

Welcome to the





NNSA Best Practice for Building a Better Cost Engine: BUILDER SMS Project Case Study

Moderator:

- Ben Matthews, Federal Client Manager

Speakers:

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- Dave Lewek, Director of Professional Services



Agenda

- NNSA infrastructure mission challenges and objectives
- BUILDER objectives
- Project scope:
 - BUILDER Cost/Catalog Update
 - BUILDER Cost Engine
- Project Results
- Questions and Discussion



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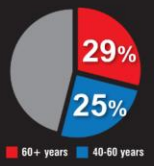
NNSA SAFETY, INFRASTRUCTURE & OPERATIONS

MAKING THE RIGHT THINGS HAPPEN



A VAST AND COMPLEX ENTERPRISE

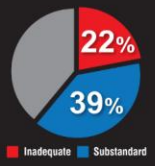
AGE OF INFRASTRUCTURE



EXCESS FACILITIES



CONDITION OF INFRASTRUCTURE



Vision

We contribute to national security now and in the future by managing the complex NNSA risks of safety, infrastructure, materials, and the environment.

Mission

Enable safe operations, ensure effective infrastructure, and provide enterprise services to meet National Nuclear Security Administration needs.

39,000 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 and hazardous facilities

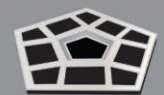


2,100 square miles of land area



ABOUT THE LAND AREA OF DELAWARE

36 MILLION SQUARE FEET OF ACTIVE FACILITY SPACE



~ six Pentagons worth

NNSA Packages ship over **500,000 miles** per year

Enough to travel to the moon and back



9 Trillion BTUs ANNUAL ENERGY CONSUMPTION



enough to power ~250,000 homes for one year



MARCH 2017

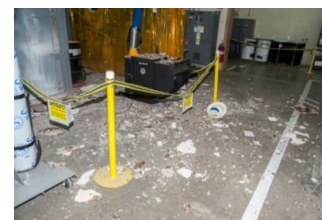


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Infrastructure Challenges

- NNSA facilities and equipment are old, obsolete, and in poor condition
- Failures are increasing in frequency, severity, and unpredictability
 - Y-12: Concrete ceilings fell Beta-2 & 9215 (Mar & July 2014)
 - LLNL: B298 mid-span truss failure (April 2017)
 - LANL: PF-4 diesel engine for fire water pump failed 3 times (August 2016 – April 2017)
 - SNL: 14" water line broke 5 times (October 2013 – August 2016)
- Traditional analytical methods used to drive investment decisions (e.g., DM) are financial surrogates that do not capture risk, importance or condition



NNSA infrastructure is too big, too old & too brittle



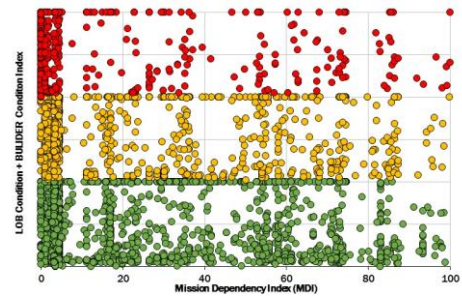
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Improving Management Tools



Enterprise Risk Management



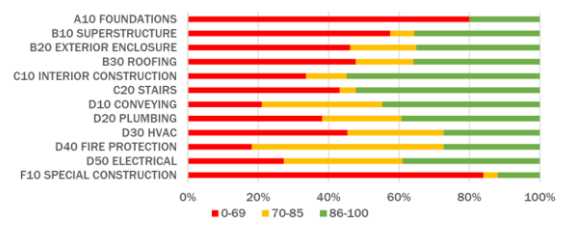
New data-driven, risk-informed tools

Mission Dependency Index

MDI	Site	Building	Asset Name	LOB Condition	RPV	GSF	Age
100	Y-12	ELECT DIST	Electrical Distribution	Inadequate	\$1,286.1M	-	60
100	Y-12	9212	Production	Inadequate	\$960.0M	442,317	71
87	Y-12	9401-07	Steam Plant	Adequate	\$49.5M	19,200	7
87	Y-12	742-000	Elza Switch Yard	Inadequate	\$6.3M	-	18

