NNSA Infrastructure Challenges

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NNSA SAFETY, INFRASTRUCTURE & OPERATIONS

A VAST AND COMPLEX ENTERPRISE

Lawrence Livermore National Laboratory

Nevada National Security Site

Los Alamos National Laboratory

Sandia National Laboratories

Pantex Plant

Kansas City National Security Campus

Y-12 National Security Complex

Savannah River Site

THE CHALLENGE: AGING & DECLINING INFRASTRUCTURE

AGE OF FACILITIES
- 30%
- 24%

■ 60 + years ■ 40-60 years

EXCESS FACILITIES
- 12%

CONDITION OF FACILITIES
- 21%
- 41%

■ Inadequate ■ Substandard
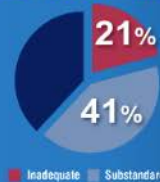
Vision
Safely operate and modernize our enterprise to meet demands now and in the future.

Mission
Maintain, Operate, and Modernize NNSA Infrastructure in a safe, secure, and cost-effective manner to enable program results.

41,000 LABORATORY & PLANT EMPLOYEES

2,000 miles of roads
NEARLY THE DRIVING DISTANCE FROM DC TO LOS ALAMOS

TRACK **400,000** METRIC TONS OF NUCLEAR MATERIAL TRANSACTIONS

safety for **400** nuclear facilities

2,160 square miles of land area
ABOUT THE SIZE OF DELAWARE

36 Million SQUARE FEET OF FACILITY SPACE
(~six Pentagons worth)

15.2 MILLION FT³ OF HAZMAT
ENOUGH TO FILL ~15 WASHINGTON MONUMENTS

9.1 Trillion BTUs ANNUAL ENERGY CONSUMPTION
enough to power ~250,000 homes for one year

JULY 2015

2

NONPROLIFERATION

EMERGENCY RESPONSE

Office of Safety, Infrastructure, and Operations

OTHER DOE PROGRAMS

NAVAL REACTORS

INTERAGENCY: DoD, DHS, DNI

DEFENSE PROGRAMS

Challenges

- NNSA's infrastructure is too big, too old and too brittle
- Failures are increasing in frequency, severity and unpredictability
- Infrastructure risks become safety and program risks

Strategic Objectives

- Build an operating model that is repeatable, predictable, transparent, effective, and efficient
- Arrest the declining state of NNSA infrastructure by using innovative tools
- Enhancing infrastructure strategic planning
- Manage risks in a holistic, enterprise-wide approach

Progress

- Created new, data-driven, risk-informed management tools
- Established Master Asset Planning process
- Increased Maintenance/Recapitalization funding and begun to achieve improvements

- Risk and inefficiency posed by poor condition of operating and excess facilities

- Failures are increasing in frequency, severity and unpredictability

  - PX: High Pressure Fire Loop (HPFL) failure (July 2016)

  - LANL: Diesel Engine for Fire Water Pump failure at PF-4 (August 2016)

  - Y-12: Kathabar dehumidification unit in Beta-2 taken out of service due to failed exhaust duct clamp (September 2016)
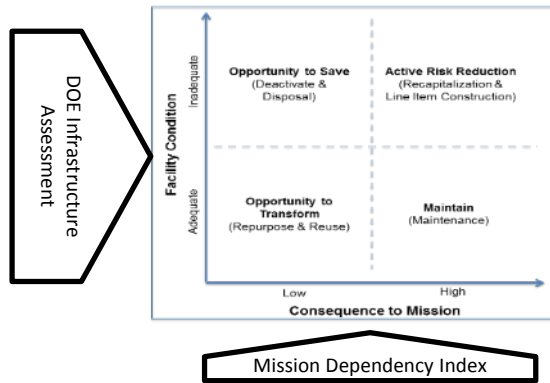
- Infrastructure risk becomes safety & program risk

