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Technomics
Better Decisions Faster

Vega: Shining a Light on the Battles of Data Collection and Managment

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MEET THE AUTHORS

Our team is a mix of four contractors and one federal employee working to support the National Nuclear Security Administration (NNSA) Office of Cost Estimating and Program Evaluation (CEPE). Established in 2014, CEPE provides the NNSA Administrator with independent cost estimates for major programs, program evaluation support, and data collection & sharing, and policy counsel.

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AGENDA

- CEPE: An Origin Story
- Our Campaign for Improvement
- Developing Data Policies
- Launching Vega
- Raw Data Challanges
- A Retrospective and Future Work

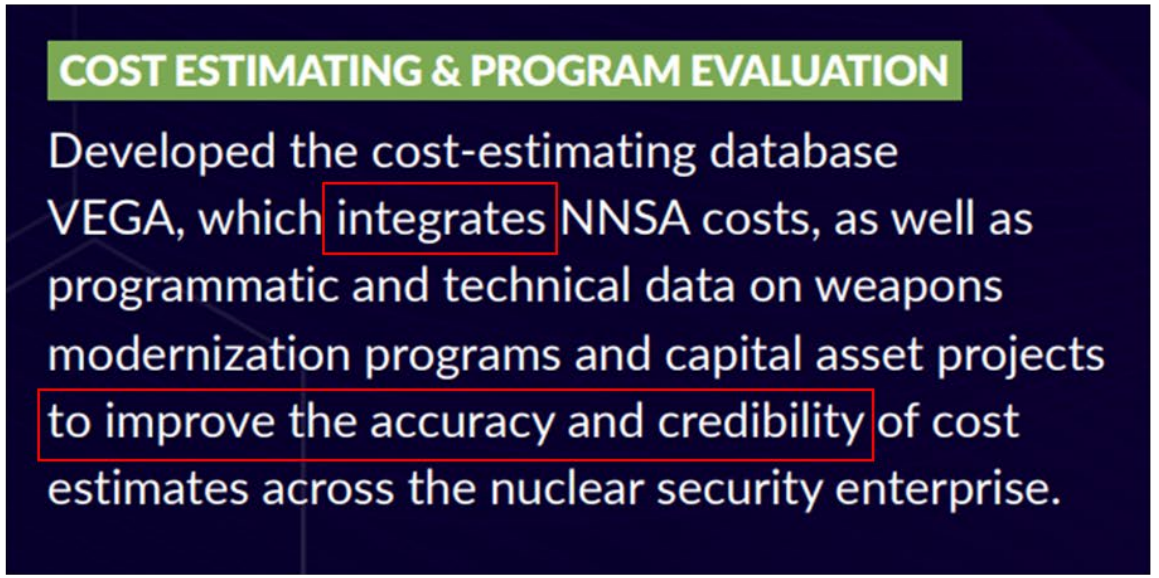
Purpose

"Federal decision makers need data of sufficient quality to assess whether federal programs achieve intended results and to set priorities for national objectives"

Source: GAO 21-152, Data Governance: Agencies Made Progress in Establishing Governance, but Need to Address Key Milestones | U.S. GAO, Dec 16, 2020

8. The Secretary should establish trusted Cost Analysis and Resource Management staffs, tools, and data; the Director should be responsible for this process for ONS.

Source: Augustine-Meis Report, National Nuclear Security Administration Comments on the Final Report of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise. May 2015



Source: 2022 NNSA Year in Review, 2022 NNSA Year In Review FINAL.pdf (energy.gov), page 23

National Nuclear Security Administration (NNSA)

Part of the Nuclear Security Enterprise (NSE), the NNSA:

- Maintains and enhances the safety, security, and effectiveness of the U.S. nuclear weapons stockpile
- Works to reduce the global danger from weapons of mass destruction
- Provides the U.S. Navy with safe and militarily effective nuclear propulsion
- Responds to nuclear and radiological emergencies in the United Sates and abroad

The mission is supported by Managing & Operating (M&O) contractors at various labs, plants, and sites.

CEPE – An Origin Story

2004 – 2015+

Technomics manages data collection and provides analysis and cost estimating support to OSD CAPE (CEPE's archetype)

April 2015

CEPE to standup a cost capability to fulfill FY14 NDAA

Develop a Gold Standard of cost estimating data and survey of existing data systems

2015

Charge Code, Earned Value Management (EVM), and Integrated Master Schedules (IMS) collected in support of the B61-12 and W88 Alt 370 Phase 6.4 ICEs

2016

Perform a requirements study to establish future home of CEPE's statutory data collection, which later becomes Vega

Collect program documents, schedules, and Selected Acquisition Reports (SARs)

2017

Establish Data Collection NAP for recurring collection of weapons cost data

Collect DoD Cost Analysis Data Enterprise (CADE) data

Expand collection of technical documentation

CEPE – An Origin Story

2018

Establish Cost Analysis Requirements Description (CARD) policy
Collect data on Technology Readiness Assessments by component