Measures impact to mission by combining the impact if the asset were lost, the difficulty to replace the asset & interdependency of assets to calculate a score from 1 to 100

BUILDER



Measures likelihood of impact to mission occurring by capturing condition & functionality at sub-asset level

G2



Award-winning program management system to analyze data

<https://nnsa.energy.gov/g2>



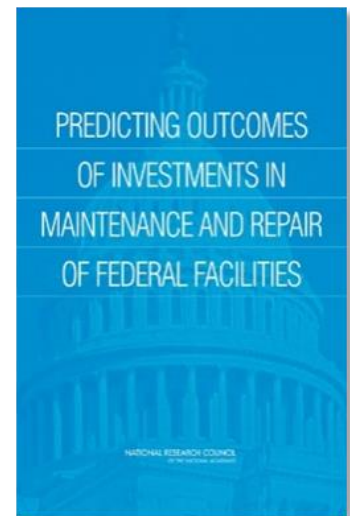
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NNSA BUILDER – Objectives

- The BUILDER™ Sustainment Management System (SMS) is 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
 - **Manage** risk and employ innovation solutions
- BUILDER is recommended by the National Academy of Sciences (NAS) and supports 5 of 7 recommendations in the NAS report, “*Predicting Outcomes of Investments in Maintenance and Repair of Federal Facilities.*”





Project Scope

- **BUILDER Cost/Catalog Update**
 - Integrate RSMeans data assemblies to ~4,000 BUILDER catalog items
- **BUILDER Cost Engine**
 - Utilize RSMeans Data Online Cost Engine and models to calculate RPV at Building Level in BUILDER



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BUILDER COST/CATALOG UPDATE



Challenges in Cost Data

- BUILDER Catalog/Cost Book
 - ~4,000 catalog items with unit replacement cost and design life (DL)
 - 999 catalog items with \$0 unit replacement cost info
- Challenges
 - **Validation** of cost data source
 - **Up to date** catalog and cost information
 - Reflects the current cost information
 - Captures the latest facility equipment and agency unique equipment
 - The latest industry standards service/design life
 - **Completeness** of NNSA BUILDER catalog/cost book



Detailed Project Scope: Cost/Catalog Update

- **Integrate RSMeans data assemblies to ~4,000 BUILDER catalog items**
 - Map at BUILDER Level V (Component/Section)
 - Use/modify existing assemblies
 - Create 225 new, NNSA-specific assemblies
 - API behind firewall

