



CEAG
COST ESTIMATING ANALYSIS GROUP

Capital Acquisition Estimating Framework CECOP 2022 Presentation

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Sandia National Laboratories

Management and Budget



NNSA
National Nuclear Security Administration

Overview of CAEF Project

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- The purpose of the Capital Acquisition Estimating Framework (CAEF) is to provide clear and concise expectations when preparing programmatic cost estimates for NNSA capital acquisition projects
- While DOE and NNSA have governing orders and policies such as DOE O 413.3B, these cost estimating requirements are very high-level and supplemented by numerous cost guides
 - CAEF fills this gap by leveraging the programmatic cost estimating expertise across the Nuclear Security Enterprise (NSE) M&O sites and the NNSA to provide a single document that identifies actionable best practices for common use

Overview of CAEF Project

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- Sponsored by the Cost Estimating Analysis Group (CEAG) and funded by the Office of Research, Development, Test, and Evaluation (NA-11)
- Team consisted of cost estimating SMEs from the M&O sites and the Office of Programming, Analysis and Evaluation (PA&E), NA-MB-90 as NNSA's programmatic cost estimating lead

Final Framework Document

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- Framework document was finalized in February 2022
- Final document includes the following:
 - Cost Estimating Expectation Framework which is organized by the GAO's Cost Estimating and Assessment Guide's 12 Step Best Practices
 - Expectations to achieve each step broken out into tables
 - Capital Acquisition Cost Estimating Flowchart identifying roles and responsibilities
 - CAEF WBS with a dictionary included
 - Cost Estimate Plan Template
 - Basis of Estimate Template
 - Estimate submittal table of contents

CAEF Structure

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- Follows the GAO guide structure
 - Chapters of the framework emulate the GAO Guide's 12 steps to cost estimating
- Cost estimating expectations written in clear language
- Expectations are placed into tables for each GAO step so they are easy to pick out
- The term “Estimate Team” is used throughout to represent individuals or larger groups, single or multiple disciplines, and NNSA and/or M&O partners or their subcontractors depending on the situation