2019 – 2020

In support of new statutory role, CEPE implements data collection for construction projects based on Gold Standard
Establish process for collecting detailed quantity data by warhead and component
Launch classified Vega

2021

Develop first Mountain Chart, which went from a one-off modernization view to a customizable Portfolio Analysis tool showing CEPE's assessment of NNSA's portfolios
Launch the unclassified version of Vega

2022

Develop and lead a training program for CEPE analysts on Vega data application modeling and weapon programs
Increase scope of data in unclassified Vega

2023

Continuous improvement of Vega, as it reaches new capabilities and users
Integrate dashboards, improve access to classified Vega data, and document clear business processes
Increase formal training for new users

Data Types

- Data-driven independent cost and schedule estimates are a proven best practice
  - GAO Cost Estimating Guide (GAO-20-195G)
- Collecting actual costs through charge code level actuals as well as project execution enables analysts to aggregate data in different ways to fit the needs of the analysis
- Technical data, such as weapon component specifications and architectural parameters for capital investments enables analysts to identify the true drivers of cost and schedule growth
- These data types, when used together, enable analysts to create a holistic view of the project. This includes the ability to identify risks and uncertainty that is inherent in the underlying data

For analysis purposes, three types of data are required:

Cost Data

- Includes labor dollars (with supporting labor hours and direct costs and overhead rates), material, facilities capital cost of money, and profit associated with various activities

Programmatic Data

- Provides parameters that directly affect the overall cost (e.g., lead-time schedules, start and duration of effort, delivery dates, outfitting, testing, initial operational capability dates, operating profiles, contract type, etc.)

Technical Data

- Defines the requirements for the equipment being estimated, based on physical and performance attributes, such as length, width, weight, power, and size

Credible cost estimates require analysis of historical and authoritative cost, technical, and programmatic data.

Our Campaign for Improvement

The NNSA M&O's are independent entities cost, program, and technical data are unique to each site

- Reporting standards vary
- Roll-up accounting varies

The charter for the early days of CEPE was to:

- Establish a gold standard for cost estimating data
- Implement policies and procedures for collecting and managing data
- Create a system to house and share the data and analytical products

Multiple meetings with data owners helped us understand the current data ecosystem

- What data existed
- How the data was collected
- The detail of the data being collected by headquarters
- The purpose of the data being collected

Policy and Data Governance

50 USC 2411

- "The Administrator, acting through the Director, shall, as appropriate seek to use procedures, processes, and policies for collecting cost data and making that data accessible that are similar to the procedures, processes, and policies used by the Defense Cost Analysis Resource Center of Cost Assessment and Program Evaluation (CAPE) of the Department of Defense (DoD) for those purposes."

Policy and Data Governance

NAP 413.1 – Data Collection for Cost Estimating

- Requirements and responsibilities for collecting data on a continuous basis to support future cost estimating requirements

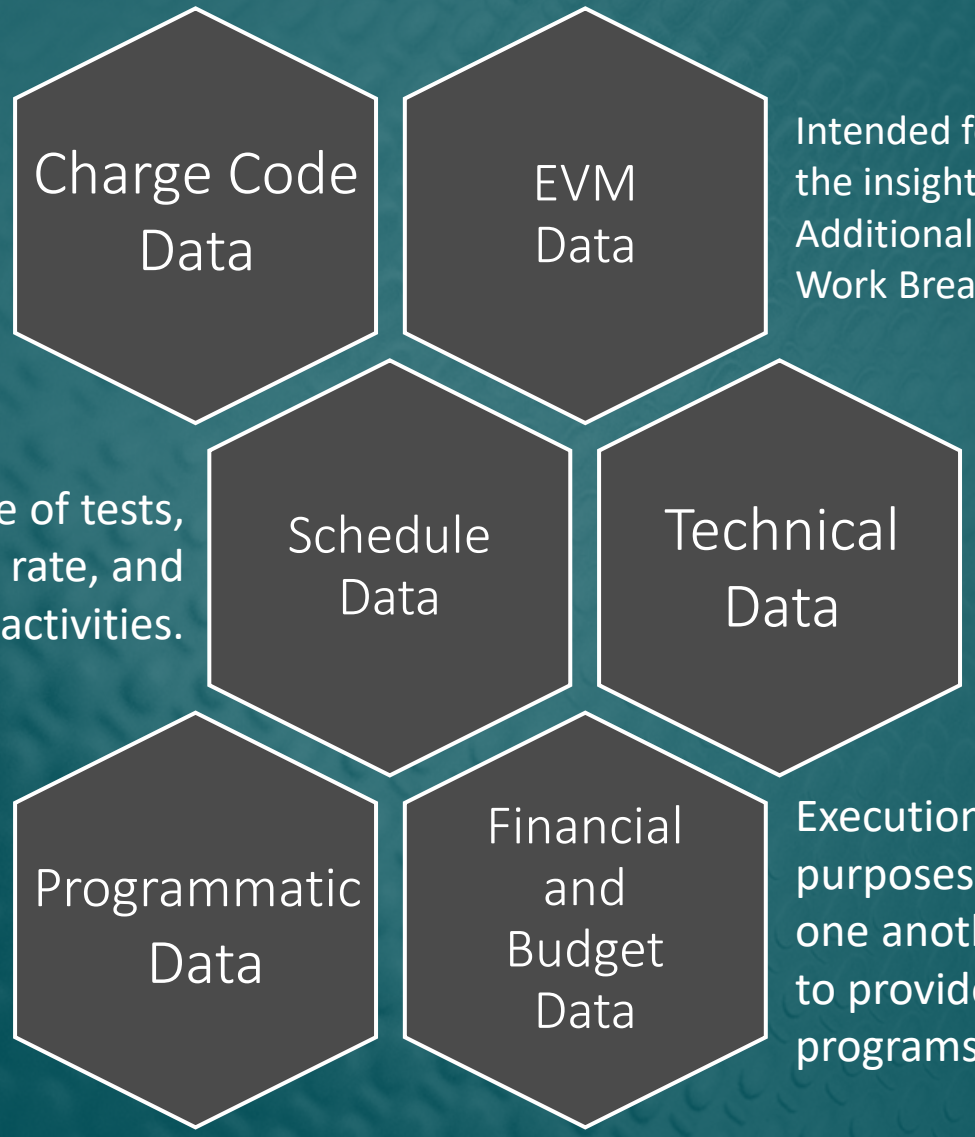
NAP 413.3A - Responsibilities for Independent Cost Estimates

