B61-12 Life Extension Program Project Controls System Overview

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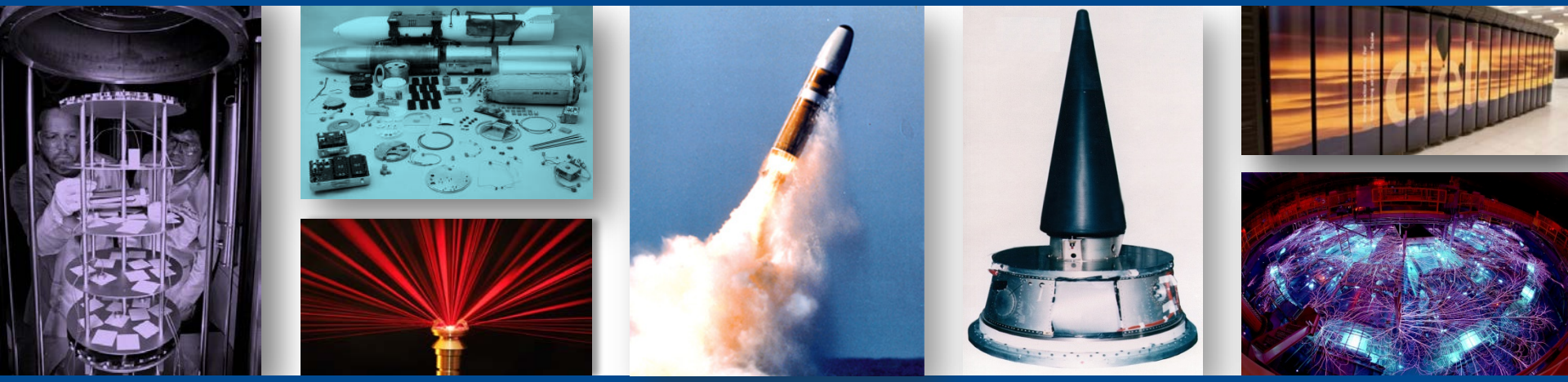
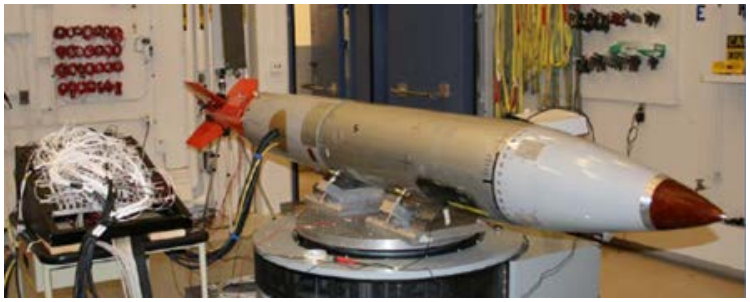


B61-12 Life Extension Program

- **Purpose:**
  - Address aging issues and ensure service life requirements are met
  - Reduce maintenance intervals
  - Assure compatibility with legacy / modern aircraft
- **Primary Objectives:**
  - Maintain military effectiveness
  - Consolidate B61 modifications
  - Improve safety and security
  - Reduce NNSA/DoD cost of ownership over the life of the system



- **Schedule:**
  - First Production Unit 2020
  - Production Complete 2024
- **NNSA Cost Estimate $8.1B ($7.3B + $0.8B other programs)**

B61-12 LEP PCS Nomenclature

Projects all roll up into the B61-12 ***Program***

NNSA

Each Agency Represents an individual ***Project***

SNL DA | LANL DA | KCP PA | SRS PA

SNL PA | LANL PA | Y12 PA | PX PA

NNSA -	National Nuclear Security Administration
SNL -	Sandia National Laboratory
LANL -	Los Alamos National Laboratory
KCP -	Kansas City Plant
SRS -	Savannah River Site
PX -	Pantex
DA -	Design Agency
PA -	Production Agency

NNSA Weapons Project Management

- **In the past:**
  - **Scope managed by Product Realization Teams (PRTs):**
    - Deliverable hand-offs and organizational interfaces
    - Handoff Milestones and PRT Schedules – driven by need dates
  - **Cost estimates for labor:**
    - Dominated by level-of-effort support
  - **Schedule/budget performance:**
    - Measured by milestones and adherence to spend plan
    - Limited rigor in programmatic total float/critical path calculations
- **Drivers for change:**
  - **US Congress/GAO**
    - Higher fidelity estimates for scope, schedule, and budget
    - Deliver proposed scope on-schedule and on-budget
  - **NNSA Defense Programs Initiative 2012**
    - Mandated resource-loaded Primavera Schedules, EVMS implementation

NA-19 B61-12 LEP Management System Mission

- **Implement a Project Controls System that will facilitate effective scope, schedule, and budget management**
  - **Baseline resource-loaded, logically-linked primavera schedules for each agency** – includes technical scope from PRTs
    - Establishes Performance Measurement Baseline (PMB)
  - **NNSA Integrated Master Schedule (NIMS) in Primavera**
    - Captures logic strings for all products, across all agencies, from concept through production, providing accurate critical path calculations
  - **Earned value management system (EVMS) tailored for weapon acquisition projects**
    - Provides performance data & mandates in-depth root cause analysis, mitigation strategies, forecasting and formal change control

