DOE Data Days Workshop: HQ Perspectives and Goals

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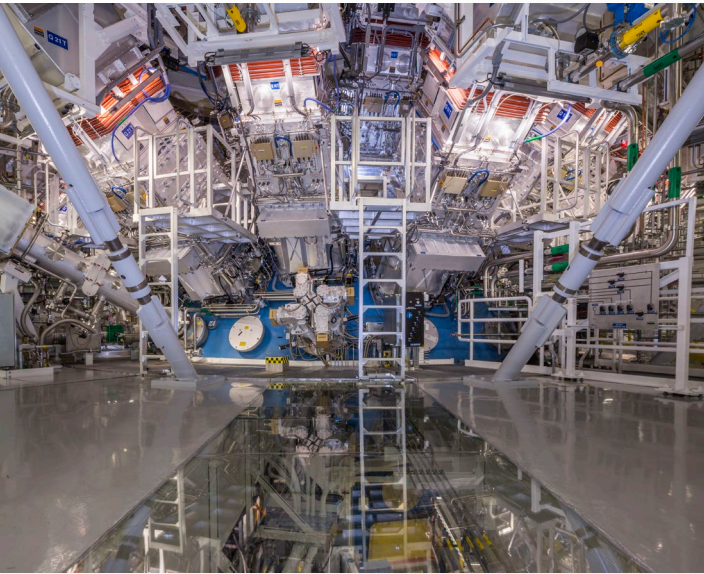
October 24, 2023
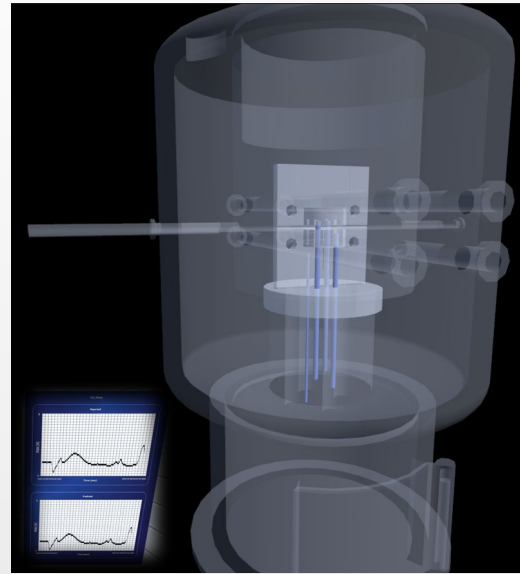
Defense Nuclear Nonproliferation Research & Development Program

National Nuclear Security Administration Mission

Maintaining the Stockpile

Nonproliferation

Counterterrorism and Counterproliferation

Powering the Navy

DNN R&D At a Glance

Our Purpose

DNN R&D is the leading USG organization for the development of advanced technology in support of the USG's nuclear nonproliferation and nuclear security goals
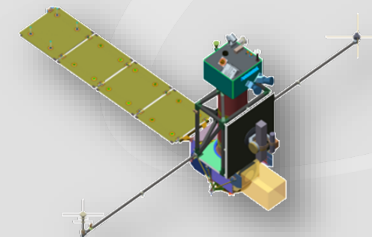

Our Environment

Applications in cooperative and non-cooperative environments that address horizontal and vertical proliferation

Our Mission

Develop technical capability resident at the DOE National Labs, to be leveraged by mission partners for specific applications
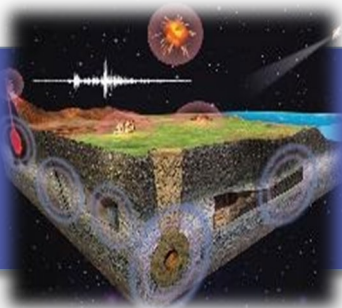
DNN R&D Goals

1. Detect Foreign Weapons Activities
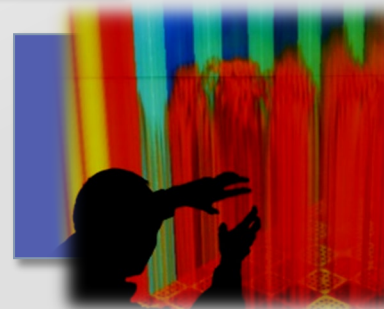Detect, locate & characterize foreign nuclear weapons development activities