Bays & Cells High Pressure Fire Loop Lead-in Breaks 1995-2015
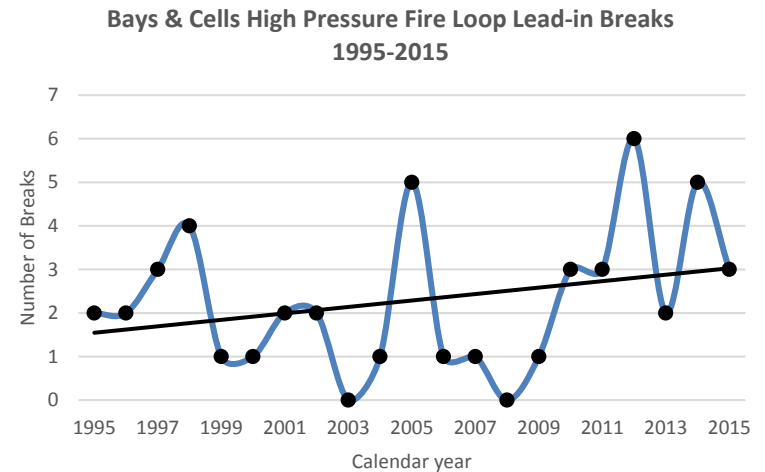
LANL Diesel Engine Failure

Y-12 Kathabar System Failure

NNSA infrastructure is too big, too old & too brittle

Enterprise Risk Management

Correlates consequence with probability; facilitates data-driven, risk-informed infrastructure investment decisions

Mission Dependency Index
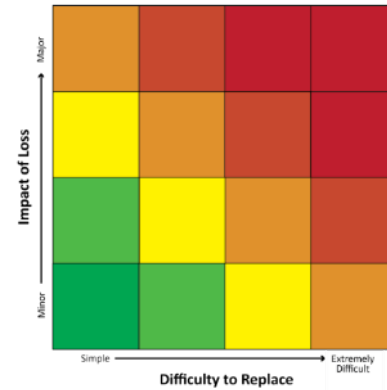
Measures "consequence;" combines the impact to mission if the asset were lost, the difficulty to replace the asset & interdependency of assets to calculate a score from one to 100
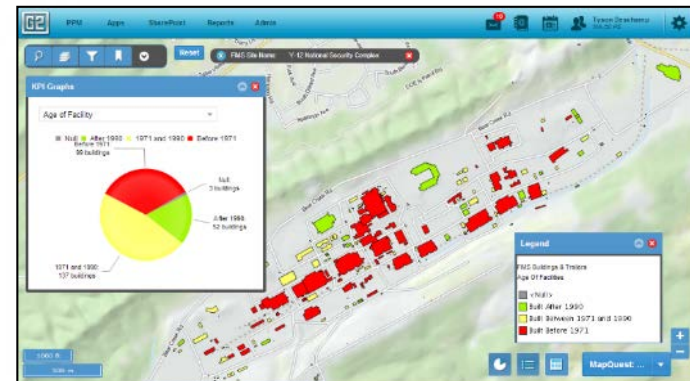
BUILDER
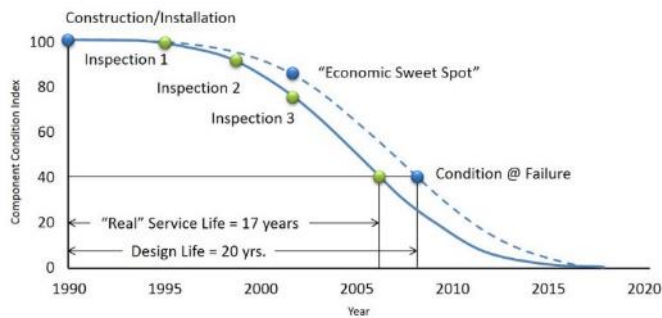
Sample Failure Curve

Measures "probability;" knowledge based condition assessment tool that can compare inspection data against known failure curves to predict system wear & identify the optimal time to invest

G2

Award-winning program management system captures & analyzes key data in a holistic manner

- The BUILDER Sustainment Management System (SMS) is a web-based software application developed by the U.S. Army Corps of Engineers (USACE), Engineer Research and Development-Construction Engineering Research Laboratory (ERDC-CERL) to help make critical asset management decisions and provide investment guidance to:

  - *Objectively* assess infrastructure across the enterprise
  - *Consistently* analyze investment requirements and prioritize scarce resources
  - *Track* investments to ensure key stakeholder requirements are addressed
  - *Forecast* the investment requirements for budget defense and course of action analysis

PREDICTING OUTCOMES OF INVESTMENTS IN MAINTENANCE AND REPAIR OF FEDERAL FACILITIES

NATIONAL RESEARCH COUNCIL OF THE NATIONAL ACADEMIES

- BUILDER is a government-owned product that is also available commercially that focuses on life-cycle infrastructure management and introduces the concept of performing Knowledge-based condition assessments.