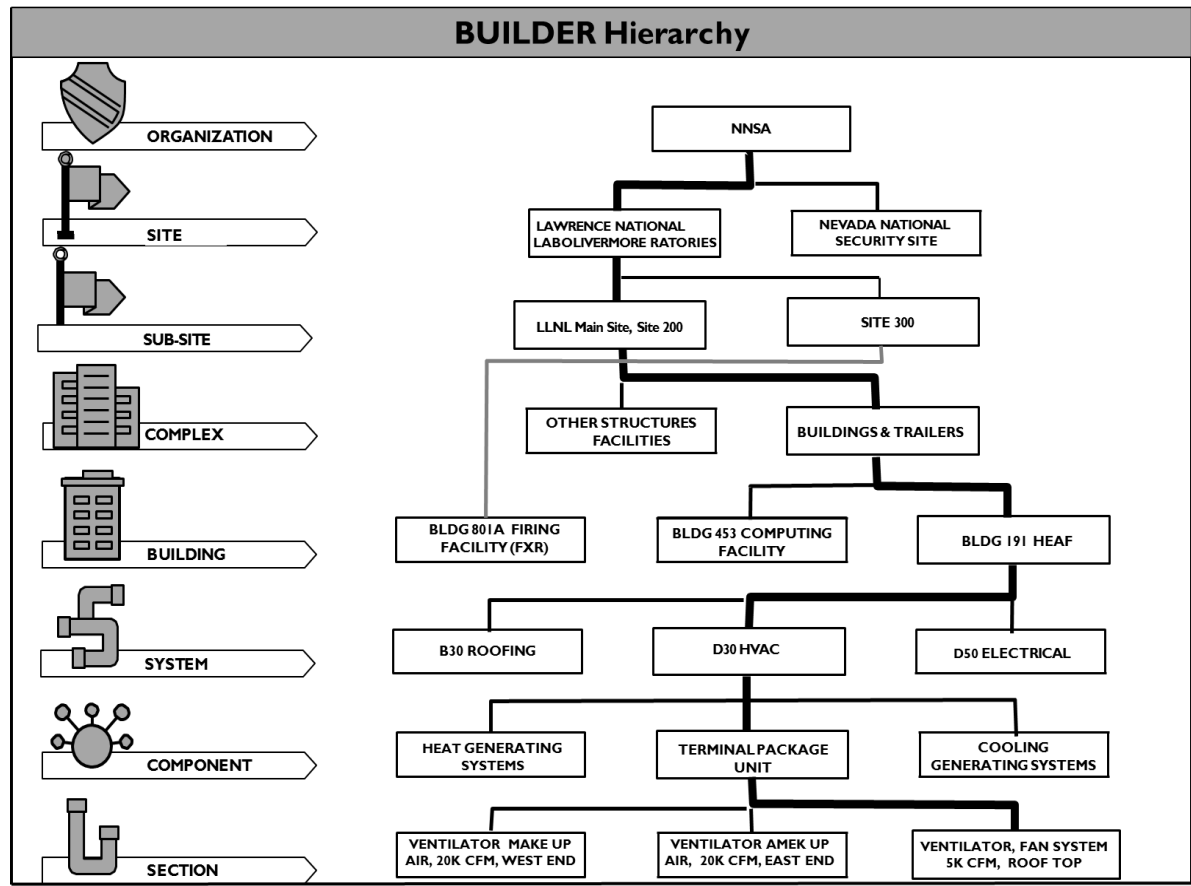


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Builder Inventory Data Structure





RSMMeans data Structure

RSMMeans data
from **GORDIAN**[®]

Database is comprised of:

