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Weapons Research Services Division

OVERVIEW AND STRATEGY 2024

Leading the digital transformation of NNSA's Weapons program data, information, and knowledge towards a more agile future.

Los Alamos
NATIONAL LABORATORY

Scott Doebling,
Division Leader
Weapons Research
Services

Message from the Division Leader

This booklet is intended to provide an overview of the Weapons Research Services Division, and an introduction to our strategy for contributing to the safety and security of the United States by supporting the science, engineering, and manufacturing of our national nuclear deterrent.

In WRS, we are the principal stewards of data, information, and knowledge for the Weapons program. Organizationally, we sit inside of the Directorate for Weapons Physics (ALDX), but we serve the broader nuclear weapons mission at LANL, including close collaborations with and support of the Directorates for Weapons Engineering (ALDW), Weapons Production (ALDWP), and Plutonium Infrastructure (ALDPI).

The nuclear Weapons program at LANL has three main objectives: to sustain the existing nuclear deterrent; transform to the deterrent of tomorrow; and assess global nuclear threats. All have a common foundation in the science, technology, and engineering capabilities of the Laboratory, including design, experiments, simulations, manufacturing, qualification, and certification. None are possible without a sustainable investment in a highly trained and specialized workforce who are dedicated to the mission.

In WRS, our contribution to the weapons mission comes in the form of four mission capabilities: data stewardship, knowledge access, information assurance, and mission software. In this booklet, you will see how those four mission capabilities are derived from the weapons mission and are implemented in our groups and centers.

A final note on our vision of the future: the digital transformation of the Weapons program. This encompasses nothing less than a fundamental change to how data, information, and knowledge are managed and shared between people, organizations, and locations. Artificial Intelligence and machine learning (AIML) are utilizing the convergence of mathematics, computing, and data to revolutionize all aspects of information technology. Digital transformation will ensure our enterprise has the agility to serve the rapidly evolving security needs of the nation and the world. This is the future of the national nuclear security enterprise. Our overarching goal is to help forge its path and expand its capabilities.

Scott Doebling, Division Leader
Weapons Research Services

Contents

Who we are

Weapons Research Services are the principal stewards of data, information, and knowledge for the Weapons program.