- Establishes CEPE as the office who owns and performs independent cost estimates

BOP 413.9 - Cost Analysis Requirements Description

- Establishes the CARD as a standard piece of data collection as a part of the ICE

Data Types



This data is collected at the lowest level of detail and is the only data that distinguishes material and labor categories.

Intended for program management, CEPE values the insight to actual costs and final projections. Additionally, EVM provides insight into the M&O Work Breakdown Structure (WBS)

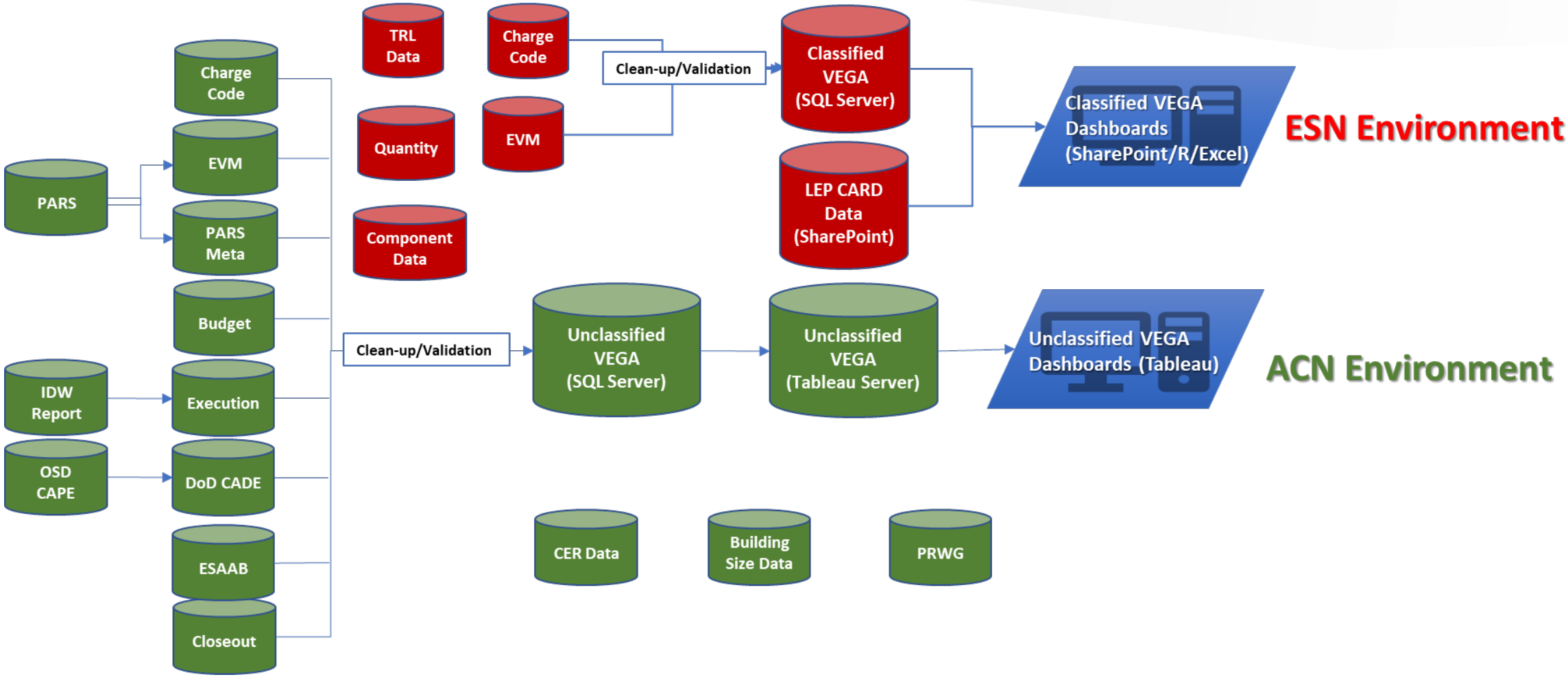
Helps us see the schedule of tests, critical path tasks, task burn rate, and duration of design activities.