NNSA Weapons Project Management

- **Present and Future:**
  - **Agencies manage:**
    - Scope, schedules, and budgets using PMB
    - Project/Program Managers and CAMs balance scope, schedule, and budget with technical input from PRTs
  - **Cost estimates for labor:**
    - Dominated by discrete activities from resource-loaded schedules
  - **Schedule/Budget performance:**
    - EVMS and milestone delivery by project and at program level based on PMB
    - Electronic roll-up (summary) of agency schedules into NNSA Integrated Master Schedule (NIMS) provides integrated programmatic information
    - Milestones driven by schedule logic to early dates
    - NIMS provides up-to-date programmatic critical path information
    - Program PMB based on roll-up of project PMBs

B61-12 LEP PCS Requirements

- **Project Controls System Description (PCSD) "The What":**
  - **B61-12 LEP EVMS (Structured by ANSI-748 Category)**
    - Organization; Planning, Scheduling, & Budgeting; Accounting; Reporting; Change Control
    - Includes compliance matrix to ANSI-748 Guidelines
  - **B61-12 LEP Schedules**
    - Milestones; Design and Production Agency Schedules; NNSA Integrated Master Schedule (NIMS); Joint Integrated Master Schedule (JIMS)
  - **B61-12 LEP Integrated Baseline Reviews (IBRs)**
- **Project Controls Manual (PCM) "The How":**
  - **Processes, procedures, and templates for how requirements are met**

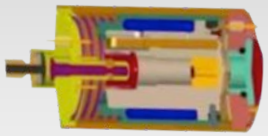
Representatives from Each Agency Chartered to Develop PCSD & PCM - Garnering Consensus, Buy-in, & Programmatic Support

Sandia Design Agency Scope

- **Responsible for:**
  - System engineering integration of the complete weapon
  - All non-nuclear components of the nuclear weapon
  - Technical Basis of the weapon qualification for War Reserve
  - All trainers, handling gear
  - Surveillance and sustainment of the system upon entry into the inventory to assure that it remains safe and militarily effective