Our Mission

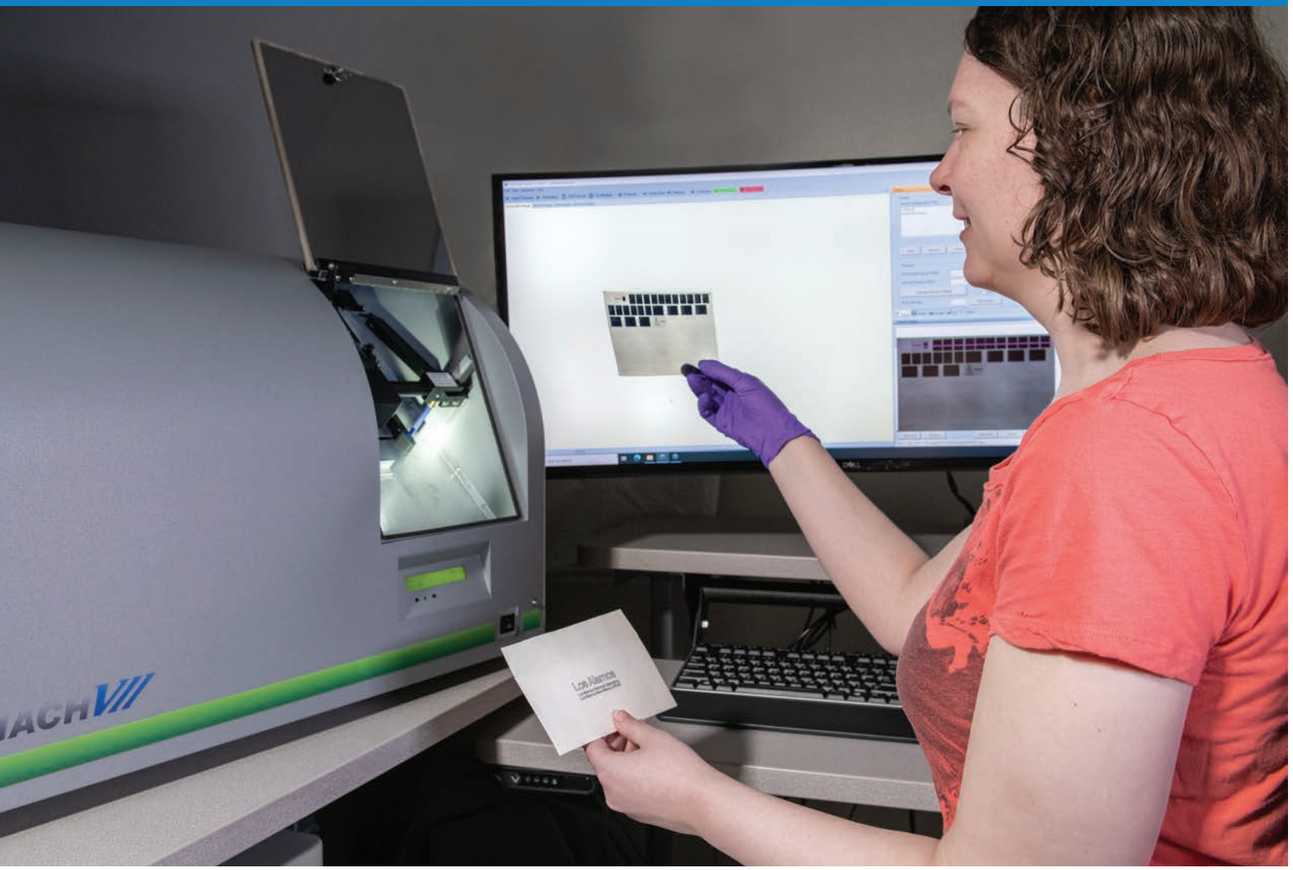
Empower the NNSA weapons mission through excellence in data stewardship, knowledge access, information assurance, and mission software.

Our Vision

Lead the digital transformation of NNSA's Weapons program data, information, and knowledge towards a more agile future.

Our Values

- Teamwork & respect
- Safety & security
- Collaboration & customer service



Agility is the key to the future US nuclear weapons complex.

The LANL nuclear Weapons program has three main objectives:

1. Sustain the existing nuclear deterrent. This objective drives activities including annual assessment, weapons surveillance, and scientific research such as material aging.

2. Transform to the deterrent of tomorrow. This objective drives activities such as the design, engineering, and production work supporting the W93 warhead, as well as LANL's significant national contribution in the manufacturing of plutonium pits.

3. Assess global nuclear threats. This objective drives activities such as capabilities in nuclear forensics, assessment of international threats, and support of national efforts in nonproliferation.

To support urgent needs and rapidly changing requirements, the design, experiments, simulations, manufacturing, qualification, and certification activities that are needed to support these mission objectives require an infrastructure and workforce that are increasingly agile.

Agility is key because of rapidly changing requirements in response to rapidly changing geopolitics, and because we will always be in search of efficiencies to allow us to deliver more capabilities and products in a cost-effective manner.

Agility is enabled by Digital Transformation, with a vision of:

USER EXPERIENCE

DATA STEWARDSHIP

Objectives of superior User Experience

- Ensure that all WRS services are "user centered," meaning that user experience is prioritized above provider experience.
- Improve time to solution and product acceptance for mission work. Avoid rework and duplication of effort.
- Reduce complexity of locating and accessing data, information, and knowledge of interest.
- Reduce mistakes due to inaccurate, ambiguous, unavailable, duplicated, or out-of-date information.
- Respond to customer requests in a timely and accurate manner.

OUR VISION FOR DIGITAL TRANSFORMATION

Objectives of superior Data Stewardship

- Ensure strong Data Governance that supports mission needs and institutional requirements.
- Improve the findability, accessibility, interoperability, and reusability of data, information, and knowledge assets.
- Prepare data, information, and knowledge content and infrastructure to empower all facets of the Nuclear Security Enterprise to utilize AIML technologies.
- Improve speed and reliability of data and information sharing across organizations and between Nuclear Security Enterprise sites.
- Ensure stability, reliability, quality, and integrity of data and data systems.
- Maintain compliance to security requirements while maximizing efficient operations.