G2
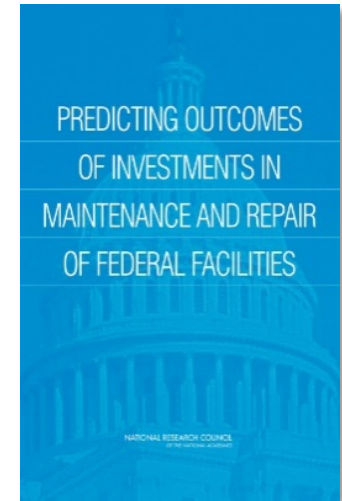
- G2 is used by a number of NNSA organizations to manage over $2B annually

- G2 is a custom-developed system designed to integrate and manage data at the NNSA Enterprise/Program level

    - Provides electronic change control, business rules and automatic notifications

    - Geo spatial data for maps, diagrams, photos, inventories and condition

    - Implements Enterprise Risk Management for prioritizing and analyzing investments

- G2 can electronically transfer data to/from existing project level systems (e.g. MS Project, Primavera P6, Oracle, SAP, etc.) to increase data sharing with minimal effort

- Encrypted access control with internal permissions and disaster recovery (UCNI, OUO and C-FGI-MOD)

- Includes mobile phone and tablet apps

Fact Summary
- ❖ Agile development with new features released every 8 weeks
- ❖ Over 10 years of operational experience (Started in 2007)
- ❖ ~900 users across HQ, Field Offices, NNSA & non-NNSA sites
- ❖ Project Awards
    - 2010 – PMI
    - 2015 – NDIA/AFEI
- ❖ Allocation of system management functionality
    - 65% Scope
    - 15% Schedule
    - 20% Financial/Budget

MASTER ASSET PLAN (MAP)

- The MAP is an enterprise-integrated, risk-informed, long-range infrastructure plan

- MAP uses G2 capabilities to analyze key data, visualize the interconnectivity of facilities, and evaluate mission requirements and our infrastructure's ability to support them

- The MAP process will provide several benefits:

  - A framework to align near-term decisions with long-term vision by linking planning outputs to programming and budgeting inputs

  - Identify the implications of mission requirement to ensure infrastructure readiness

- Completion of 1st MAP scheduled for end of March 2017

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Master Asset Plan (MAP)