Information on design, type, part count, and other scope related details assist in making adjustment from analogous programs.

Helps us understand program office scope, including other program money, risk mitigation, staffing plans, and contingency.

Execution and budget data serves different purposes and are not always traceable to one another. Multiple sources of data helps to provide a more reliable representation of programs from a budgetary perspective.

Vega Architecture



Verification and Credibility

- Traceable
  - Maintaining data as close to original as possible before transforming and standardizing
  - Documentation in script on any data manipulation (R/Python)
- Trackable over time
  - Matching program names AND dollars to track programs over time
- Validated
  - Collecting at the smallest level and summing
  - Comparing summed totals with totals in the raw data to prevent double counting or missing data

Example Future Year Nuclear Spend Plan (FYNSP)

SSMP Dashboard

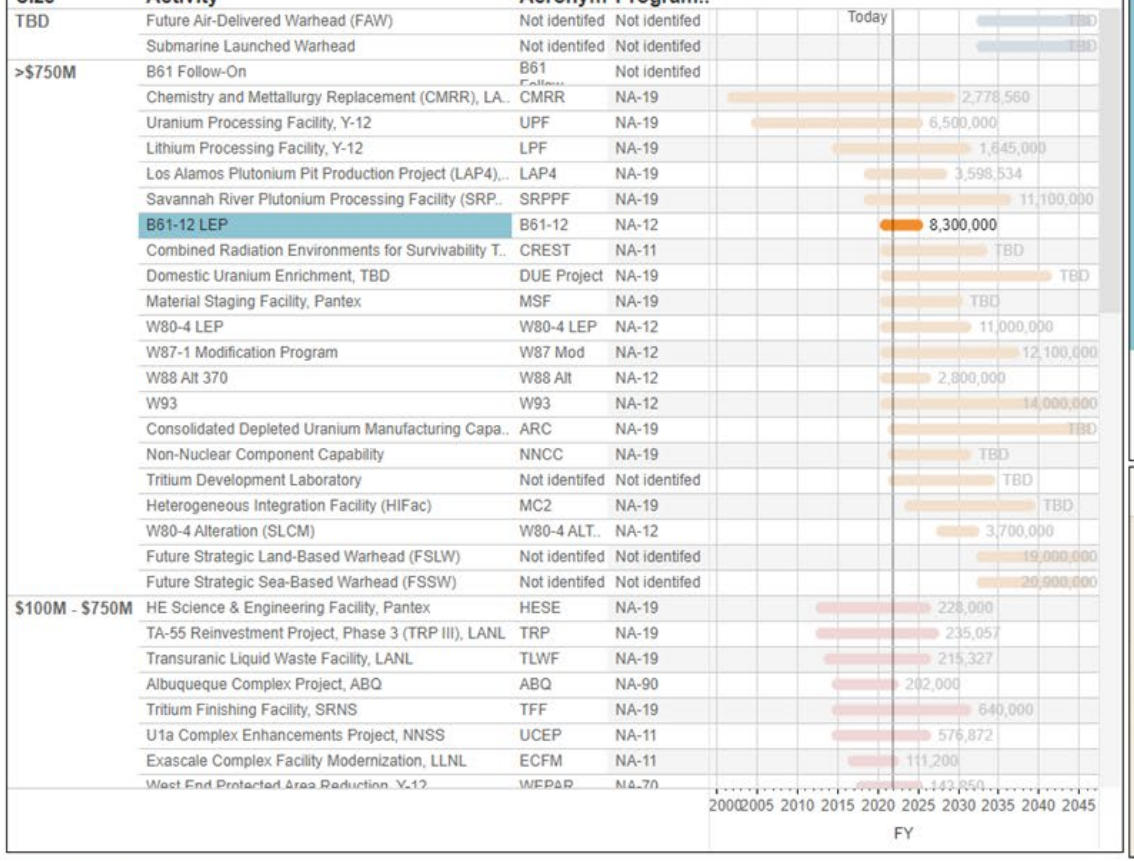
Source Comparisons Dash | FYNSP vs. Appropriated | SSMP Schedule | WA Dashboard | Org Dashboard | Milestone Dashboard | Sheet 20

Filters: FY Start 2002 – 2039; FY End 2022 – 2046; Capability Portfolio (All); Org (All); Size (All)

