consistently applied and include workforce optimization and performance management.

Leadership & Administration	
AI Portfolio & Program Optimization	**AI Strategy & Partnerships**

FY23, DOE is the lead agency in the civilian use of AI, supporting national AI leadership and innovation

FY21 & FY22 PLAN

Goal 1: Responsible and Trustworthy AI/ML

To effectively operate as strategic portfolio advisors, AITO must promote federal risk mitigation and management, and trustworthy performance, outcomes, and assurances through ethical and responsible AI policies and practices, aligning with the NAIIO and executive orders, including Executive Order 13960: Promoting the Use of Trustworthy Artificial Intelligence in the Federal Government. Key activities and outcomes areas are:

- Improve the AI Exchange (AIX) system and processes to store and support DOE-wide AI strategic portfolio and investment alignment.
- Publish the AI Risk Management Playbook and Framework for use by DOE and other agencies.
- Conduct DOE and multi-agency challenges to bring awareness and publish insights on trustworthy AI and assurances.
- Publish guidelines for protecting conversational AI systems from adversarial attacks and establish guidelines as applicable for consistency and best practices in the use of conversational AI.

Goal 2: Departmental AI/ML Strategy

To effectively establish a DOE-wide strategy, AITO will conduct a comprehensive assessment of the AI/ML landscape (current, target, and future state) to optimize strategic portfolio alignment. In addition, the strategy will formulate prioritized implementations and support answering common questions, including:

- **Mission**: How can we better apply AI investments to address the Department's missions and policies (e.g., equity, energy justice, climate resilience, and cyber)?
- **Investments**: How do we optimize DOE AI investments for impact?
- **Cybersecurity**: How can we support the development and deployment of AI as a force multiplier for DOE cyber strategy?
- **Complex Problem Solving**: Are we strategically planning to use AI to mitigate risks and solve complex challenges – mainly where there are no data sets (e.g., explosives, cyber, and nuclear)?
- **Emerging AI:** What are next-generation AI practices, and where are gaps in current investments versus mission needs?
- **Leadership**: How do we better partner across communities to apply holistic synergies and international AI leadership?

Key activities and outcomes:

- Conduct AI asset and investment inventory (current and planned) across Departmental elements.
- Define priorities for focused investments in AI and related technologies.
    - AI Architectures and Tools
    - Trusted AI for Applications (Critical Infrastructure and Cybersecurity)
    - Data and Access
- Deliver roadmap and implementation, including pilot projects, ensuring alignment with the Department's mission, nuclear security, and the National AI R&D Strategy.
- Organize consortiums of industry, government, and academic leadersas appropriate to inform the development and deployment of AI solutions across DOE.

Goal 3: AI/ML Council

The AI Council represents all Departmental elements with AI equities – these stakeholders are authorized to make decisions for the program offices. The AI Council will act as "AI translators" between business and technology stakeholders, initiating cross-cutting organizational knowledge and information exchange to inform policy, investment, strategic portfolio alignment, ethics, and trustworthy AI research, development, and integration. AIC will interface with committees and entities, to include but not limited to:

- National AI Initiative Office (NAIIO)
- National Science and Technology Council (NSTC) Select Committee on AI
- NSTC Machine Learning and AI Subcommittee
- Networking and Information Technology Research and Development (NITRD) AI R&D Working Group
- National AI Research Resource (NAIRR) Commission

Goal 4: Strategic Partnership Framework

DOE must remain aware of changing priorities in the highly dynamic AI/ML field. One success factor is through active participation in national and international AI communities:

- Advise/participate in international AI councils
- Foster partnerships with key allies (e.g., G-7)

Goal 5: Workforce Education, Training and Upskilling

DOE must be deliberative and persistent in building a workforce that understands AI's unique requirements, and that can develop responsible and trustworthy AI solutions, partake in an aggregation of human-machine teams, acquire and adopt AI solutions with stewardship, and merge existing solutions into today's business models securely and effectively. The workforce requires a greater understanding of AI components and skills for leaders and practitioners, and this plan considers populations and regions that may not have access to AI education and employment opportunities. AITO will plan and implement workshops, training, and events that inform, educate, and address current and emerging AITO goals. For example, this effort may include activities such as:

- Publishing reports, including how AI can enable efforts on Climate Action
- Preparing and executing AI Leadership and Practitioner training
- Conducting an AI Green Jobs Challenge

SUMMARY

Artificial Intelligence promises to drive the growth of the United States economy, enhance our economic and national security, and improve our quality of life. AI is of paramount importance to maintaining the security of the United States and to shaping the global evolution of AI in a manner consistent with our Nation's values, policies, and priorities, making the US more competitive internationally. The Department of Energy is uniquely positioned to lead the nation in the delivery of AI advancements.

The DOE has developed in the national lab system the resources, infrastructure, networks, scientific excellence, and security expertise that allow it to tackle complex, cross-cutting societal challenges as a matter of routine. The DOE will invest in the intersection of AI and big data with high-performance computing and will improve the reproducibility, transparency, and scalability of AI-based technologies to advance our missions from nuclear security, energy, and science missions to operation and business components in an efficient and cost-effective manner. Properly structured and resourced, this office will coordinate, connect, and advise investments to enable DOE to deliver AI leadership as effectively and rapidly as possible, helping to ensure America's safety, security, equity and prosperity.

REVISION HISTORY TABLE				
ROW#	DOCUMENT VERSION NUMBER	DATE	REVISION DESCRIPTION	REVIEWER
1	1.0	8/31/2021	Revised Program Plan	AITO Team with program office inputs and feedback from NAIIO