March 2017

Safe Operations
Effective Infrastructure
Enterprise Services
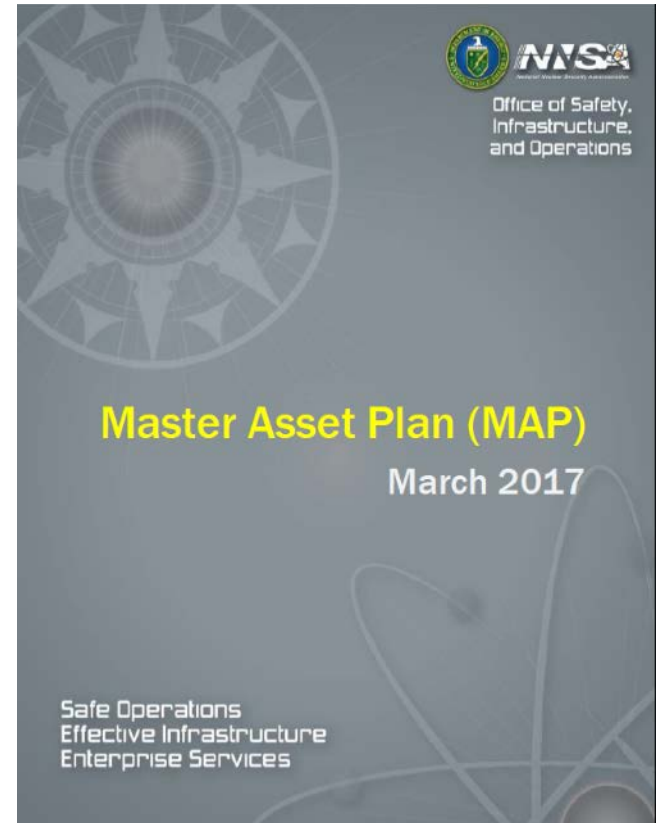
Program Management Plan
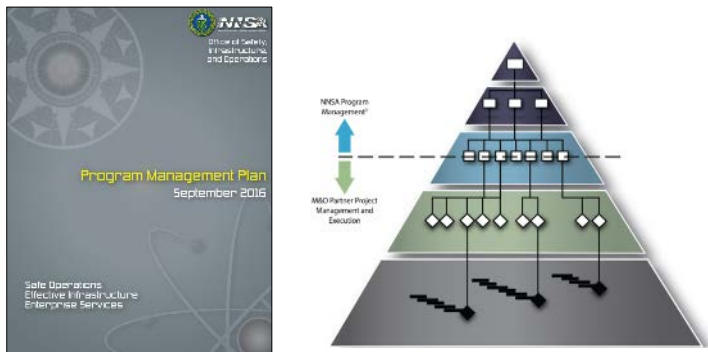
Defines program management requirements; including risk-based approach to creating IPL

Enterprise Risk Management
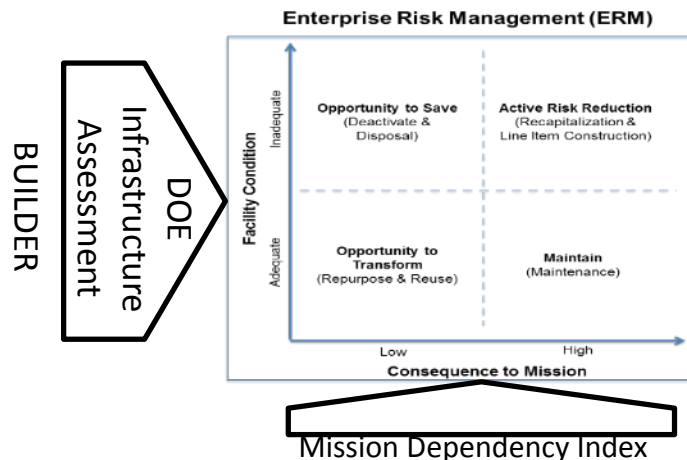
Integrated Priorities List (IPL)
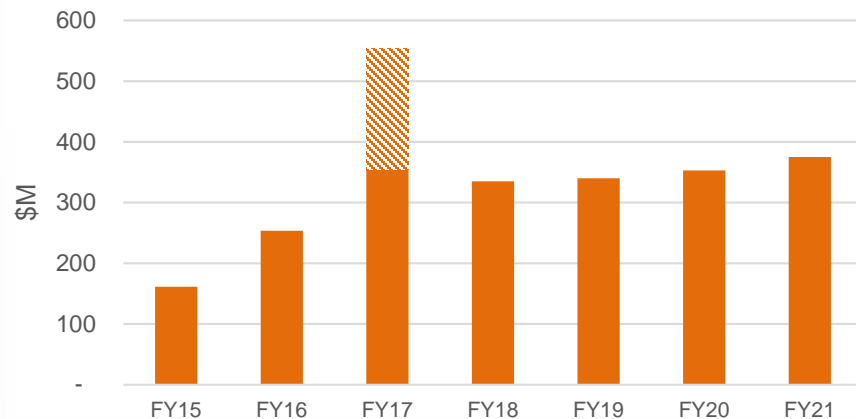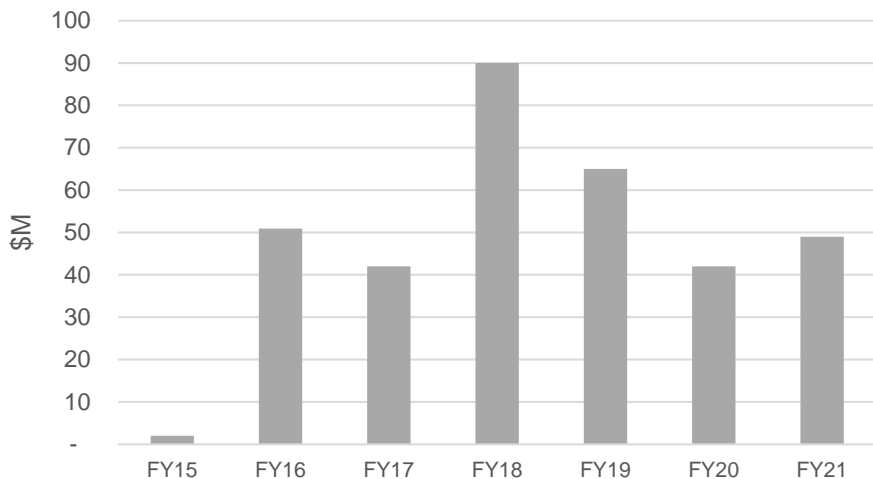