The Team

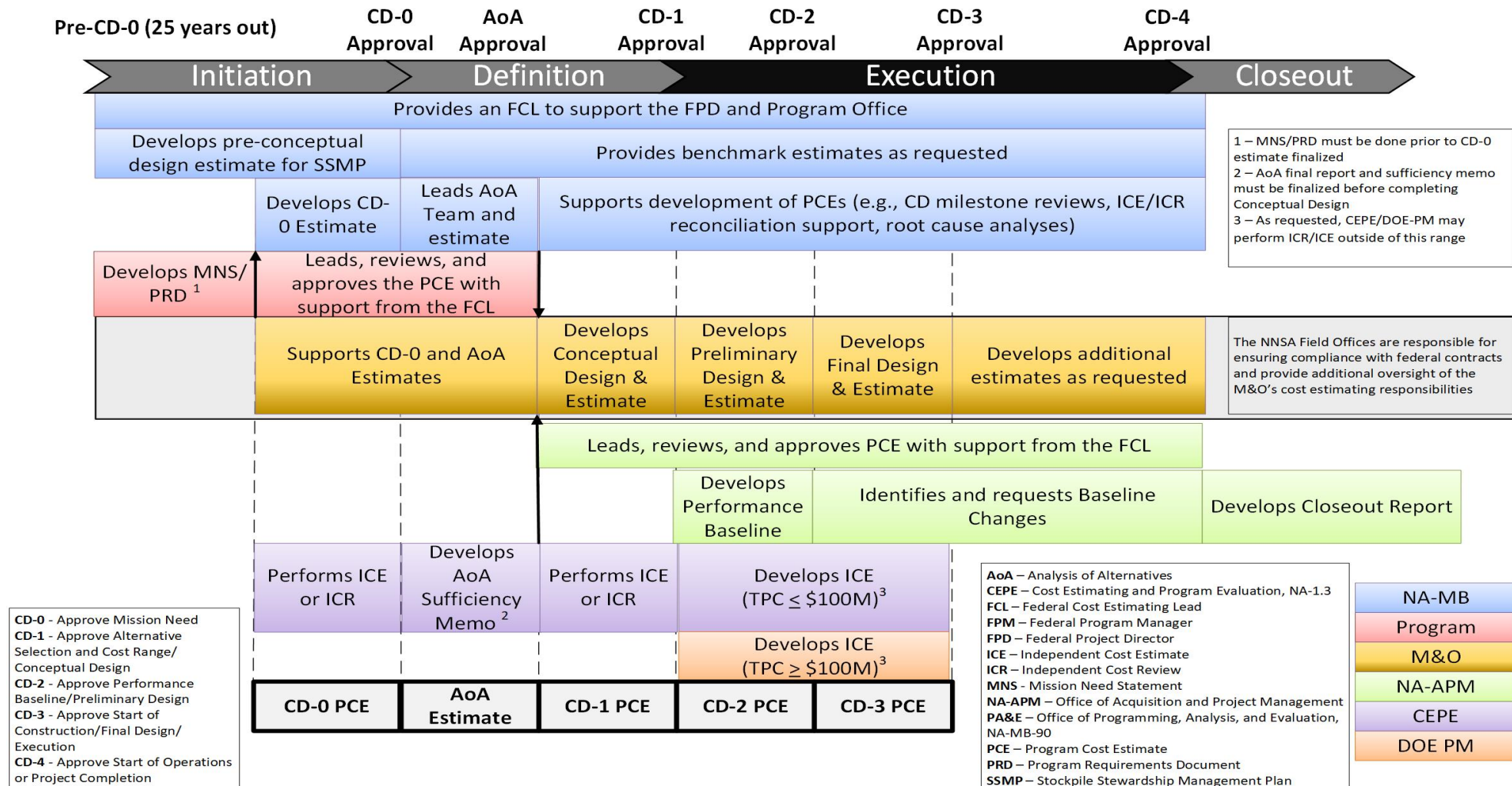
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Team Members and CEAG Council Members			
Chris Adams	LLNL	Krista Lathery	NNSS
Julie Anderson	NNSA	Duff Lill	SNL
Cameron Ayers	KCNSC	Charles Loelius	NNSA
Sakti Basu	LLNL	Carol Meyers	LLNL
Edward Bright	KCNSC	Tanya Moore	LANL
Mac Carey	NNSA	Carly Naylor	KCNSC
Phil Chamberlin	SNL	Mike Nelson	SRS
Abhijeet Deshmukh	NNSA	Chris Nesbit	SNL
David Epp	SNL	Susan Norwood	NNSA
Cash Fitzpatrick	NNSA	Todd Proffitt	LANL
Veronica Garza	LLNL	Jonell Samberson	SNL
Travis Gitau	NNSA	Gabriel Sandler	NNSA
Jennifer Gonzales	SNL	John Tapia	LANL
Ross Hallman	CNS	Brian Temple	LANL
Casey Hulet	NNSS	Tri Tran	LANL
David Hulett	NNSA	Rodney Whisenhunt	SNL
Megan Ladwig	KCNSC	Eric White	CNS
Kathy Lane	SNL	Jason Wilson	SRS
Maura Lapoff	NNSA	Carrie Wood	SNL

Roles and Responsibilities in Capital Acquisition Cost Estimating

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Roles & Responsibilities in Capital Acquisition Cost Estimating



- CAEF was authored to be generally applicable to any capital acquisition project and it was anticipated it would be issued by the program or project lead
- The term “shall” is used throughout this document and reflects the authors’ endorsement of specific methods and practices to be followed
 - However, given the diversity of project size and complexity across NNSA’s capital portfolio, it may be appropriate to tailor specific requirements depending on the situation

- Official policies take precedence if any conflicts arise between those policies and this framework
- CAEF is intended to support programmatic cost estimates. Independent Cost Estimates follow guidance from DOE-PM and CEPE.