Warhead Systems Engineering and Integration

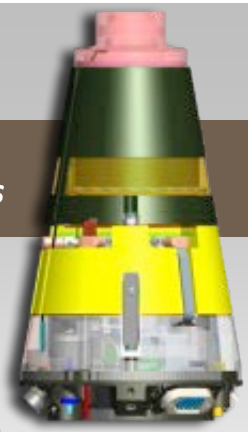
Design Agency for Nonnuclear Components



Gas Transfer systems

Neutron generators

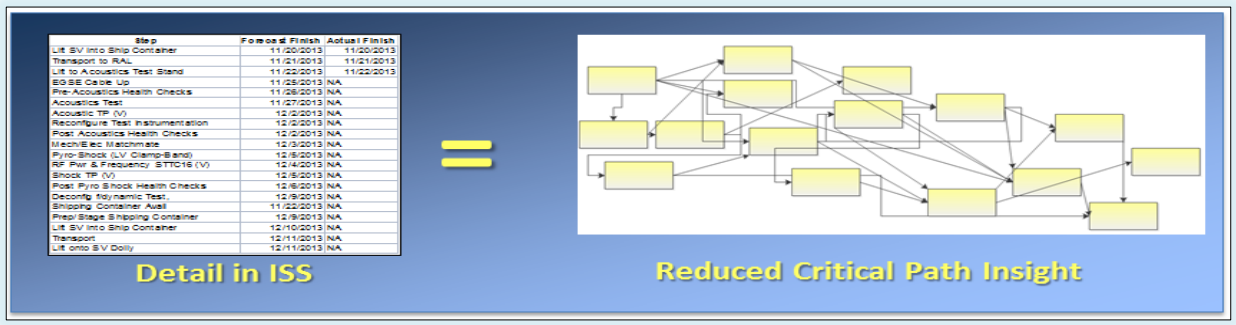
Arming, fuzing, and firing systems



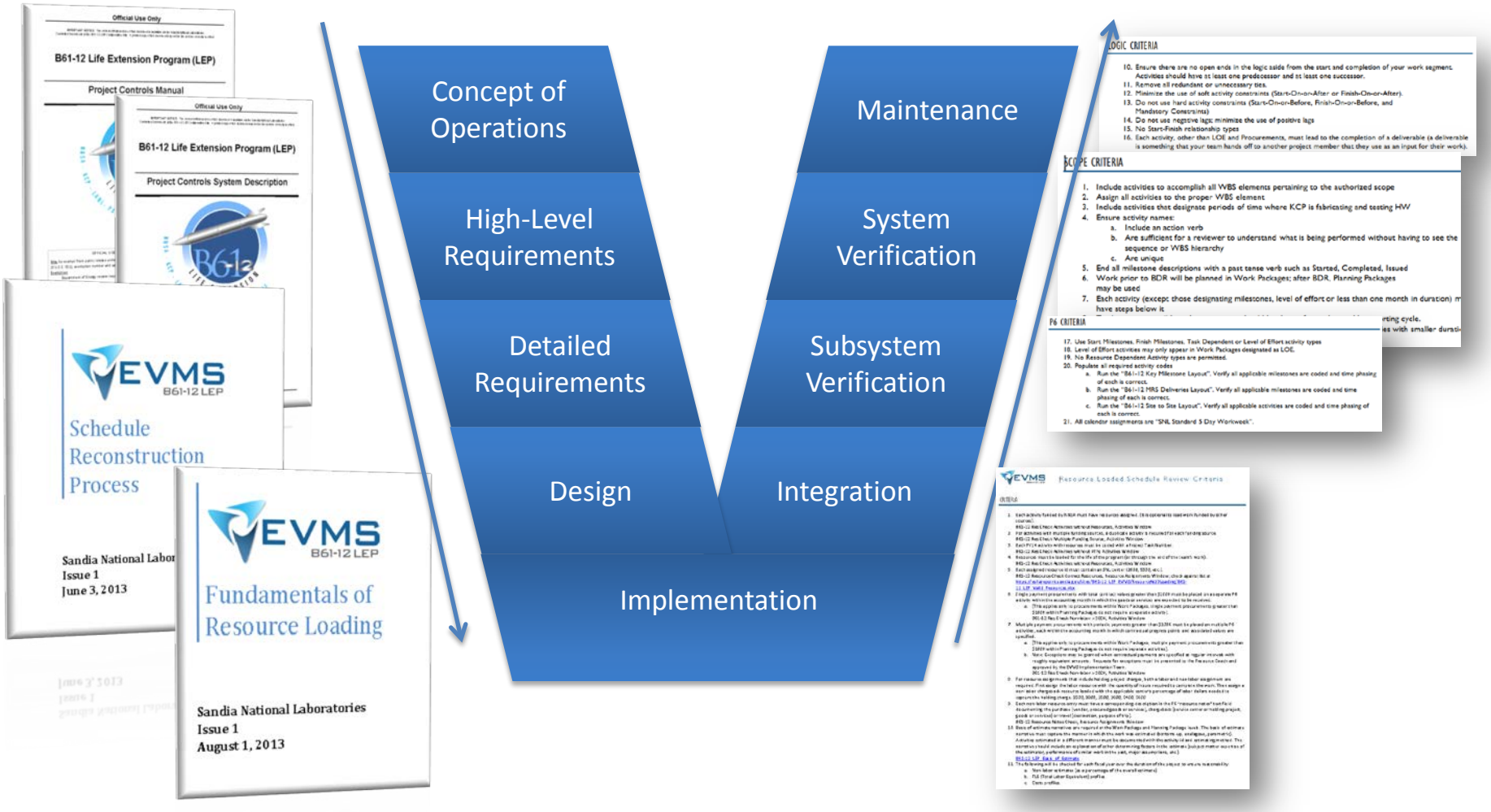
Safety systems

Sandia Weapons Project Management

- **In the past:**
  - **PRTs managed cost, schedule and technical performance somewhat independently**
  - **Programmatic performance evaluated using milestone achievements and tracking to a spending plan**
  - **Inconsistent level of detail and organization methodology in schedules**
    - 60,000 activities, thousands of interdependencies—complex network of interlinked activities preventing critical path analysis
  - **Schedule linkage management loosely controlled**



Systems Engineering Approach to Schedule Reconstruction and Resource Loading



Keys to Success

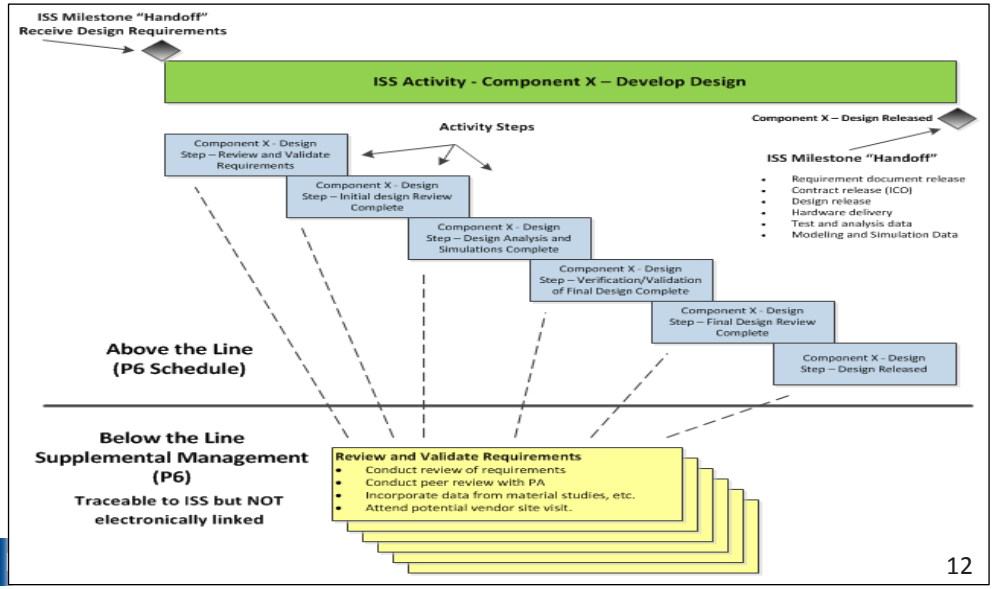
- **High-level philosophy in EVMS implementation:**
  - **Requirements and design solutions must benefit the organization**
  - **These benefits must be communicated repetitively to Managers, Leads, and Project Controls staff in order to change the culture and garner support for the EVMS**