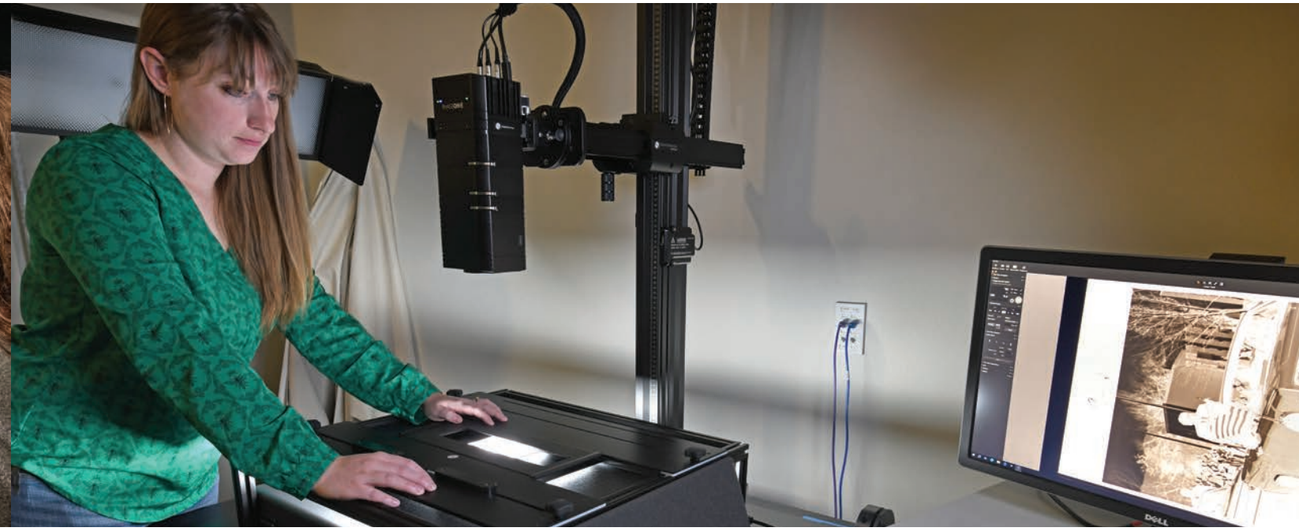
Our vision for digital transformation: mission needs and goals

As the scope and scale of the WRS mission evolves to meet the broadening needs of the LANL and larger NNSA Weapons programs, in the context of new developments in data and research technologies, we face several challenges in the path of our objectives in user experience and data stewardship:

USER EXPERIENCE

CHALLENGE	DESIRED STATE
Access control to Weapons program classified data, information, and knowledge is fragmented and inconsistent.	Implement common Need to Know and access protocols across the Weapons program and the Nuclear Security Enterprise.
New users have difficulty accessing and using WRS data systems.	Provide single source of access control and user information for WRS data systems.
Information in separate data systems is difficult to identify, locate, and retrieve consistently.	Provide consistent access and retrieval of data, information, and knowledge assets across systems.
Researchers struggle to find relevant information among the disparate repositories of historical data.	Using generative Artificial Intelligence (AI) large language models to retrieve results instantaneously and vastly improve discovery and research for the Weapons programs.

OUR VISION FOR DIGITAL TRANSFORMATION



DATA STEWARDSHIP

CHALLENGE	DESIRED STATE
Mission data and software tools are not managed consistently across Weapons program and Nuclear Security Enterprise sites.	Consistent implementation of best-practice data governance and software tools across the enterprise.
Historical records are disorganized and many exist only as physical media.	Historical records stored and available digitally with informative metadata. Leverage Artificial Intelligence (AI) and Machine Learning (ML) to automate the cataloging of Weapons program data, information and knowledge.
Experimental and reference data are managed locally and/or by individual contributors in different systems.	Centralized repository for experimental and reference data supporting the Weapons program from across the Nuclear Security Enterprise.
Operational technology introduces risk due to cyber-physical security threats.	Standardized analysis process for new equipment and software to identify and mitigate security risk.