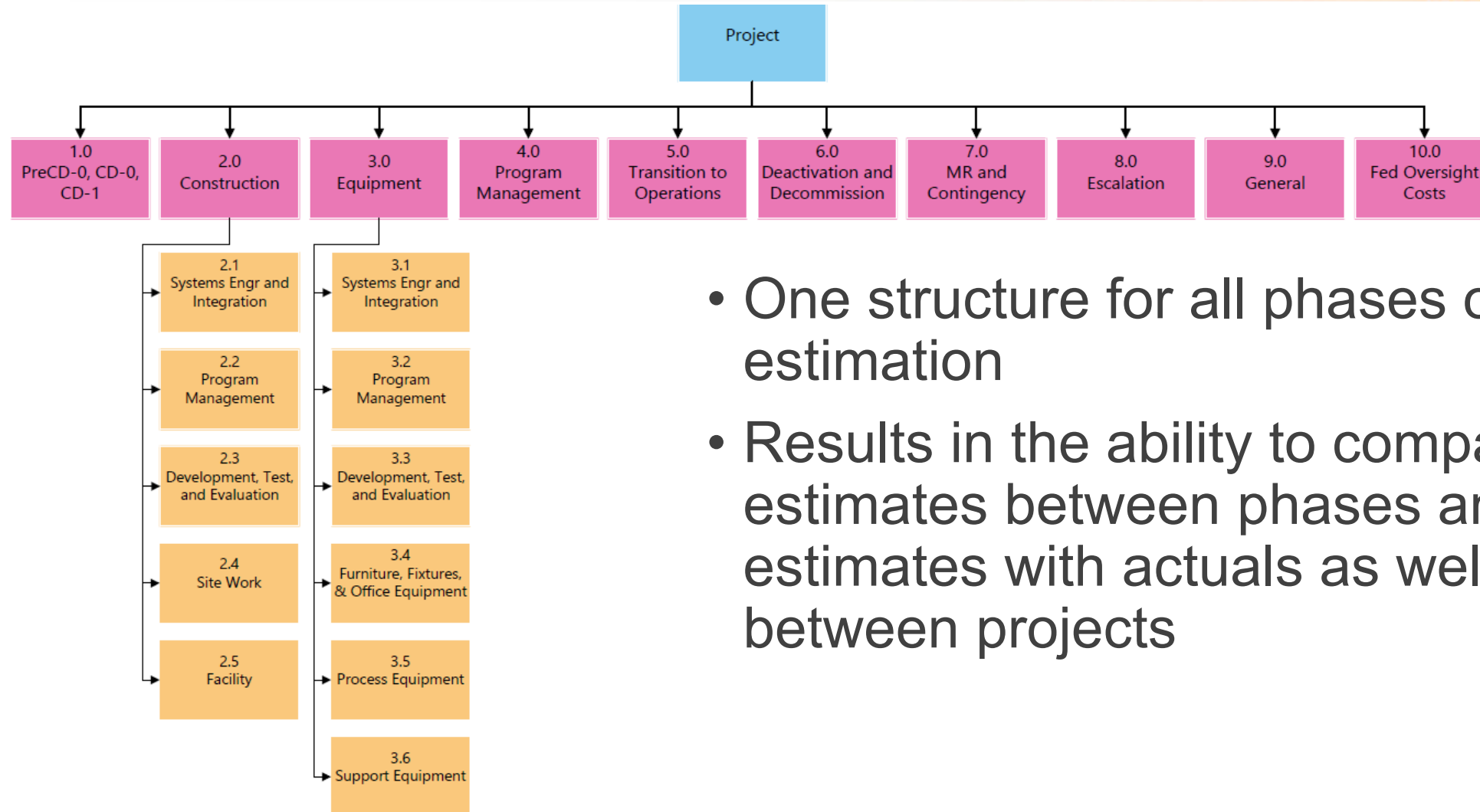
CAEF WBS w/ WBS Dictionary

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- To develop the WBS, the team pulled from
 - DOE WBS
 - Construction Specifications Institute (CSI) Uniformat
 - NA-MB-1.4 (Office of Business Systems and Integration) project reporting WBS
- The WBS with its associated WBS Dictionary is included within the CAEF as a potential structure to organize estimates
- NNSA is continuing to develop a common capital WBS which the CAEF team believes will improve the NNSA's ability to estimate and validate estimates against actuals for lessons learned

CAEF WBS

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- One structure for all phases of estimation
- Results in the ability to compare estimates between phases and estimates with actuals as well as between projects