- **Three factors leading to success:**
  - **Assure proper sizing of the EVMS**
  - **Develop an efficient schedule architecture**
  - **Establish a Program Business Rhythm**

Assure Proper Sizing of the EVMS

- PMB schedule contains enough detail for critical path analysis, but not an overly complex set of network paths
  - Activities 2 weeks to 2 months in duration
  - Most activities lead to a handoff
  - Utilize Primavera "steps" for additional detail under discrete activities
- PMB resources dictionary composed of "generic" resources instead of enterprise-wide resource list

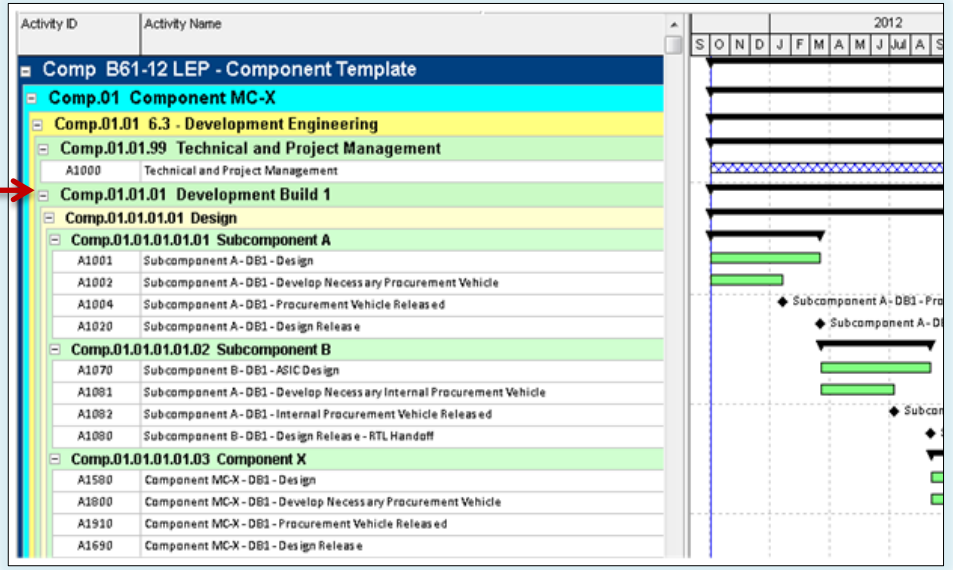
Resource Dictionary	
Smith, John|16|2624	By Name - Too much detail
ENGINEER TEST|16|2624	By Dept. – Better
ENGINEER TEST|16|2600	By Center – Recommended



Develop an Efficient Schedule Architecture

- **Schedule construction guidance provides criteria for a <u>consistent</u> architecture**
  - **Provide schedule templates—starting point for schedule construction**
  - **Establish activity and step requirements**
    - **Activities 2 weeks to 2 months; one step per month**
  - **Establish standard activity and convention for naming milestones**

WBS		
01	Component MC-X	
'01.01	6.3 Development Engineering	CA-Control Account
01.01.99	Technical and Project Management	WP-Work Package
'01.01.01	Development Build 1	
'01.01.01.01	Design	WP-Work Package
'01.01.01.02	Fabricate	WP-Work Package
'01.01.01.03	Test & Analysis	WP-Work Package
'01.01.02	Development Build 2	
'01.01.02.01	Design	PP-Planning Package
'01.01.02.02	Fabricate	PP-Planning Package
'01.01.02.03	Test & Analysis	PP-Planning Package
'01.01.03	Development Build 3	
'01.01.03.01	Design	PP-Planning Package
'01.01.03.02	Fabricate	PP-Planning Package
'01.01.03.03	Test & Analysis	PP-Planning Package



Establish a Program Business Rhythm

Team Member	Charter
Customer - NNSA	Direction, Requirements, Visibility
B61-12 LEP Program Manager *- all at CAM and Control Account Level* Control Account Manager *- all at Control Account and Work Package*	• Manage Management Reserve • Allocate CAM Budgets • Establish Key Performance Metrics • Monitor performance at CAM and Control Account level • Sets Schedule for Reviews • Monitor, Review and Approve artifacts (VARS, Corrective Actions, etc.) • Review and Approve Change Requests
Tech Leads and Supporting EVM Staff (Financial Analyst, Schedulers)	• Develop detailed Control Account Plans • Conduct twice monthly schedule status • Identify and analyze problems • Develop workarounds • Produce monthly EV metrics • Perform variance analysis • Exercise tradeoffs • Determine corrective action plans • Report performance to CAMs and PM • Develop Change Requests