2. Increase Nuclear Security
Detect presence, movement & diversion of SNM, including for interdiction, emergency response, safeguard; nuclear forensics; monitor and verify nuclear arms control treaties

3. Detect Nuclear Explosions
Detect and characterize underground, atmospheric, and space-based nuclear detonations

4. Sustain Nonproliferation Capabilities
Enabling infrastructure, S&T, and expert workforce to meet future nonproliferation challenges

Nonproliferation Stewardship Program

Stewarding Foundational Competencies to Meet Future Nonproliferation Challenges

MISSION RELEVANCE
Ensured through collaboration with USG partners

STAKEHOLDER TRANSPARENCY
Competency assessment and strategic planning using clear, rigorous, and open process

TECHNICAL OBJECTIVITY
Investment strategy based on comprehensive analyses

Enabling Infrastructure

Leverage and develop research environments for advancing science and expertise

Enabling S&T

Advance understanding in technical disciplines necessary to enable nonproliferation missions

Expert Workforce

Ensure an enduring workforce with modern knowledge, skills, and experience

Office of Nuclear Detonation Detection (NDD)

Advance U.S. technical capabilities by delivering nuclear detonation detection sensors to the USAF for global monitoring and by improving the means to detect, identify, locate, and characterize any nuclear test or explosion
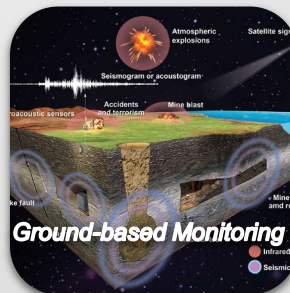
Collaboration with Interagency

Collaboration with Small Business

Global Monitoring of Atmosphere and Space
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Space-based Nuclear Detonation Detection

Characterize Surface-Interacting Bursts

Nuclear Forensics

Ground-based Monitoring

Ground-based Nuclear Detonation Detection

Nuclear Test Detection Testbeds

Office of Proliferation Detection (PD)

Develop U.S. technical capabilities to detect, prevent, counter, and respond to nuclear security threats by investing in research and development at the DOE National Laboratories

Nuclear Weapons Development
- Uranium Production Detection
- Plutonium Production Detection
- Weapons Development Detection
- Other Nuclear Processes

Nuclear Security
- International Safeguards
- Emergency Response
- Warhead Verification and Monitoring
- Near-field Detection
- Radiological Source Replacement

Nonproliferation Enabling Capabilities
- Remote Detection
- Data Science/Artificial Intelligence
- Innovation
- Laboratory Analysis Enhancement
- Nuclear Data