85,000+
Units

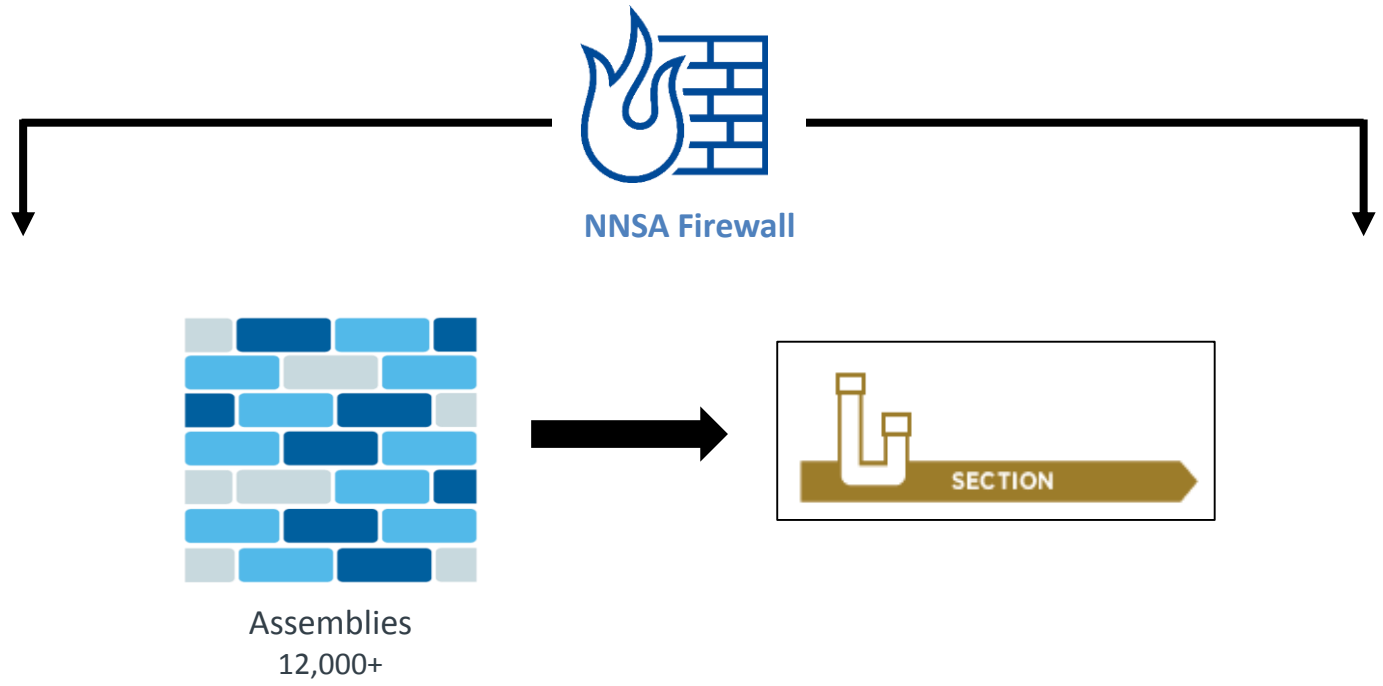
12,000+
Assemblies

125+ Square
Foot Models



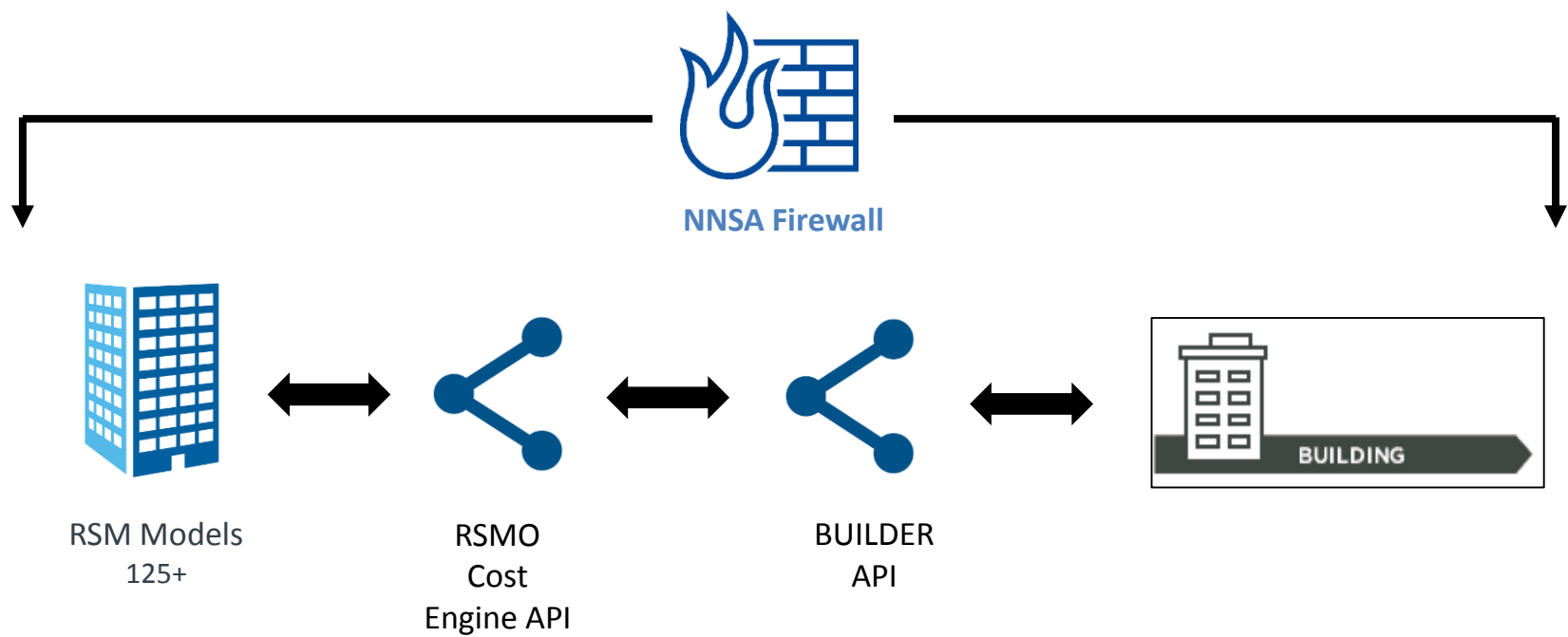


RSMeans Assemblies Mapped to BUILDER Component Section





RSMeans data Models Informing BUILDER

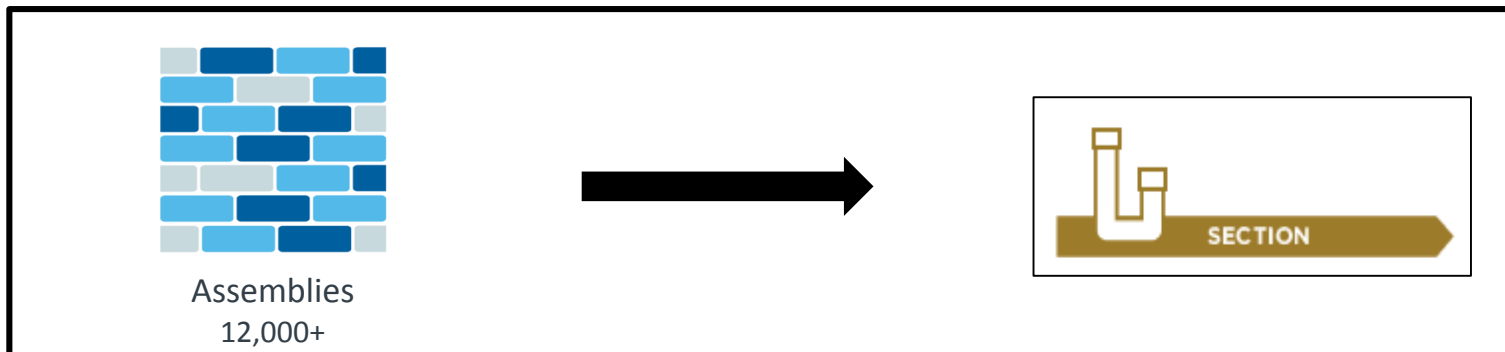
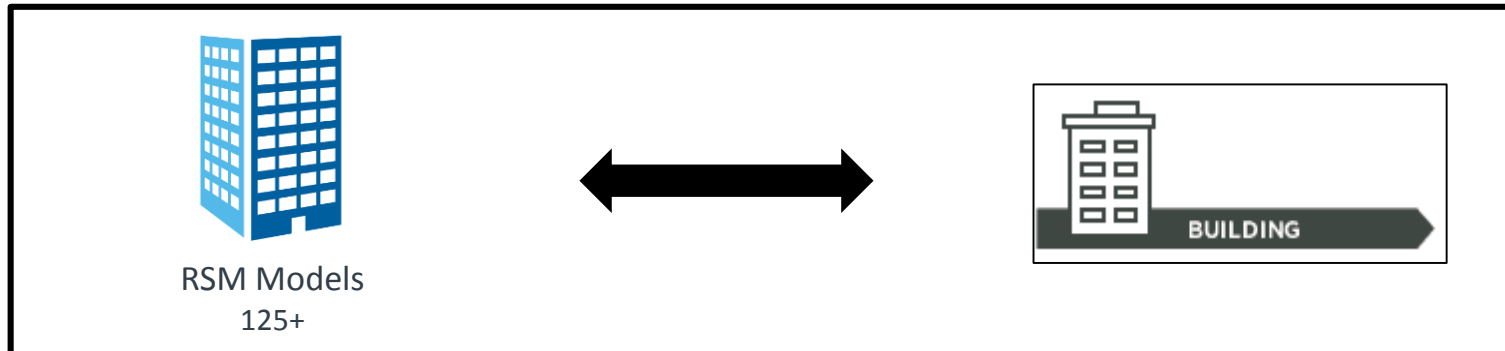




NNSA Solution Overview

RSMMeans Database

BUILDER Database





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BUILDER COST ENGINE



Challenges in Replacement Value

- **NNSA Replacement Plant Value (RPV)**
 - 80 RPV RSMeans data models created for Department of Energy
 - Unit price driven calculation
 - Usage Codes (FACODE/CATCODE in DoD) to determine RPV models
- **Challenges**
 - Out-dated RPV models and unit prices
 - NOT 1-1 between Usage Codes and RPV models
 - Gaps to capture agency unique facilities
 - Creates inaccurate RPVs with inaccurate agency RP portfolios