Strategic direction and accountability

Execute the Program

Create a Constant Flow of Actionable Information

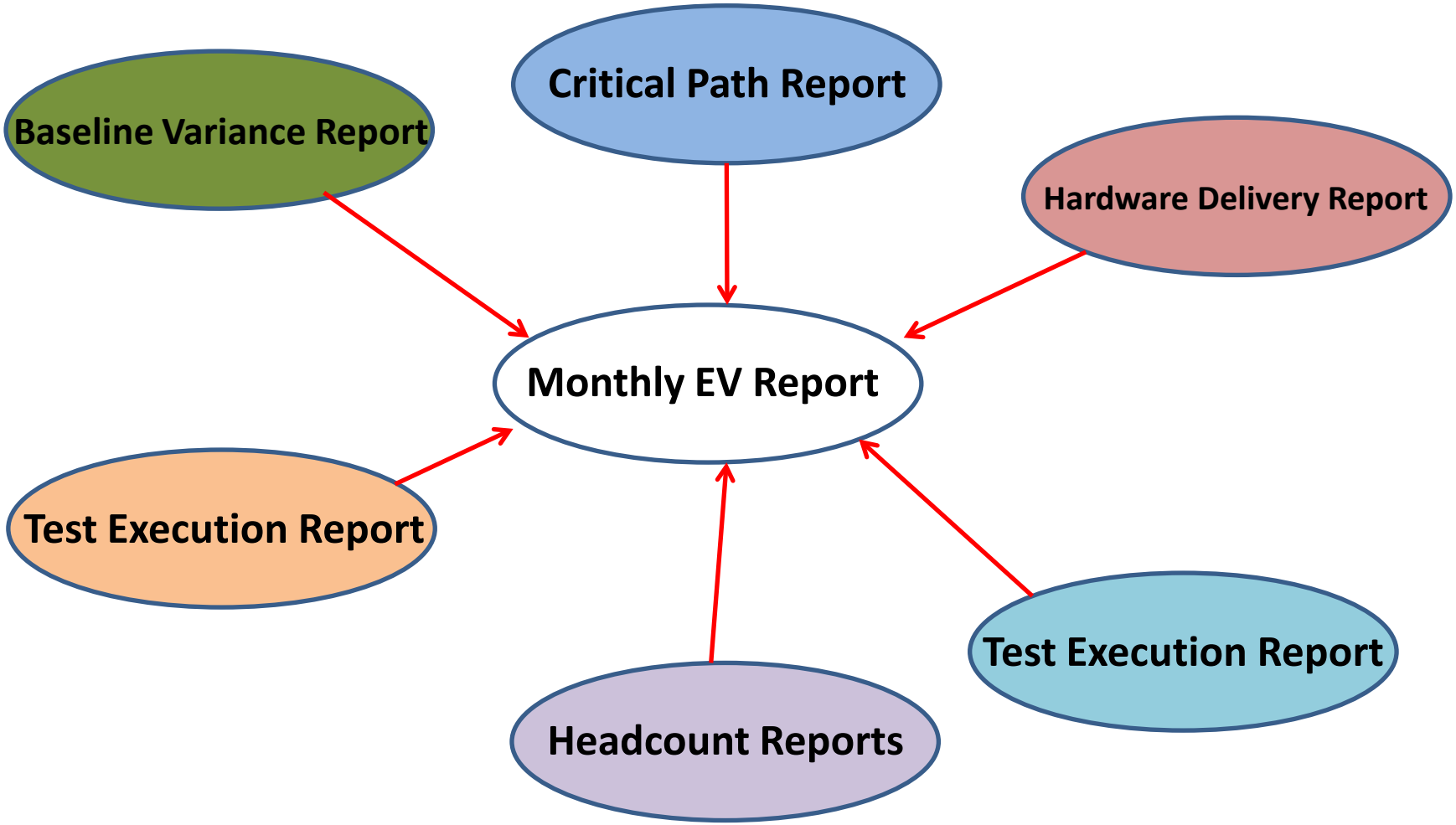
Program Business Rhythm

October 2014

CAMs | Schedulers | Tech Leads | PCAs
B61-12 PM | EV Team | NNSA Deliverables | Reviews

S	M	T	W	T	F	S
★1			1 CAM Quad/Schedule Review - *rescheduled from 9/24* Tech Leads Post Quad Charts Review Key Milestone Handoff Report with PRTs	2 Generate and Distribute Month End EV Reports/VARs	3	4
5 ★2	6 Tech Leads Review EV Data and Develop Variance Reports (VARs) INTEGRATED BASELINE REVIEW (IBR)	7 CANCELLED: CAM Meeting	Mid-Month Schedule Status CANCELLED: Quad Chart Rvw	9 CAMs Review EV Data / VARs	10 NIMS Flash File Due	11
12 ★3	13 Tech Leads Review Mid-Month Schedule Data and Develop Quad Charts	14 PM EV Data Review CAM Meeting Reporting Schedules Available	15 NIMS Passback Tech Leads Post Quad Charts Generate Handoff Spreadsheet	16 Merge/Distribute Handoff Spreadsheet	17	18
19 ★4	20 NNSA Monthly Reports Due Review Key Milestone Handoff Report with PRTs SITE REVIEW AT KCP	21 CAM Meeting	22 CAM Quad/Schedule Review	23	24	25
26	27 Critical Path Available on SCN	28 CAM Meeting	29 Month End Schedule Status	30	31 Enter ETCs (starting at 1PM) Financial Month End	

