Program Management Improvement Team: A Best Practice Based Approach to Process Improvement and Program Governance at the National Nuclear Security Administration

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ABSTRACT

The National Nuclear Security Administration (NNSA), a semi-autonomous agency within the U.S. Department of Energy, applies technical capabilities to global nuclear security challenges. NNSA's strategic goals are to maintain and enhance the safety, security, reliability and performance of the U.S. nuclear weapons stockpile without nuclear testing; work to reduce global danger from weapons of mass destruction; provide the U.S. Navy with safe and effective nuclear propulsion; and respond to nuclear and radiological emergencies in the U.S. and abroad. NNSA's Office of Safety, Infrastructure and Operations (NA-50) plans, directs and oversees the maintenance, operation and modernization of infrastructure and facilities at eight NNSA sites. With an annual budget of approximately $1.5 billion, NA-50 plans, funds, directs and oversees many projects ranging in size and complexity each year.

In September 2015, NA-50 established a Program Management Improvement Team (PMIT) to enhance program, portfolio and project performance through the identification, development and sharing of best practices and to help ensure the achievement of cost-effective, timely, measurable and quality results in support of the NNSA mission. The PMIT is comprised of a small cadre of private industry program management experts who meet with NA-50 federal program managers quarterly to discuss and share successful leading-edge program management practices. This paper will describe the purpose, activities and results to date of the NNSA's PMIT.

SCOPE OF NNSA'S INFRASTRUCTURE RESPONSIBILITIES

The NNSA enterprise consists of more than 6,000 facilities located at eight sites in seven states. The primary NNSA sites are:

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- Kansas City National Security Campus (Missouri)
- Lawrence Livermore National Laboratory (California)
- Los Alamos National Laboratory (New Mexico)
- Nevada National Security Site (Nevada)
- Pantex Plant (Texas)
- Sandia National Laboratories (New Mexico)
- Savannah River Site (South Carolina)
- Y-12 National Security Complex(Tennessee)

The$12.9 billion FY 2017 President's budget request for the NNSA represents an increase of $360 million, about 3 percent over the FY 2016 appropriations level. With an annual budget of approximately $1.5 billion, NA-50 is responsible for enabling safe operations, ensuring effective infrastructure and providing enterprise services to NNSA programs and national laboratories, plants and sites to meet the 21st Century needs of the NNSA Nuclear Security Enterprise now and in the future.

NNSA INFRASTRUCTURE PROJECTS, PROGRAMS, AND PORTFOLIOS

NA-50 plans, directs and oversees the maintenance, operation and modernization of infrastructure and facilities that comprise a complex enterprise. With over $50 billion in real property assets, 41,000 employees, 36 million square feet of buildings including 400 nuclear facilities and 2,000 miles of roads on 2,160 square miles of land, the scope of NNSA infrastructure is vast. This enormous effort requires the planning and execution of hundreds of projects within a smaller number of programs, all managed within portfolios of facilities. These facilities include production, fabrication, testing, and secure transportation and storage of nuclear/radioactive materials and equipment, plus very advanced laboratory, computing and communications facilities.

NNSA has the complex challenge of safely operating and modernizing the nuclear security enterprise, a challenge made more difficult as NNSA's infrastructure is failing at an increasing frequency due to its age and condition. Half of NNSA's facilities are over 40 years old, 30 percent date to the Manhattan Project era of 70 years ago, and 12 percent are excess to current needs. Nearly two-thirds of NNSA's aging and brittle infrastructure is less than adequate to meet mission needs. Deferred maintenance is at an all-time high of $3.67 billion, posing an increasingly unacceptable risk to the safety of workers, the public and the environment. NNSA's capability to achieve programmatic goals obviously depends upon safe and reliable infrastructure.

NNSA INFRASTRUCTURE MANAGEMENT CHALLENGES AND SOLUTIONS

NNSA's sites are managed by experienced private contractor companies, in some cases in partnership with major universities, under the direction of Federal Government personnel in NNSA's Headquarters and Field Offices. The major infrastructure management challenges include:

- The safety of employees, the general public and the environment related to both active and excess facilities, some of which are contaminated
- Allocation of available funds to satisfy conflicting priorities between the overall NNSA mission demands and enterprise safety and operational demands
- Aging facilities, with some buildings dating to the 1940s, combined with a large backlog of deferred maintenance across all sites

The analytical methods and performance measures NNSA used for the 70 years prior to 2015 to drive infrastructure investment decisions were based on financial metrics that did not capture the relative importance or actual condition of facilities. Furthermore, these investment decisions were stove-piped to individual sites, and in some cases individual facilities, resulting in projects that were prioritized based on site-specific criteria rather than being screened systematically at the enterprise level. While this approach did result in maintenance and upgrades for some facilities, it did not factor in or prioritize supporting infrastructure and facilities that are critical to the mission. The deferred maintenance on critical facilities added fragility to mission objectives and the need to find better ways of performing the right maintenance on the right facilities.