CAEF WBS

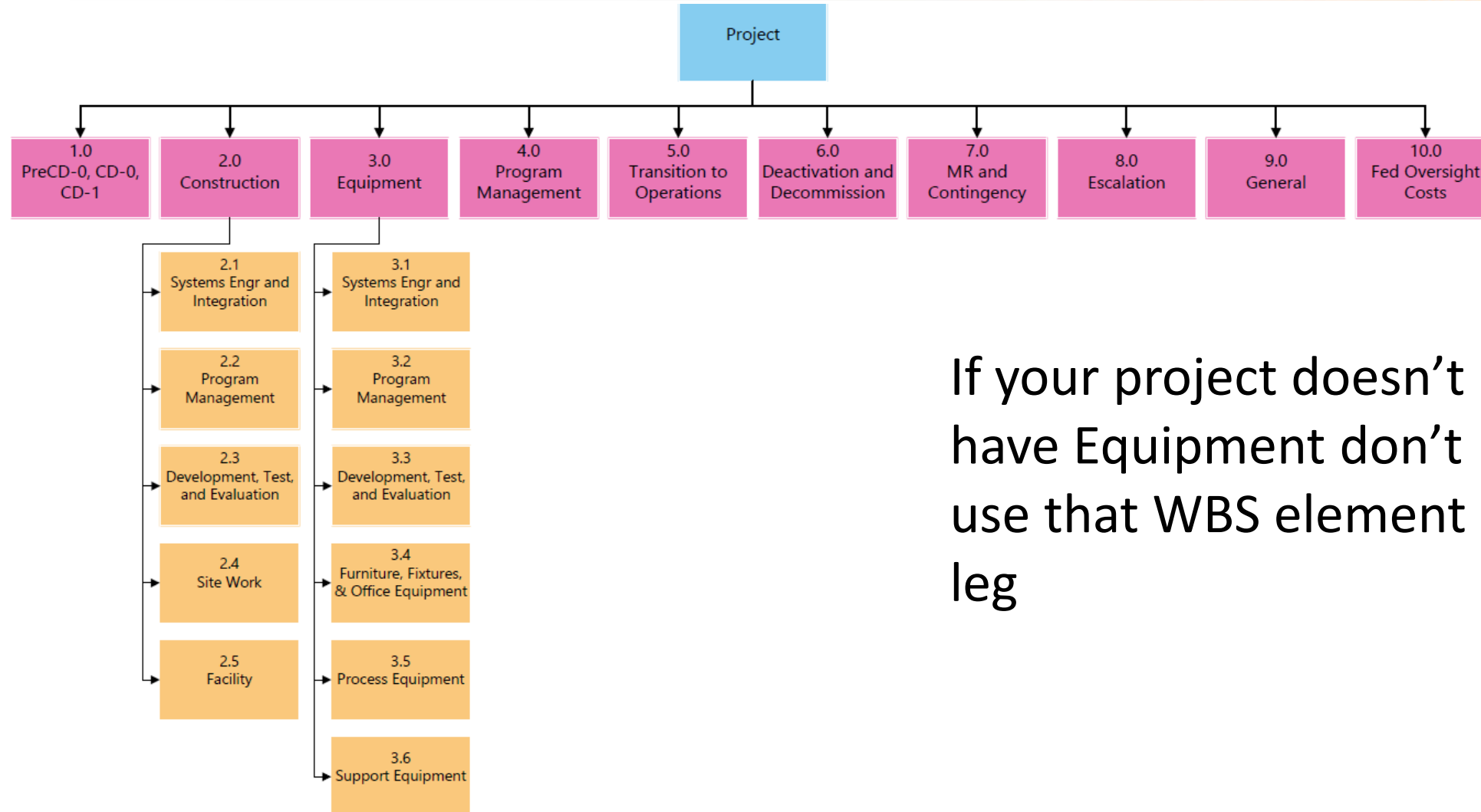
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WBS	Title	Level
2.5.1.9	Miscellaneous Facility Structure	4
2.5.2	Facility Utilities	3
2.5.2.1	Systems Engineering and Integration	4
2.5.2.2	Program Management	4
2.5.2.3	Training	4
2.5.2.4	Development, Test, and Evaluation	4
2.5.2.5	Operations and Support	4
2.5.2.6	Conveying System	4
2.5.2.7	Plumbing System	4
2.5.2.7.1	Plumbing Fixtures	5
2.5.2.7.2	Domestic Water Distribution	5
2.5.2.7.3	Sanitary Waste	5
2.5.2.7.4	Rainwater Drainage	5
2.5.2.7.5	Miscellaneous Plumbing	5
2.5.2.8	HVAC System	4
2.5.2.8.1	Energy Supply	5
2.5.2.8.2	Heat Generating Systems	5
2.5.2.8.3	Cooling Generating Systems	5
2.5.2.8.4	HVAC Distribution	5
2.5.2.8.5	Terminal and Packaging Units	5

- Detail is available but it is anticipated that the WBS will be tailored
- Use the appropriate level for the phase you're estimating.