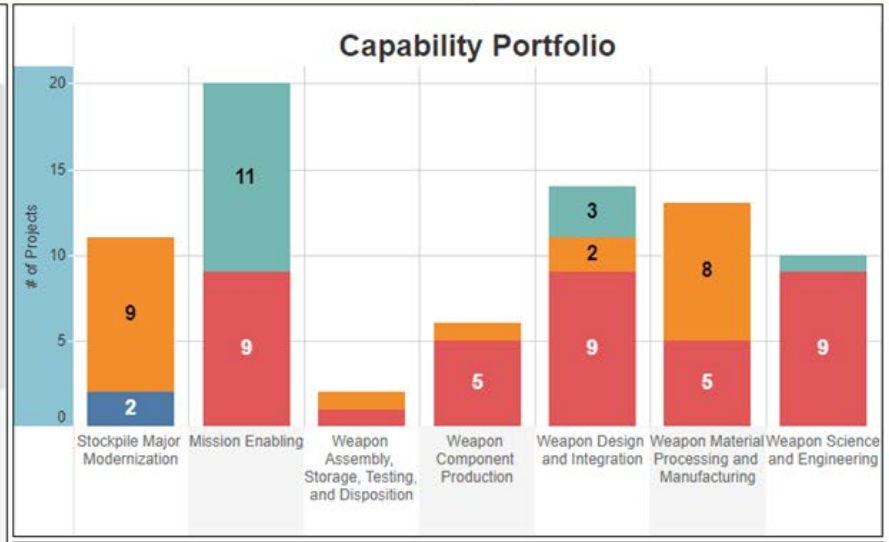
Legend: TBD; $100M - $750M; >$750M; <$100M

Ongoing/Future Line Item Project Schedule

Size	Activity	Acronym	Program..
TBD	Future Air-Delivered Warhead (FAW)	Not identifed	Not identifed
	Submarine Launched Warhead	Not identifed	Not identifed
>$750M	B61 Follow-On	B61	Not identifed
	Chemistry and Mettallurgy Replacement (CMRR), LA..	CMRR	NA-19
	Uranium Processing Facility, Y-12	UPF	NA-19
	Lithium Processing Facility, Y-12	LPF	NA-19
	Los Alamos Plutonium Pit Production Project (LAP4),..	LAP4	NA-19
	Savannah River Plutonium Processing Facility (SRP..	SRPPF	NA-19
	B61-12 LEP	B61-12	NA-12
	Combined Radiation Environments for Survivability T..	CREST	NA-11
	Domestic Uranium Enrichment, TBD	DUE Project	NA-19
	Material Staging Facility, Pantex	MSF	NA-19
	W80-4 LEP	W80-4 LEP	NA-12
	W87-1 Modification Program	W87 Mod	NA-12
	W88 Alt 370	W88 Alt	NA-12
	W93	W93	NA-12
	Consolidated Depleted Uranium Manufacturing Capa..	ARC	NA-19
	Non-Nuclear Component Capability	NNCC	NA-19
	Tritium Development Laboratory	Not identifed	Not identifed
	Heterogeneous Integration Facility (HIFac)	MC2	NA-19
	W80-4 Alteration (SLCM)	W80-4 ALT..	NA-12
	Future Strategic Land-Based Warhead (FSLW)	Not identifed	Not identifed
	Future Strategic Sea-Based Warhead (FSSW)	Not identifed	Not identifed
$100M - $750M	HE Science & Engineering Facility, Pantex	HESE	NA-19
	TA-55 Reinvestment Project, Phase 3 (TRP III), LANL	TRP	NA-19
	Transuranic Liquid Waste Facility, LANL	TLWF	NA-19
	Albuqueque Complex Project, ABQ	ABQ	NA-90
	Tritium Finishing Facility, SRNS	TFF	NA-19
	U1a Complex Enhancements Project, NNSS	UCEP	NA-11
	Exascale Complex Facility Modernization, LLNL	ECFM	NA-11
	West End Protected Area Reduction, Y-12	WEPAR	NA-70