Our vision for digital transformation: solutions

We are actively developing solutions to enable the digital transformation of the Weapons program to a more agile future.

WEAPONS PROGRAM DATA GOVERNANCE COUNCIL

- Ensuring that there is institutional commitment to high-quality data governance and data stewardship via a policy-making body of senior managers.

NATIONAL SECURITY DATA SOLUTION

- Creating an institutional repository for Weapons program experimental and reference data, and the infrastructure to sustainably build and manage its collections.

ENDURING KNOWLEDGE BASE

- Empowering broader accessibility of the classified nuclear weapons data and sensitive technical information with lasting relevance for stockpile stewardship and weapons mission capabilities.

DATA VIRTUALIZATION FOR THE DIGITAL THREAD

- Integrating, managing, and delivering data from disparate sources to a broad range of users across the Weapons program and collaborators, with connectivity to improve findability and reduce time to solution.

DIGITAL COLLECTIONS SERVICES

- Creating and managing classified and unclassified digital information and knowledge assets to serve the needs of the Weapons program.

NATIONAL SECURITY RESEARCH CENTER SERVICES

- Helping Weapons program researchers access the data, information, and knowledge that they need in a timely and accurate manner.

TITAN ON THE RED

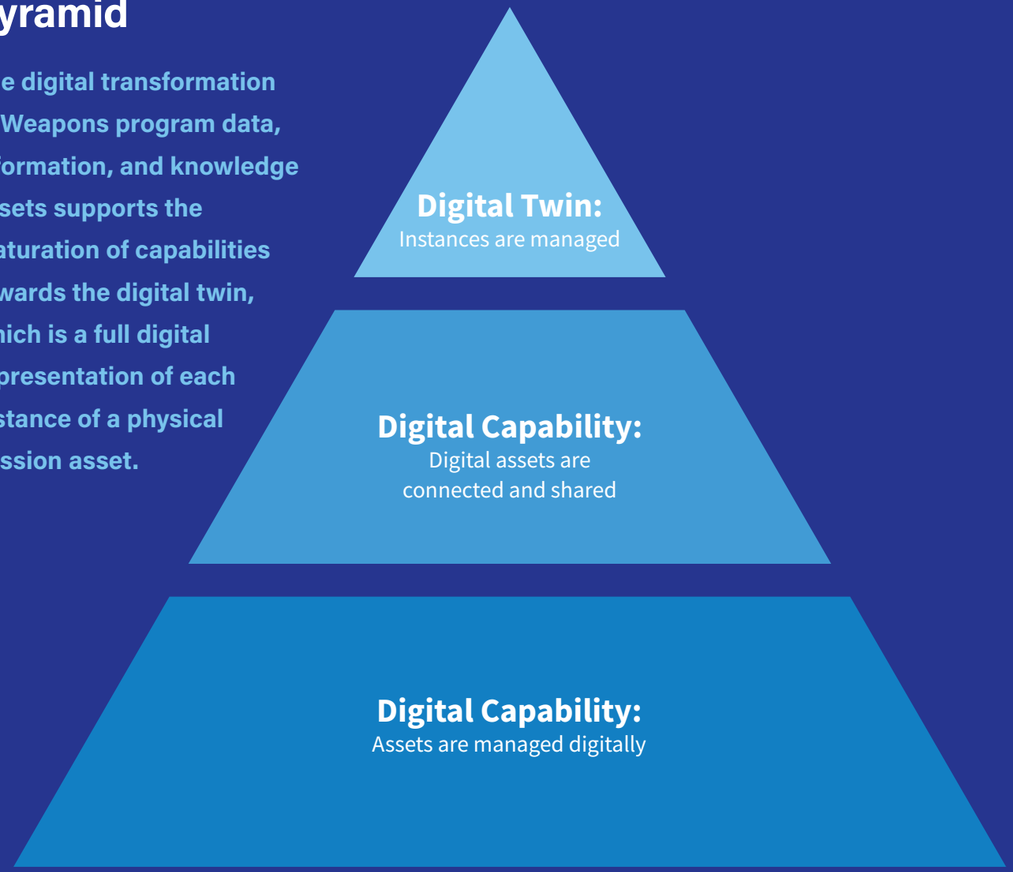
- Using AI/ML through natural-language processing to automate cataloging and searching Weapons program data, information, and knowledge across a broad range of data systems.