Tailorable WBS

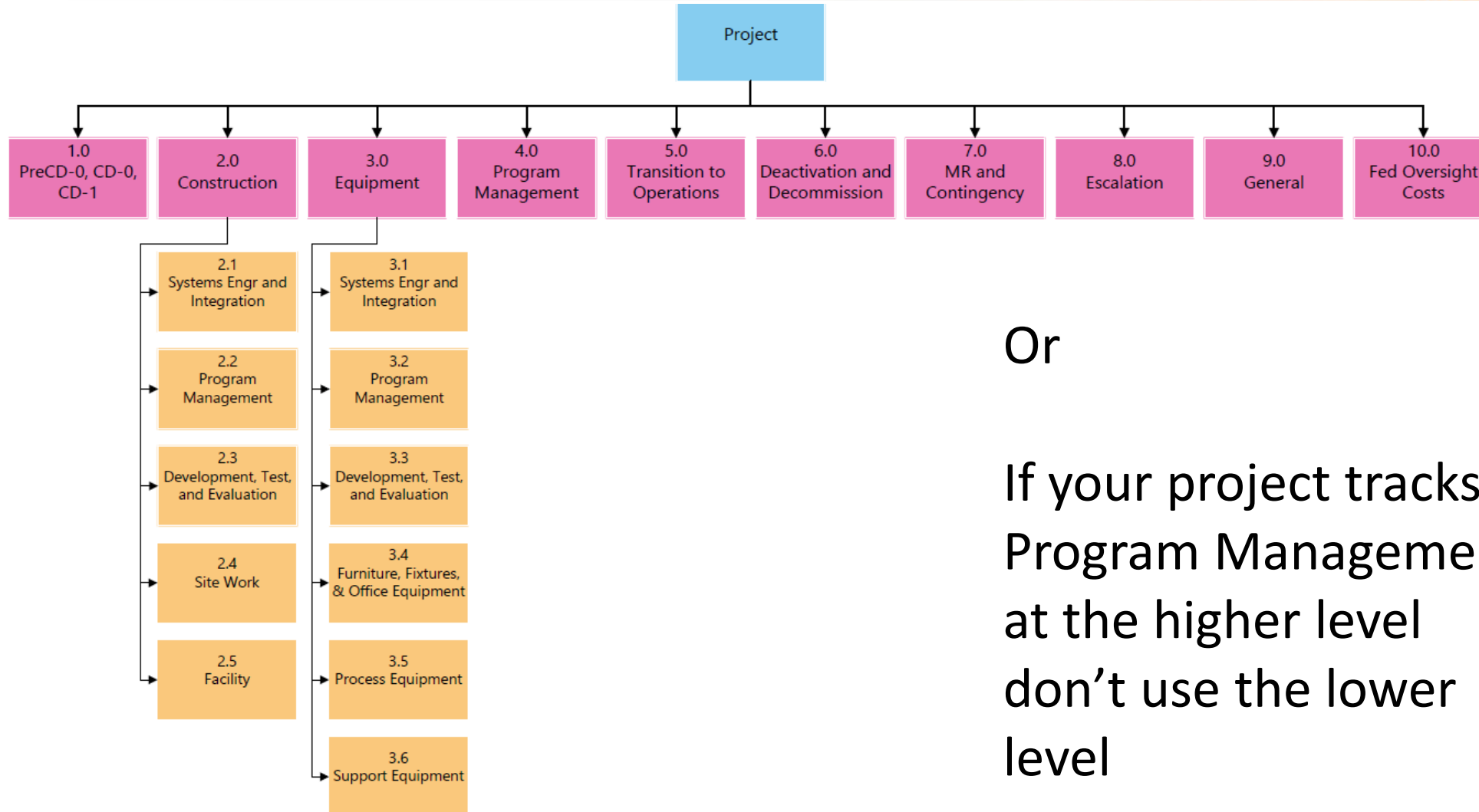
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If your project doesn't have Equipment don't use that WBS element leg