Collaboration with Interagency and international partners

Collaboration with Small Business

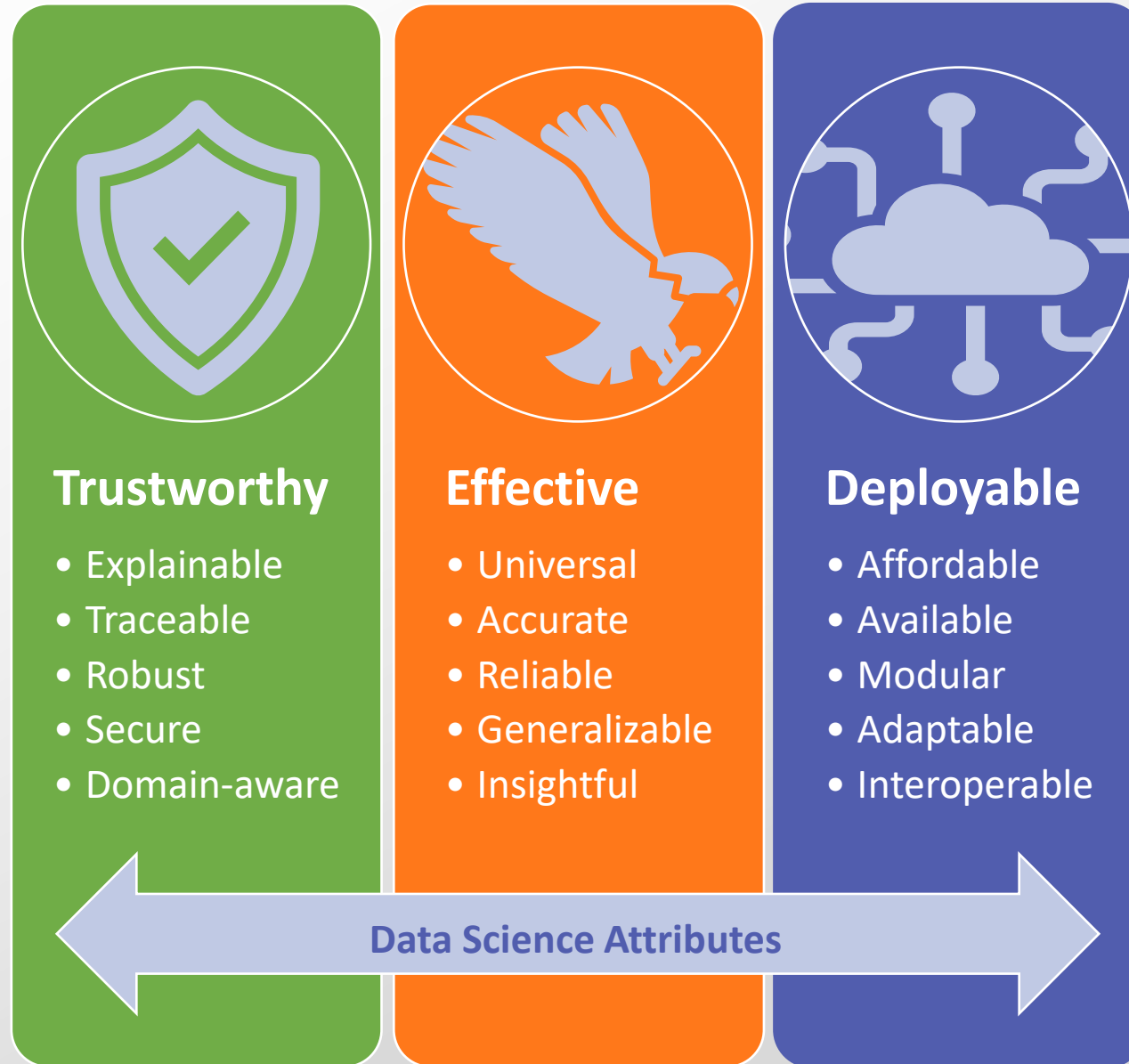*Collaboration with University Program for Nonproliferation*

Trustworthy

- Explainable
- Traceable
- Robust
- Secure
- Domain-aware

Effective

- Universal
- Accurate
- Reliable
- Generalizable
- Insightful

Deployable

- Affordable
- Available
- Modular
- Adaptable
- Interoperable

Data Science Attributes

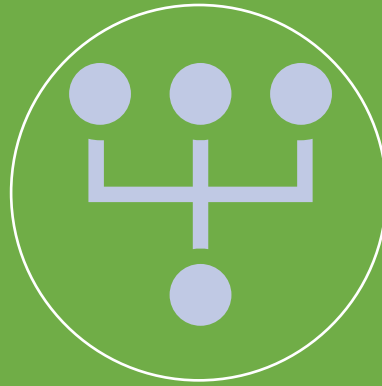*Defense Nuclear Nonproliferation R&D*

Compute
- HPC
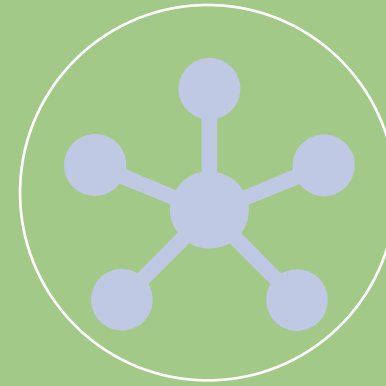- Cloud/cloud-like
- Cluster
- Edge

Data
- Governance
- Infrastructure

Algorithms
- Multimodal data fusion
- Uncertainty quantification
- Domain-aware

Systems
- Multimodal foundation models
- Knowledge discovery
- Computer vision
- User experience

Expertise
- Diversity
- Training
- Education
- Experience
- Community

Data Science Enablers

Defense Nuclear Nonproliferation R&D

PROJECT
ALEXANDRIA

Defense Nuclear Nonproliferation R&D