WEAPONS LEARNING CENTER

- Developing tools and services to steward weapons learning across the Weapons program.

The Digital Transformation pyramid

The digital transformation of Weapons program data, information, and knowledge assets supports the maturation of capabilities towards the digital twin, which is a full digital representation of each instance of a physical mission asset.



WRS: The key capabilities that enable us to fulfill the vision

We are actively developing solutions to enable the digital transformation of the Weapons program to a more agile future.

DATA STEWARDSHIP

Manage the governance, growth, and curation of Weapons program data, information, and knowledge assets.

INFORMATION ASSURANCE

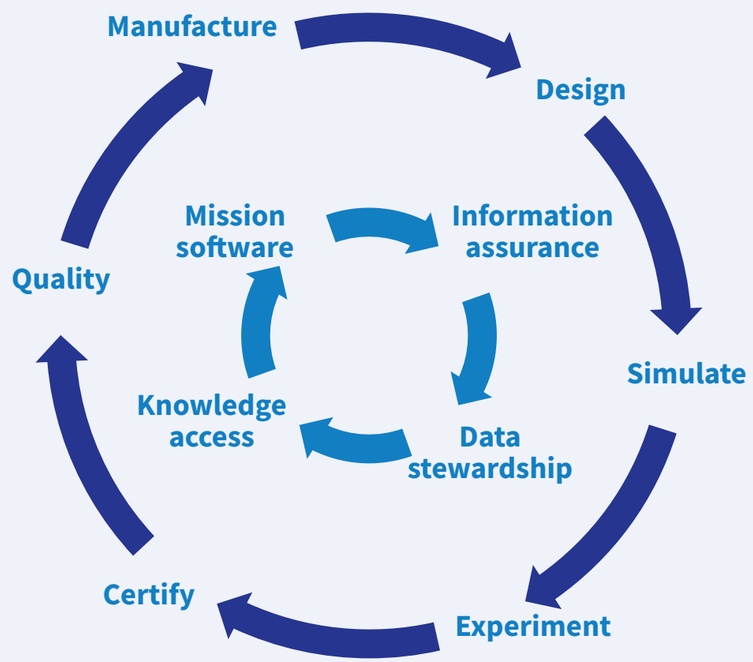
Provide mission-focused network accreditation, risk management, and controls for information and operational technology.

KNOWLEDGE ACCESS

Improve the discoverability and utilization of data, information, and knowledge resources for mission work and competency development.

MISSION SOFTWARE

Manage critical engineering, research, and mission operations applications for the Nuclear Security Enterprise.



Our centers empower the integration of capabilities and organizations

We are actively developing solutions to enable the digital transformation of the Weapons program to a more agile future.

NATIONAL SECURITY RESEARCH CENTER

- The Lab's classified library supporting weapons researchers.
- Preserving and safeguarding nuclear knowledge for tomorrow's discoveries.
- Providing state-of-the-art digitization services and best-practice collections management.

NUCLEAR WEAPONS CYBER ASSURANCE LABORATORY

- Ensuring security of research and data management.
- Developing and applying cyber-physical assessments of DDW operational technology.
- Providing a research foundation for cyber assurance.

CENTER FOR THE WEAPONS DIGITAL ENTERPRISE

- Managing Data Governance and the Enterprise Data Architecture across the Weapons program.
- Using Data Virtualization and Digital Threads to connect relevant information across data systems.
- Preparing for Artificial Intelligence Machine Learning applications.

WEAPONS LEARNING CENTER

- Build the knowledge and learning environment for the Weapons program.
- Identify mission-focused knowledge and learning needs, resources, and gaps.
- Build knowledge and learning tools and resources to accelerate time to competency for DDW staff.

"What is a WRS center?"

Integrates capabilities and funding sources to achieve strategic objectives.

Coordinates work across organizations, projects, and programs.

Groups focus on capabilities & expertise.

Centers focus on strategy & strategic outcomes.