Tailorable WBS

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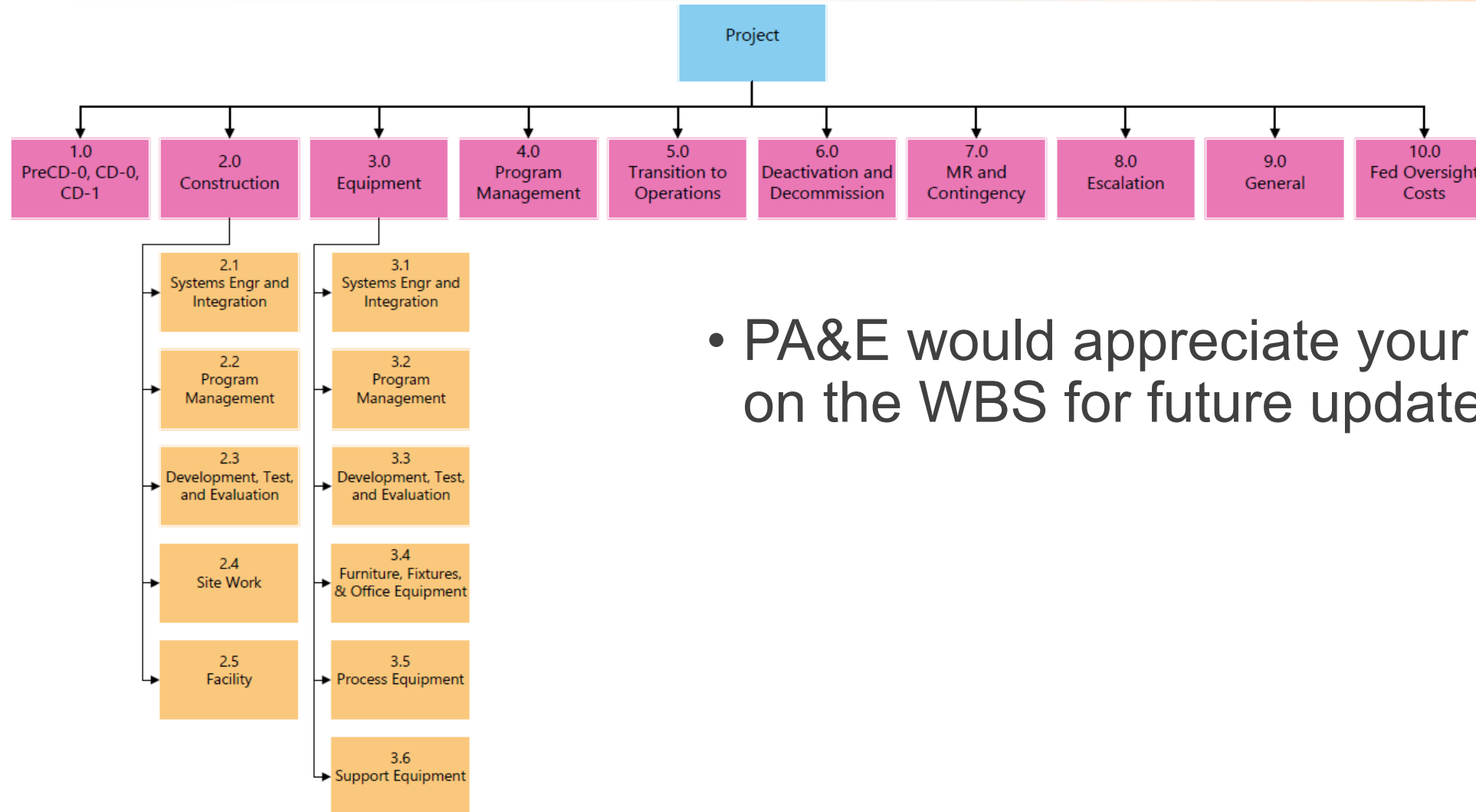


Or

If your project tracks
Program Management
at the higher level
don't use the lower
level

CAEF WBS

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- PA&E would appreciate your feedback on the WBS for future updates

Also included – Cost Estimate Plan Template

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Appendix C: Cost Estimate Plan Template

Objective of the Cost Estimate Plan Example

The objective of this CAEF Cost Estimate Plan example is to provide a template that outlines the strategy and approach for the development and successful approval of estimates associated with capital acquisition projects.

The Cost Estimating Analysis Group (CEAG) and the Office of Programming, Analysis, and Evaluation (PA&E, NA-MB-90) CAEF project is chartered to outline a framework (versus guidance, requirement, etc.) to develop estimates for capital acquisition projects.