Project Controls Tools



Integration of EVMS Tools

Reasons EcoSys was Chosen

- Flexibility
- Scalability
- Highly Configurable
- Access/ Data Control
- Future Tool Advancements
- Broad Capabilities over Multiple Functional Areas

Implementation

- EcoSys Consultant was onsite
- Regular interaction throughout development
- Defined functionality and system requirements
- Had dedicated implementation team with knowledge of our specific configuration
- Defined Success

Lessons Learned/ Pitfalls

- Understand impacts of Custom Configuration and allow time for testing
- Define Business Practices and Cycles in Stage 1 of Development
- Own Process, Procedures, and Tool
- Early Report Development (prior to Production)
- Allow for 3 months of high-fidelity testing and review of data
- Focus effort and resources on your specific implementation/configuration

Program Realizing Early Benefits

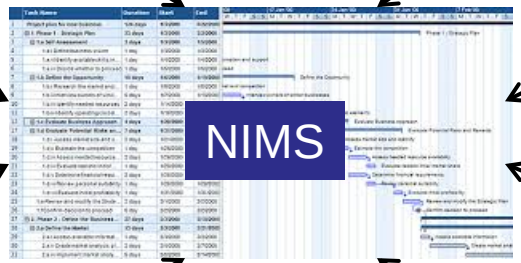
- **Managing Program to an integrated schedule**
  - Master schedule used in all meetings
  - Critical path driving decisions and utilization of risk mitigation funding
  - Internal/external handoffs clearly identified and key topic in reviews
- **Schedule and cost integration**
  - Cost impacts of schedule delays/gains understood
  - Over/Under-runs recognized earlier
  - Resource issues clearly highlighted – headcount
- **Earned Value rigor driving attention to planning**
  - Variance analysis exposes impacts of deviating from plan
  - Duration and resource estimates improving

Resource-Loaded Integrated Master Schedule System

Resource-Loaded Site Schedules

Resource-Loaded Site Schedules

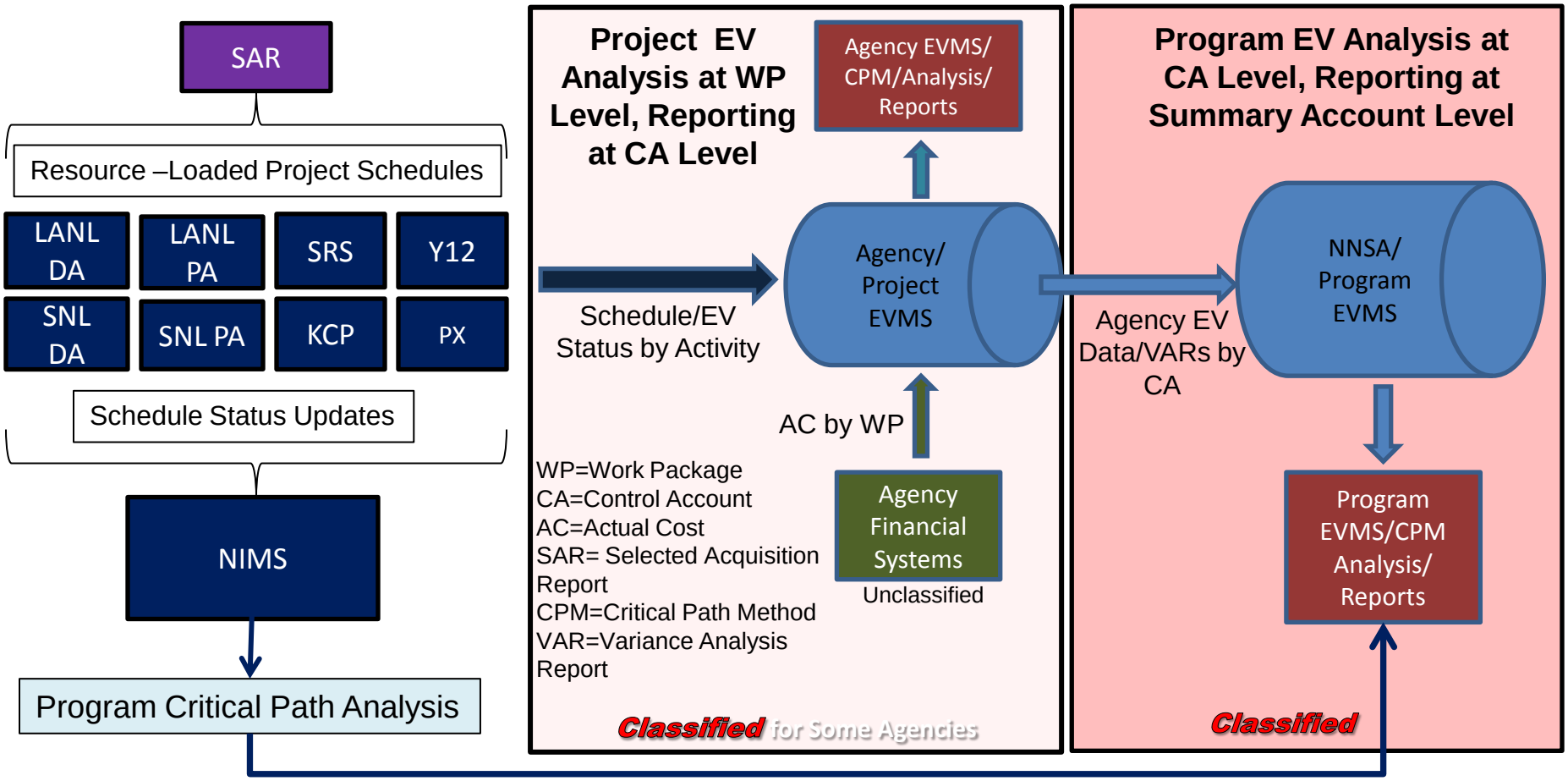
NIMS Provides Programmatic Life Cycle Schedule and Critical Path