NNSA's long term goals include ensuring that infrastructure investments are prioritized at an enterprise level to enable mission results and reduce enterprise risk. In short, the current strategy is to fully consider the long term health of NNSA as an interdependent unit rather than following the historical, sub-system (site-by-site) approach. An enterprise view considers the health of the organization when making investments and NNSA needed to change the processes and develop new tools to support an enterprise-wide prioritization model.

In 2015 NNSA developed innovative management tools to facilitate a data-driven process that leads to risk-informed investment decisions at the enterprise level. These efforts include deploying, for the first time, an NNSA infrastructure Enterprise Risk Management (ERM) methodology that better measures the "consequence to mission" and the "likelihood of the consequence occurring." To measure "consequence," NNSA created a Mission Dependency Index (MDI), combining the impact to mission

if the asset were lost, the difficulty to replace the asset, and the interdependency of assets, to calculate a score from 1 to 100. To measure "the likelihood of the consequence occurring," NNSA is deploying the knowledge-based condition assessment tool BUILDER to compare inspection data against known failure curves to predict system wear and identify the optimal time to invest. The keystone to NNSA's ERM is the G2 Enterprise Management Information System, which NNSA developed to capture and analyze its enterprise information and topology.

NNSA'S AWARD-WINNING G2 ENTERPRISE MANAGEMENT INFORMATION SYSTEM

The Project Management Institute (PMI®) awarded the initial version of the G2 system a Distinguished Project Award for 2010[7] (the first ever bestowed on a government IT project), in recognition of the speed with which it was created, the uniqueness of the "Agile" development methods used in its creation and refinement, and the management usefulness of the resulting information system. Over the next five plus years the G2 System continued its advanced development and its application to the total NNSA enterprise. It is noteworthy that the Association for Enterprise Information (AFEI) also awarded its 2015 Excellence in Enterprise Information prize to NNSA for the G2 System.[8]
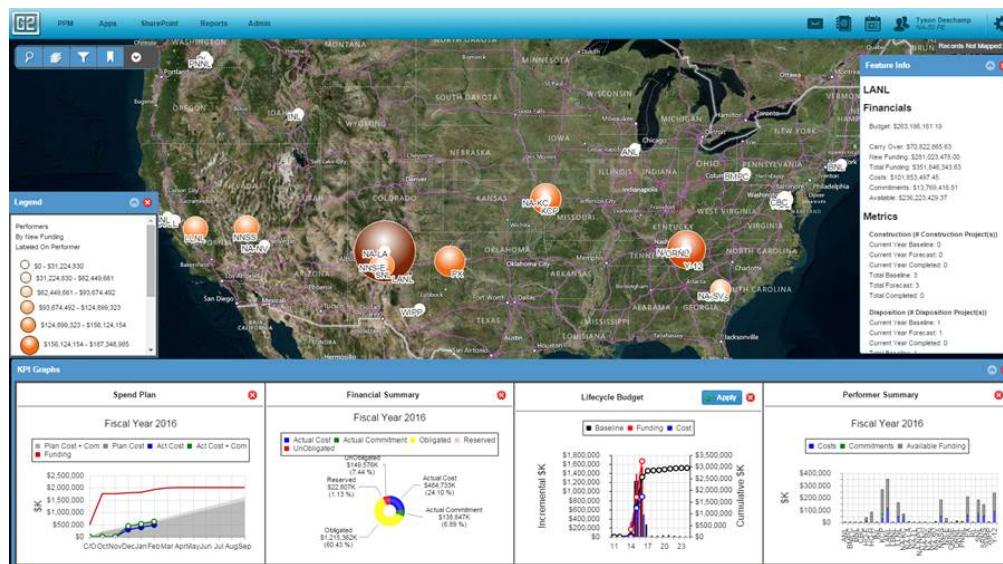

Figure 1. NASA's G2 Enterprise Management Information System uses best-in-class business practices to prioritize and manage scope, schedule, and cost.