Capability Portfolio

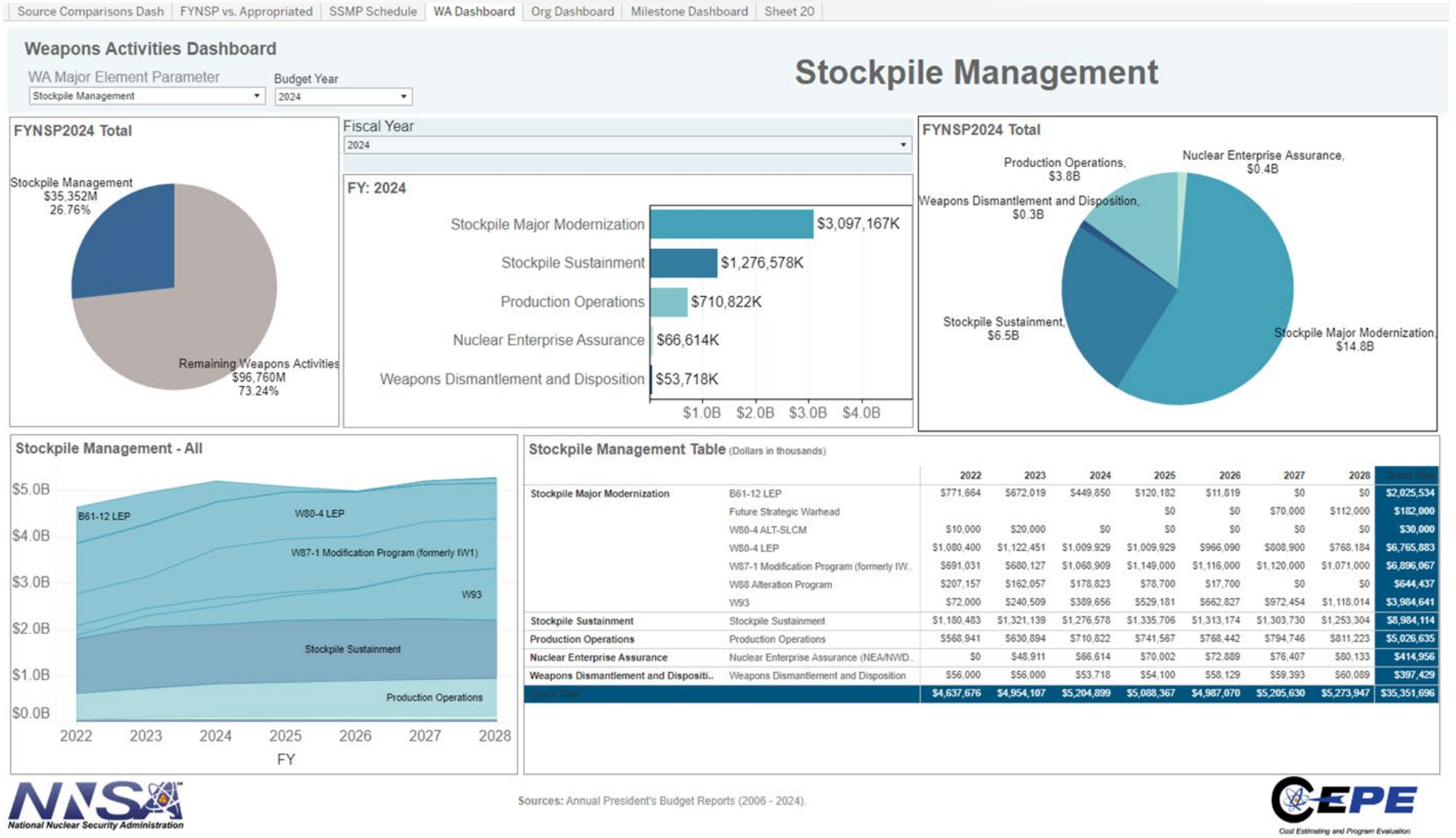


Project Description

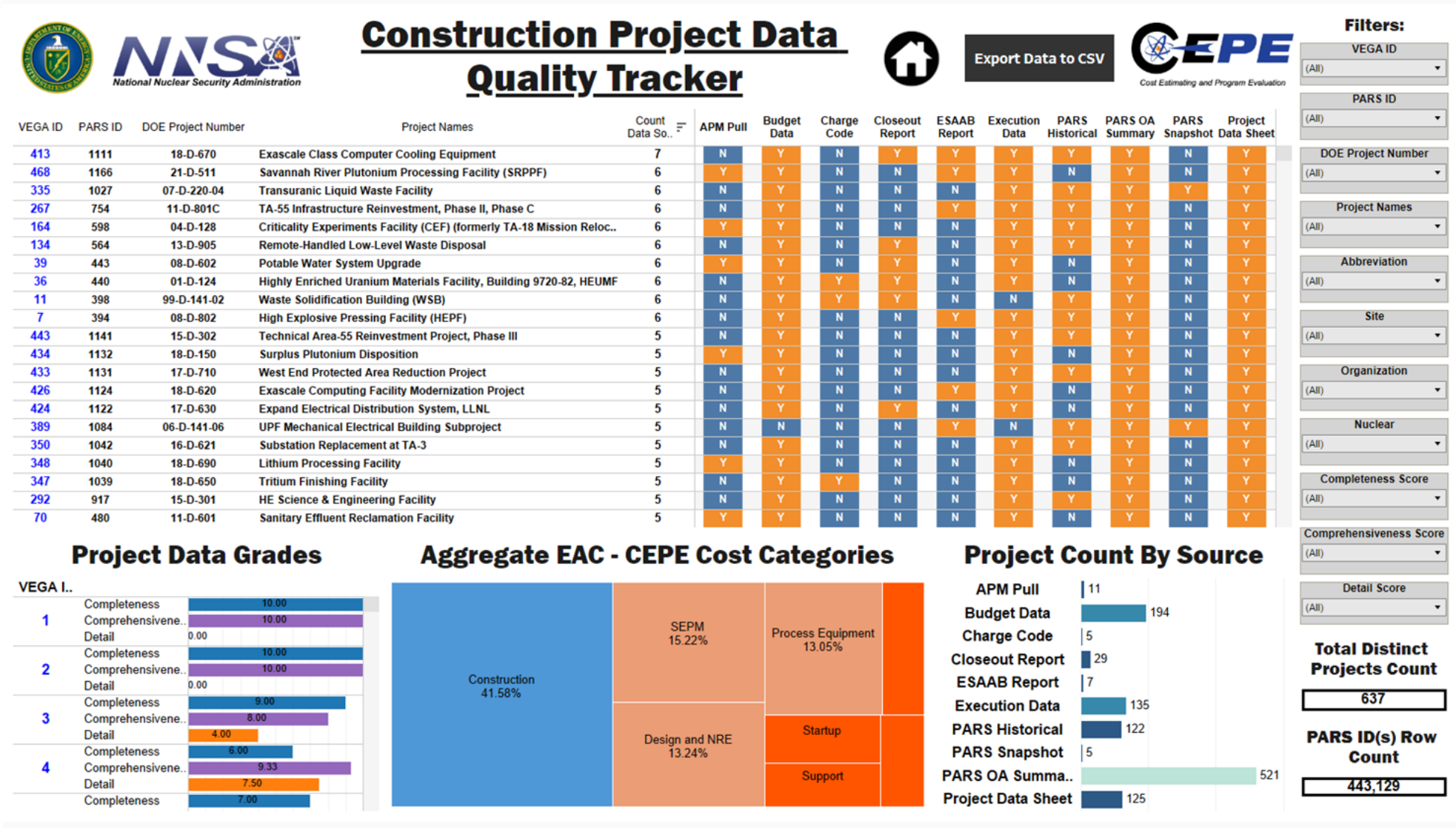
The B61-12 received authorization to enter Phase 6.5, First Production, in fiscal year (FY) 2021, and completed the first production unit in November 2021. The B61-12 LEP required replanning to allow re-qualification of base metal electrode (BME)- affected components,1 similar to the W88 Alt 370. The requalification efforts were completed in the first quarter of FY 2021, in accordance with the re-baselined plan.