Detailed Project Scope: Cost Engine

- **RSMeans Data Online Cost Engine and models to calculate RPV at Building Level in BUILDER**
 - Use existing 76 models (standard and DOE)
 - Create 37 new models
 - Inform models with refined data from BUILDER



BUILDER Cost Engine Project

Goal: More accurate costs to inform decision making

Project: Integrate more accurate and defensible RPV, maintenance and repair costs in BUILDER

Approach:

- Map and configure RSMeans data from Gordian to BUILDER catalog
- Enhance catalog with NNSA-specific items
- Provide Cost Engine to calculate RPV with updated inventory from BUILDER
- Reviewed and adjusted Service Life



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Mapping BUILDER to RSMeans data

Current NNSA Catalog								RSMeans				
CMC	System	Component	Mat_Cat	Comp_Type	Design Life	Unit Cost	UoM	RSMeans ID Number	RSMeans Description	Design Life	Unit Cost	UoM
21350	A10 FOUNDATIONS	A1010 STANDARD FOUNDATIONS	A101001 WALL FOUNDATIONS	Strip Footing	150	72.47	LF	A10101053060	Foundation wall, CIP, 6' wall height, direct chute, .222 CY/LF, 10.8 PLF, 12" thick	100	132.00	LF
21351	A10 FOUNDATIONS	A1010 STANDARD FOUNDATIONS	A101001 WALL FOUNDATIONS	Grade Beams	100	163.63	LF	A10202104600	Grade beam, 30' span, 40" deep, 18" wide, 8 KLF load	100	151.50	LF
30212	A10 FOUNDATIONS	A1010 STANDARD FOUNDATIONS	A101001 WALL FOUNDATIONS	Foundation Wall	100	8.76	SF	A10101051520	Foundation wall, CIP, 4' wall height, direct chute, .1 CY/LF, 4.8 PLF, 8" thick	100	78.50	LF



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Mapping BUILDER General, Other and Unknown to RSMeans data

Current NNSA Catalog								RSMeans				
CMC	System	Component	Mat_Cat	Comp_Type	Design Life	Unit Cost	UoM	RSMeans ID Number	RSMeans Description	Design Life	Unit Cost	UoM
4106 6	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	General	10	5.35	SF	B301010517 00	Roofing, asphalt flood coat, gravel, base sheet, 4 plies 15# asphalt felt, mopped, on nailable deck	18	3.68	SF
4206 6	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	Other	10	5.35	SF	B301012062 00	Roofing, single ply membrane, reinforced, PVC, 48 mils, fully adhered, adhesive	20	2.82	SF
4306 6	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	Unknown	10	5.35	SF	B301012065 00	Roofing, single ply membrane, reinforced, PVC, 60 mils, fully adhered, adhesive	20	2.83	SF



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Design Life

Current NNSA Catalog								RSMeans				
CMC	System	Component	Mat_Cat	Comp_Type	Design Life	Unit Cost	UoM	RSMeans ID Number	RSMeans Description	Design Life	Unit Cost	UoM
21412	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	Single Ply Membrane	20	5.07	SF	B30101203300	Roofing, single ply membrane, EPDM, 60 mils, fully adhered	20	2.44	SF
21413	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	Built-Up	10	6.05	SF	B30101051600	Roofing, asphalt flood coat, gravel, base sheet, 4 plies 15# asphalt felt, mopped	20	3.74	SF
30107	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	Liquid Elastomers	10	5.46	SF	075610100025	Elastomeric roofing, acrylic, 44% solids, 2 coats, on smooth metal	20	0.89	SF
30119	B30 ROOFING	B3010 ROOF COVERINGS	B301002 LOW SLOPE ROOF SYSTEMS	Modified Bitumen	20	4.8	SF	B30101204000	Roofing, single ply membrane, mb, sbs modified, granule surf cap sheet, mopped, 150 mils	15	3.61	SF