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[7] http://www.pmi.org/en/About-Us/Press-Releases/PMI-Honors-National-Nuclear-Security-Administration.aspx

[8] NNSA press release, dated Feb 17, 2016

It is a monumental effort to change how a $1.5 billion per year program is managed. The G2 System has helped NNSA revolutionize its infrastructure management and decision-making processes. Each month, G2 enables NNSA to review and analyze data in new and holistic ways. People are empowered, processes are innovative, and technologies are revolutionized. Using the Agile approach, the G2 System is upgraded every 8 weeks to incorporate new and more powerful features.

For example, the G2 project prioritization tool resulted in a new, innovative process to deliver value and ensure NNSA meets long-term/strategic goals to arrest the declining state of its infrastructure. NNSA reengineered its Recapitalization program management processes, resulting in major improvements in performance and safety. Before G2, it took NNSA months to provide Congress with a complete picture of its Recapitalization program projects. Using G2, NNSA now produces clear, complete and accurate quarterly reports that are sent to Congress within days of each quarter's end. NNSA developed a risk-based Recapitalization prioritization method that the program applied for the formulation of the FY 2017 budget. This was important because NNSA only had enough funds for one-third of the proposed infrastructure projects and needed to make sure the highest priority projects received the limited funds.

THE NA-50 PROGRAM MANAGEMENT IMPROVEMENT TEAM (PMIT)

Based on a previous successful experience using independent program management experts, the NNSA Deputy Associate Administrator for Infrastructure established the PMIT in 2015 to support NA-50's management improvement initiatives. In order to highlight executive sponsorship and to ensure enterprise-wide support, the PMIT was announced in a memo from the NA-50 Associate Administrator to NNSA sites and headquarters leaders in September 2015. That memo included the PMIT charter, as shown below.

PMIT Charter

Purpose

Enhance program, portfolio and project performance by sharing best practices including methods, processes and tools for planning, executing and controlling scope, schedule, costs, risks and opportunities. This continual, self-driven improvement will assure that NA-50 achieves cost-effective, timely, measurable and quality results in support of the NNSA mission.

Process

The PMIT is comprised of a small cadre of private industry program management experts who will meet with NA-50 federal managers quarterly to discuss and share

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successful leading-edge program management practices. NA-50 may invite M&O Partners, Field Office experts, and others as needed to participate in PMIT meetings. The PMIT will not score/rank NA-50 or M&O Partner performance/practices nor establish new requirements. The PMIT will serve as a no-fault, non-attribution, safe forum to share experiences, discuss examples of successful initiatives, and provide opportunities to link participants to help one another improve their project, program and portfolio management performance. NA-50 and M&O Partners are encouraged to increase cross-communication and group-learning by openly sharing lessons with the PMIT – both the ones that worked and the ones that didn't work and why.

Products

A Management Best Practices List will be created to identify and share notable best practices. This document will be discussed and updated at PMIT meetings. The "best practices" that will be compiled are meant to be superior and/or unique approaches, not merely good or adequate approaches. If management practices at specific sites are not documented as "best practices" it should not be interpreted to mean those sites are doing less than good sound management practices. Furthermore, the defined "best practices" are not meant to be requirements to be adopted by every site for every situation, but rather a road map that could be used for improvement if applicable to a site.

A PMIT Meeting Report will be developed following each meeting by the PMIT members. The PMIT Meeting Report should include a record of topics discussed and any findings and recommendations the PMIT members may have.

Meetings

PMIT Meetings will be 3-4 times each year, lasting 2-3 days. A draft agenda will be prepared in advance of each PMIT meeting to allow NA-50 to comment on and suggest timely topics and meeting participants. Participants must feel free to openly share management challenges within their respective organization as well as best practices. The host M&O Partner/entity will be given time on the agenda to highlight issues/efforts unique to them.

Membership

The Executive Sponsor for the PMIT is Kenneth Sheely[9] and the Executive Director for the PMIT is Jessica Kunkle[10]. The Executive Sponsor and Executive Director will approve the meeting dates, agendas, locations, and determine what additional participants will be invited to each meeting.