Resource-Loaded Site Schedules Provide EV Data & Analysis Plus Site Critical Path

Alignment between Site Schedules and NIMS Maintained by Monthly Electronic Status Updates & Feedback Loop

B61 LEP Project Controls System

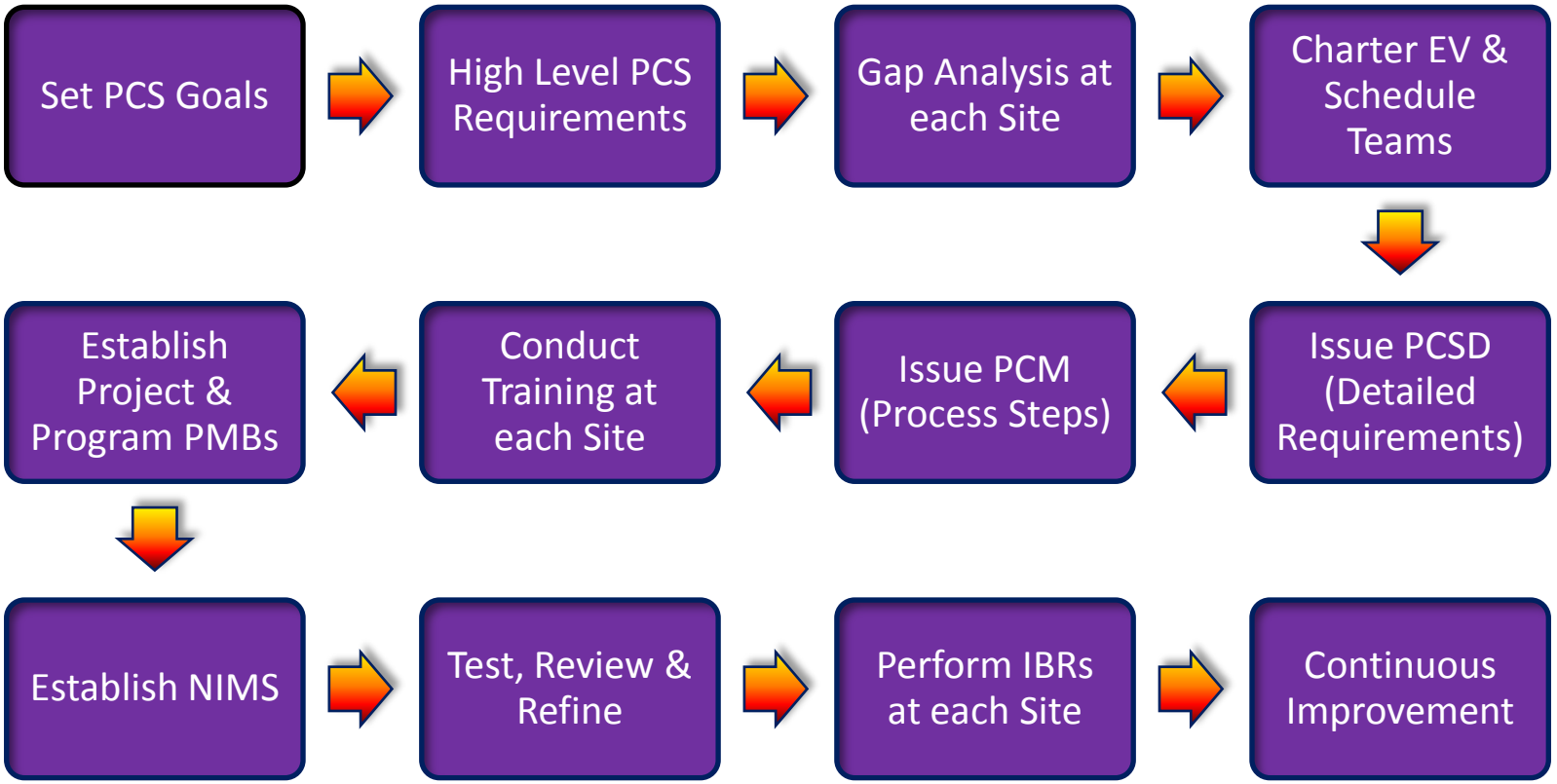


Indications of Progress

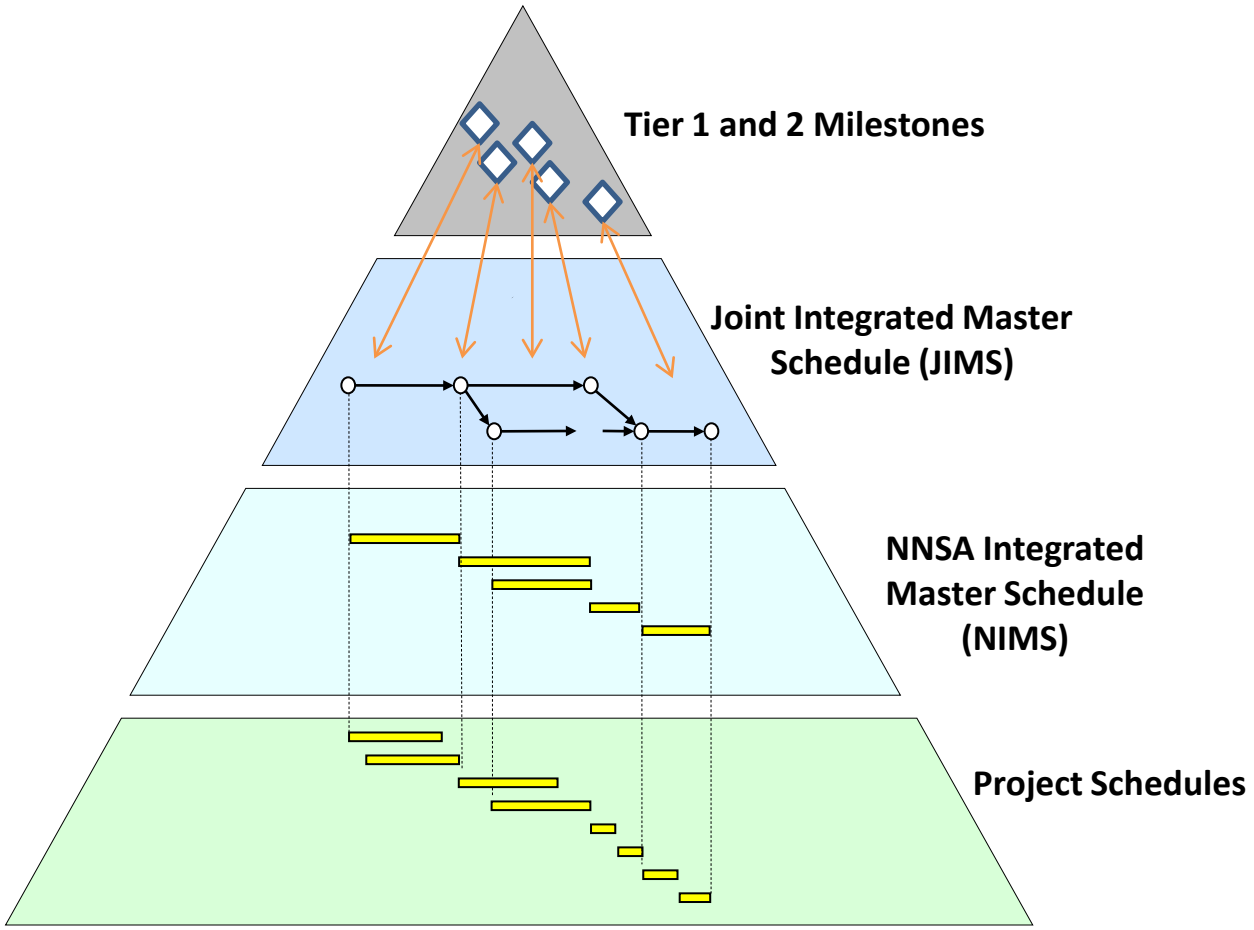
- **Project/Program EV and Schedule focus;**
  - Timely variance/issue identification by WBS and Organization
  - Detailed, documented, and timely analyses
  - Proactive management action
- **EV nomenclature established in team vernacular**
  - Full understanding and utilization of EV, PV, AC, PMB, BCR, Cost Variance, Schedule Variance, Critical Path, Total Float
- **Technical/Scope discussions include potential impact on schedule and budget for both product and program**
  - Recognition of the variance/poor-planning connection driving improved schedule/cost estimate quality
- **Recognition by project teams of value added from EVM/Schedule Management Rigor**
  - Enhanced integration, coordination, and forecasting

Backup Slides

Process for Developing the PCS



B61-12 LEP Schedule Hierarchy



NIMS Roll-up Mechanics

Relationship Between NIMS & Example Project Schedule