Presents a common external interface for communication.

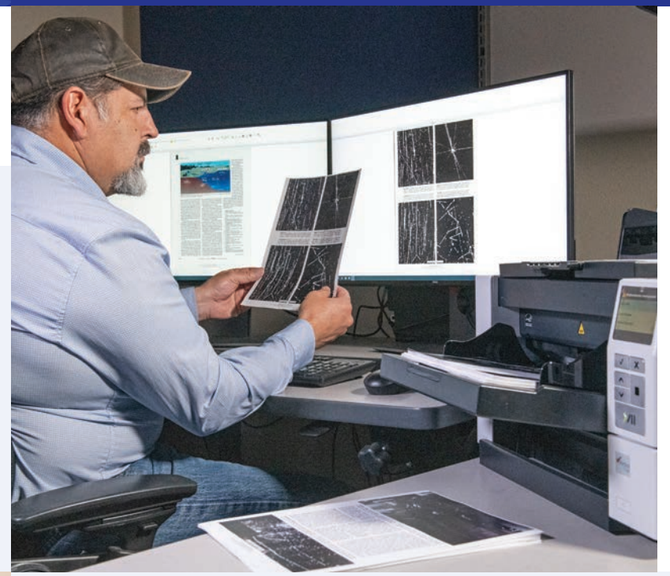
Our groups develop and maintain capabilities and expertise

NSRC MISSION SUPPORT GROUP (WRS-NSRC-MS)
Research Librarians, Archivists, Collections Management, Knowledge Management, Historians

NSRC DIGITAL COLLECTIONS GROUP (WRS-NSRC-DC)
Digital Archivists

SECURE NETWORKS & ASSURANCE GROUP (WRS-SNA)
Information System Security, Developer Ops, System Ops, Scientific Software Development & Assurance

WEAPONS MISSION TECHNOLOGY GROUP (WRS-WMT)
Scientific Software Development, Database Administration, Digital Engineering



Our data systems: WRS manages a wide variety of the data, information, and knowledge assets of the Weapons program in several digital storage repositories

ONLINE VAULT
The main repository of the Enduring Knowledge Base for weapons design and production.

PDMLINK
Configuration management and documents of record for design and system engineering.

NATIONAL SECURITY DATA SOLUTION (NSDS)
An enterprise database for Weapons program experimental and reference data.

GRANTA MI
An enterprise database of material properties.

COMPNT
A repository of procedures for weapons production.

WEAPONS VIDEO SERVICES
Video content supporting the Enduring Knowledge Base, weapons learning, knowledge management, and more.

TITAN ON THE RED
An automated natural-language system for cataloging and searching Weapons program data, information, and knowledge assets across a broad range of data systems.

ATLASSIAN SUITE
Tools for Weapons program collaboration and developer operations, including Confluence, Jira, and Bitbucket.

Our collaborators & customers

PROGRAMS

- Product Realization Integrated Digital Enterprise (PRIDE) (NA-12)
- Engineering and Technology Maturation Archiving and Support (NA-11)
- Pit production (NA-19)
- Advanced Simulation and Computing (NA-11)
- Office of Experimental Sciences (NA-11)
- Nuclear Enterprise Assurance (NA-12)

LANL ORGANIZATIONS

- Weapons Physics, Weapons Engineering, Weapons Production, Plutonium Infrastructure
- Deputy Director's Office for Science, Technology and Engineering (DDSTE)
- Global Security

EXTERNAL PARTNERSHIPS

- Defense Threat Reduction Information Analysis Center (DTRIAC)
- Universities: UNC Charlotte, Auburn, Purdue, Texas A&M

THE NATIONAL NUCLEAR SECURITY ENTERPRISE

Sandia National Laboratories

Lawrence Livermore National Laboratory

Nevada National Security Site (NNSS)

Y-12 National Security Complex

SRNL Savannah River National Laboratory

Pantex

Kansas City National Security Campus (KCNSC) managed by Honeywell FM&T

Acknowledgments

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Simplifying and Improving the User Experience

Los Alamos NATIONAL LABORATORY
TRIAD National Security, LLC
NNSA National Nuclear Security Administration

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