Source: Data on size, schedule, capability portfolio, and descriptions for NNSA activities come from the **FY 2022 Stockpile Stewardship and Management Plan (SSMP)**, published in March 2022.

Appropriations Dashboard

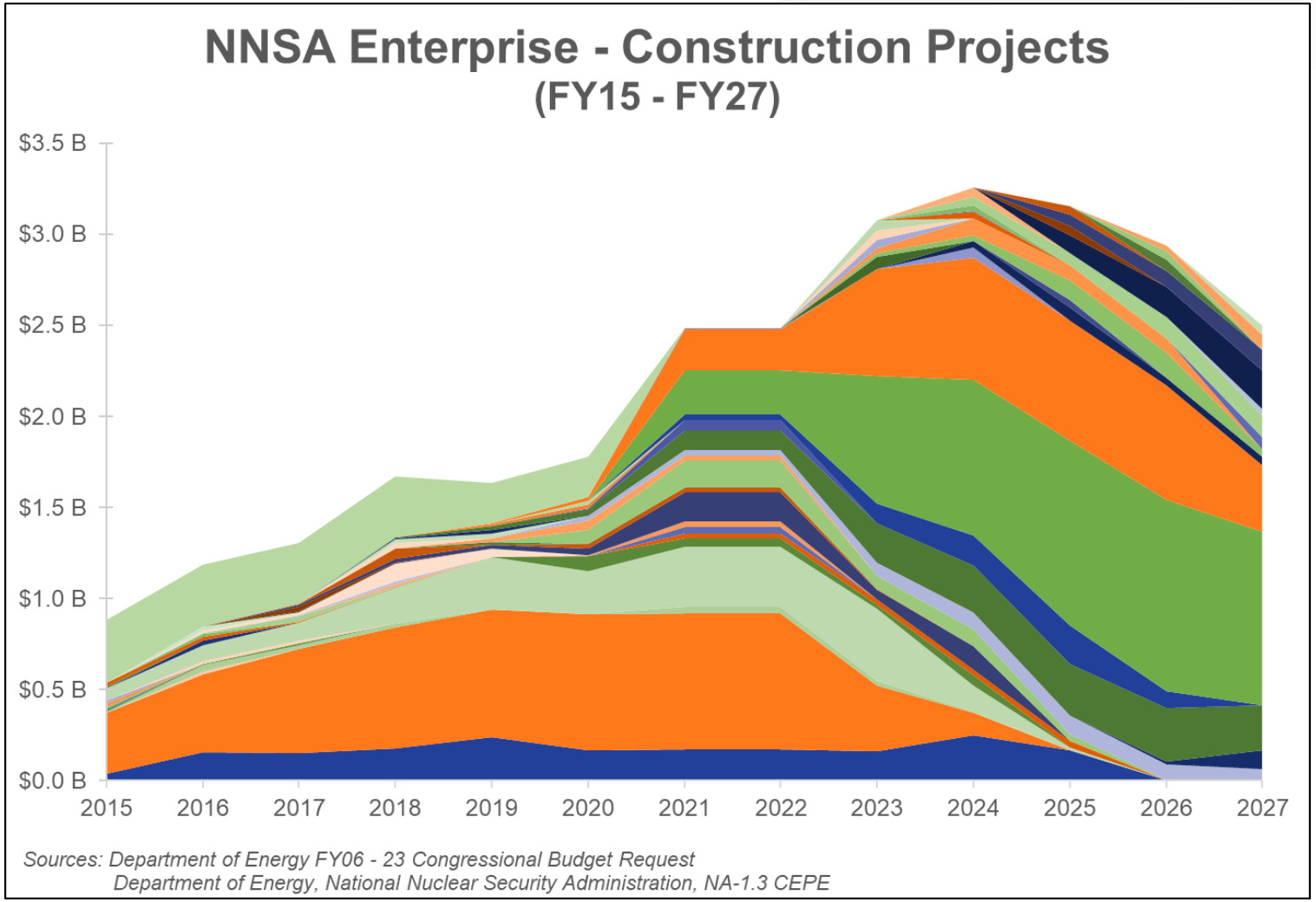


Quality Tracker



VEGA ID	PARS ID	DOE Project Number	Project Names	Count Data So..	APM Pull	Budget Data	Charge Code	Closeout Report	ESAAB Report	Execution Data	PARS Historical	PARS OA Summary	PARS Snapshot	Project Data Sheet
413	1111	18-D-670	Exascale Class Computer Cooling Equipment	7	N	Y	N	Y	Y	Y	Y	Y	N	Y
468	1166	21-D-511	Savannah River Plutonium Processing Facility (SRPPF)	6	Y	Y	N	N	Y	Y	N	Y	N	Y
335	1027	07-D-220-04	Transuranic Liquid Waste Facility	6	N	Y	N	N	N	Y	Y	Y	Y	Y
267	754	11-D-801C	TA-55 Infrastructure Reinvestment, Phase II, Phase C	6	N	Y	N	N	Y	Y	Y	Y	N	Y
164	598	04-D-128	Criticality Experiments Facility (CEF) (formerly TA-18 Mission Reloc..	6	Y	Y	N	N	N	Y	Y	Y	N	Y
134	564	13-D-905	Remote-Handled Low-Level Waste Disposal	6	N	Y	N	Y	N	Y	Y	Y	N	Y
39	443	08-D-602	Potable Water System Upgrade	6	Y	Y	N	Y	N	Y	N	Y	N	Y
36	440	01-D-124	Highly Enriched Uranium Materials Facility, Building 9720-82, HEUMF	6	N	Y	Y	Y	N	Y	N	Y	N	Y
11	398	99-D-141-02	Waste Solidification Building (WSB)	6	N	Y	Y	Y	N	N	Y	Y	N	Y
7	394	08-D-802	High Explosive Pressing Facility (HEPF)	6	N	Y	N	N	Y	Y	Y	Y	N	Y
443	1141	15-D-302	Technical Area-55 Reinvestment Project, Phase III	5	N	Y	N	N	N	Y	Y	Y	N	Y
434	1132	18-D-150	Surplus Plutonium Disposition	5	Y	Y	N	N	N	Y	N	Y	N	Y
433	1131	17-D-710	West End Protected Area Reduction Project	5	N	Y	N	N	N	Y	Y	Y	N	Y
426	1124	18-D-620	Exascale Computing Facility Modernization Project	5	N	Y	N	N	Y	Y	N	Y	N	Y
424	1122	17-D-630	Expand Electrical Distribution System, LLNL	5	N	Y	N	Y	N	Y	N	Y	N	Y
389	1084	06-D-141-06	UPF Mechanical Electrical Building Subproject	5	N	N	N	N	Y	N	Y	Y	Y	Y
350	1042	16-D-621	Substation Replacement at TA-3	5	N	Y	N	N	N	Y	Y	Y	N	Y
348	1040	18-D-690	Lithium Processing Facility	5	Y	Y	N	N	N	Y	N	Y	N	Y
347	1039	18-D-650	Tritium Finishing Facility	5	N	Y	Y	N	N	Y	N	Y	N	Y
292	917	15-D-301	HE Science & Engineering Facility	5	N	Y	N	N	N	Y	Y	Y	N	Y
70	480	11-D-601	Sanitary Effluent Reclamation Facility	5	Y	Y	N	N	N	Y	N	Y	N	Y

Mountain Chart



Raw Data Challanges

OMB Pillars of Good Data Governance (2019 Federal Data Strategy)

Working with the Raw Data offers many opportunities but takes a significant number of resources driven by:

- Manual and Automated Mapping
- Different data types
- Constant verification

A Retrospective

DOCUMENTATION

EXTERNAL BUY-IN

REQUIREMENTS GENERATION

Future Work

Reduce silos

Mapping Scripts

Increased points of integration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