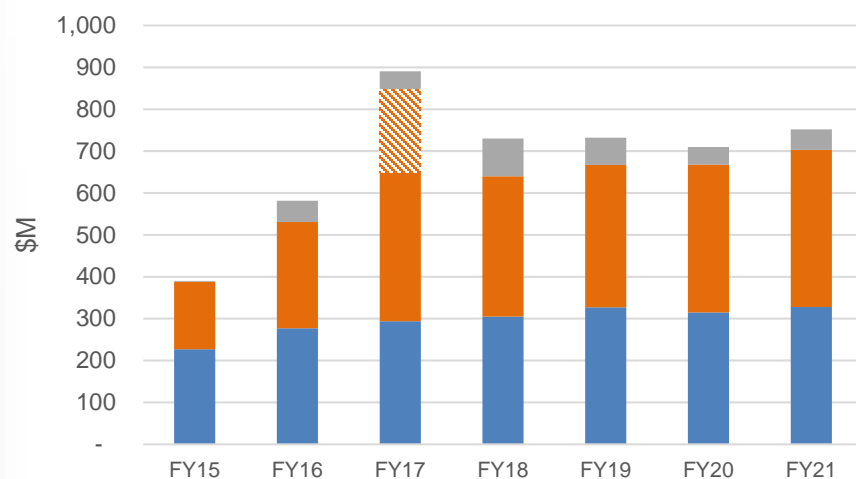## Performance Metrics

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Maintenance

Recapitalization
Includes $200M in FY 2017 for Bannister

Construction

Total

Before

After

Y-12 Bldg. 9204-2 Oven Room Ceiling Repair

Pantex Bay/Cell and Lead In/Flame Detection System

NNSS Lead In Line Replacements
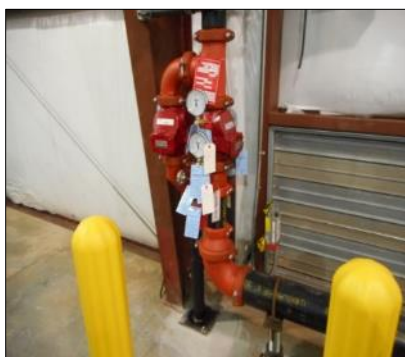
SNL Tonopah Main Distribution Hub

Before   After

LANL Casa 3 Demolition

SRS Fire Suppression Modifications

LLNL B131 Chiller Replacement

We have challenges

- NNSA's infrastructure is too big, too old and too brittle
- Failures are increasing in frequency, severity and unpredictability
- Infrastructure risks become safety and program risks

Our Strategic Objectives focus on those challenges

- Building an operating model that is repeatable, predictable, transparent, effective, and efficient
- Arresting the declining state of NNSA infrastructure by using innovative tools
- Enhancing infrastructure strategic planning
- Modernize NNSA facilities/equipment and halt the growth of Deferred Maintenance

We are making progress

- Using new, data-driven, risk-informed management tools
- Producing first Master Asset Plan end of March
- Increased Maintenance/Recapitalization funding and begun to achieve improvements