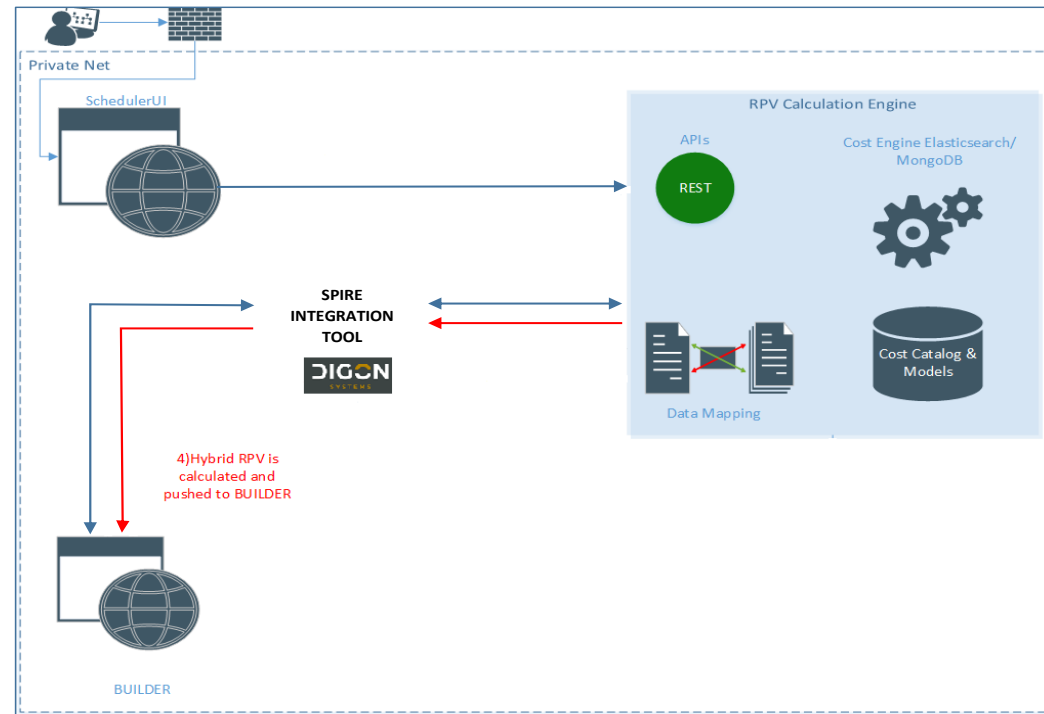
Parametric Components

D50200119000	DOE - 2 Story Office - Branch Wiring		SF				\$2.29
Unit Cost ID	Description	Qty	Unit	Material	Labor	Equipment	Total OP
260519900940	Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	0.0040	C.L.F.	\$11.75	\$61.50		\$0.29
260533132500	Intermediate metal conduit, 1/2" diameter, to 10' high, incl 2 terminations, 2 elbows, 11 beam clamps, and 11 couplings per 100 LF	0.1850	L.F.	\$2.42	\$6.80		\$1.71
260533160150	Outlet boxes, pressed steel, 4" square	0.0040	Ea.	\$3.17	\$34.00		\$0.15
260533160300	Outlet boxes, pressed steel, plaster rings, 4" square, concealed	0.0040	Ea.	\$2.24	\$10.60		\$0.05
262726202460	Duplex receptacle, grounded, 120 volt, 15 amp	0.0040	Ea.	\$1.39	\$16.95		\$0.07
262726203110	Wall plate, brown plastic, 1 gang	0.0040	Ea.	\$0.42	\$8.50		\$0.04



Cost Engine Integration Diagram

1. Cost Engine 'Scheduler' initiates a request to update RPVs for NNSA assets
2. Cost Engine requests asset information including model IDs and RPUIDs from BUILDER via SPIRE, Integration Tool*
3. Cost Engine receives BUILDER inventory via SPIRE*
4. Cost Engine generates enhanced RPV and returns to BUILDER via SPIRE to populate the new value



* This may be part of the same service/step



NNSA Cost Engine Project Results

1. With RSMeans data, NNSA, will be a leader in this important stage of BUILDER maturity
2. NNSA will be the first agency with a high-fidelity BUILDER costing system capable of generating customized RPVs
3. NNSA will have more accurate, defensible costs to support the mission of sustaining aging infrastructure



Questions and Discussion

For additional questions or more information,
please contact:

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