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[9] NNSA Deputy Associate Administrator for Infrastructure (NA-52)
[10] Director of the NA-50 Program Management Office (PMO)

The PMIT member list is as follows:

Wayne Abba – Private sector management expert
David Pells – Private sector management expert
Miles Shepherd – Private sector management expert
Marc Zocher – Private sector management expert
Michael Haase – Executive Secretariat [11]

RESULTS TO DATE

Meeting Number 1 – December 2015: The first PMIT meeting was held in December 2015 at Oak Ridge National Laboratory in Tennessee, with approximately 20 participants. Presentations and discussions covered NA-50 mission and plans, tools and systems being employed, enterprise risk management and other topics. In their Outbriefing report, the PMIT highlighted the following very positive observations: strong leadership and teamwork; standardization of processes; excellence of G2 program management information system; and impressive system tools, including MDI, BUILDER, MAP and AMP. They also commended NA-50 for the enterprise perspective, especially related to multi-site planning, stakeholder participation and supply chain management, and for promoting agility as a philosophy and culture. The PMIT recognized NA-50's organizational program and project management (P/PM) maturity, suggesting that NA-50's management approach might also be recognized as a P/PM best practice.

The PMIT identified some potential issues, including sustainability, documentation and institutionalization. Suggestions for consideration included expanding enterprise planning to the strategic level, consideration of long-term strategy for G2, and strategizing for dealing with P/PM on larger projects.

Meeting Number 2 – February 2016: The second PMIT meeting was held at Lawrence Livermore National Laboratory (LLNL) in California, in conjunction with "Deep Dive" planning meetings of NA-50 leadership with LLNL managers. Meetings included more than 50 participants. Presentations and discussions covered status, issues, needs and plans associated with facilities and infrastructure at the site. In their Outbriefing report, the PMIT highlighted the following positive observations:

Best practices at LLNL

- Visible engagement/support of LLNL leadership
- Integration of infrastructure with programs
- Space optimization modeling

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[11] These members are authors of this paper.

Other positive observations demonstrated by LLNL

- Clear support of NA-50 goals and initiatives
- Active site/lab participation in development of NA-50 tools and solutions
- Use of multiple tools for analysis, prioritization and planning
- Involvement of program staff (critical stakeholders) in infrastructure planning
- Emphasis on future work force and external community during planning

Best practices by NA-50

- The Deep Dive approach to engaging with sites (increasing knowledge and teamwork)
- Excellence Awards (NA-50 presented awards to LLNL individuals and teams)
- Enterprise level supply chain management (for cost savings and efficiencies)

Other positive observations demonstrated by NA-50

- Visible involvement and commitment of NA-50 leadership
- Active engagement with multiple stakeholders
- Open and frank discussions and communications
- Long term planning rather than focused on annual budgeting
- Enterprise-wide planning rather than individual sites
- Visible emphasis on program, portfolio and project management
- Visible emphasis on risks and risk-informed decisions
- Emphasis on sustainability
- Recognition of tool limitations
- Breaking large projects into smaller sub-projects to reduce risks and facilitate annual budgeting
- Engagement with sites on tool development and pilot projects

The PMIT identified some issues, including potential roadblocks, funding, stakeholder involvement and project management resource availability. Suggestions for consideration included expanding enterprise supply chain management, expanding sustainability to incorporate health and safety, investigation of additional tools, use of six-sigma approaches for selected process improvements, continued emphasis on data quality, expansion of project planning to cover entire facility life cycle, additional emphasis on resilience, more attention on organizational sustainability and possible use of site project management offices.

CONCLUSIONS AND LESSONS LEARNED THAT MAY BE USEFUL TO OTHERS

The PMIT for NNSA's Office of Safety, Infrastructure and Operations is just getting started, but the experience to date suggests some useful lessons that may apply to other organizations and programs.

Positive results have been reinforced from employing traditional best practices such as visible leadership support, active stakeholder engagement, effective communications, emphasis on risk management, thorough planning, and use of good modern software tools and project/program management methodologies.

The independence of the PMIT has also been a positive factor resulting in increased NNSA cross-complex communication and an understanding that PMIT members are looking to share "good practices" rather than an audit or assessment posture at NNSA sites.

More importantly, we have already seen evidence of NNSA implementing several best management practices:

> ➢ Enterprise-wide approaches to planning, prioritizing and budgeting projects across a large organization involving thousands of facilities
> ➢ Enterprise-wide supply chain management, implemented practically through use of pilot projects, selected system procurements and national suppliers
> ➢ Adaptation and effective use of best-in-class software tools, some developed by other government agencies, to support both enterprise and site-specific characterization, analysis and prioritization of facilities and infrastructure
> ➢ Effective proactive long term planning by a government agency rather than relying on the reactive planning associated with annual budgeting

We think these approaches could be useful to any large government or private enterprise that maintains, upgrades, operates and then disposes of a large number of facilities, buildings or infrastructure.

The PMIT is helping to highlight good practices by NNSA and its site contractors, along with other program management issues that might warrant additional attention in the future.

REFERENCES

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