The framework provides a single document that addresses and consolidates the many DOE and NNSA directives and guidance documents, and provides best practices (using GAO best practices as a starting point) and lessons learned from subject matter experts (SMEs), previous capital acquisition projects, and reviews. The framework's objective is to facilitate and improve the capital acquisition process (CD-0 through CD-4), and ensure that cost estimates are accurate, transparent, defensible, and consistent with requirements, best practices, and lessons learned.

This Cost Estimate Plan template is written in an instructional format to accompany the framework and provides suggested templates and examples from previous successful projects to organize and communicate the estimate development process. This plan is written for the most detailed estimate to be provided, CD-2 or CD-3. It is anticipated that estimates at previous phases might not require the level of detail required for CD-2 or CD-3. However, even for CD-2 and CD-3, this plan will be tailored as applicable.

Background

The CAEF Cost Estimate Plan example builds upon the success of the 2020 Weapons Systems Cost Estimating Guidance (Reference 6) that was tailored and used for the W87-1 Weapons Design and Cost Report and W80-4 Baseline Cost Report guidance. That success was possible because of the expertise, experience, and collaboration of participants from NNSA and across the M&O partners.

Similarly, this framework is composed of representatives from NA-MB-90 (lead), and M&O SME representatives from Consolidated Nuclear Security, LLC (CNS), Kansas City National Security Campus (KCNSC), Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), Nevada Nuclear Security Site (NNSS), Sandia National Laboratories (SNL), and Savannah River Site (SRS).

Also included – Basis of Estimate Template

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Appendix D: Basis of Estimate Template

Start of Basis of Estimate Template

Basis of Estimate Development Template, Instructions and Examples

Basis of estimates (BOEs) are developed for each to-be-determined work breakdown structure (WBS) element with the level of WBS commensurate with the phase of the estimate (i.e., lower-level WBS elements for more detailed phases).

1.0 Work Breakdown Structure Name, Number, and Dates

WBS # Title [insert WBS number and title as it appears in current WBS] and [dates]

[EXAMPLE] WBS 01.26.09.00.01.02.01.05 – Project Support – Technical Agencies (LOE)

2.0 Description of Scope

This WBS is for [insert type] work during the [insert phase] phase of the [insert title] subproject. The scope of the work consists of [insert objective of scope].

[EXAMPLE] This WBS is for Technical Agency project support during the Planning, Engineering, and Design phase of the Engineered Equipment Procurement subproject. The scope of the work consists of support for the purchase of equipment for the Training and Operations Center.

Also included – Submittal Table of Contents

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Estimate Submittal Table of Contents

- 1.0 EXECUTIVE SUMMARY
- 2.0 INTRODUCTION
 - 2.1. Project Description
 - 2.1.1. Estimate Team Organization, Roles, and Responsibilities
 - 2.1.2. Project Manager
 - 2.1.3. Project Engineer
 - 2.1.4. Operations Manager/System Owner Representative
 - 2.1.5. Construction Representative
 - 2.1.6. Project Controls Representative
 - 2.1.7. Quality Assurance Representative
 - 2.1.8. Environment, Safety, and Health Representative
 - 2.1.9. Procurement Representative
 - 2.1.10. Safeguards, Security, and Emergency Services Representative
 - 2.1.11. Readiness Leader
 - 2.1.12. Safety Analysis Representative
 - 2.1.13. Program Manager
 - 2.2. Estimate Basis
 - 2.3. Financial Information
 - 2.4. Summary Estimate by Participant
 - 2.5. Project Summary Work Breakdown Structure
 - 2.6. Project Schedule
- 3. BASIS OF ESTIMATE
 - 3.1. PROJECT SCOPE AND TECHNICAL BASIS
 - 3.1.1. Site Conditions
 - 3.1.2. Project Assumptions
 - 3.1.3. Project Exclusions

Also included – Submittal Examples

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
	Table 1. Total Project Cost (TPC)																			
	Project Name																			
	Historical Projects								Previous CD-2/3				Current CD-2/3				Delta			
	Project 1								\$ 25				\$ 25				\$0			
	Project 2								\$ 2,500				\$ 2,500				\$0			
	Total Historical Projects								\$ 2,525				\$ 2,525				\$0			
	Current Projects																			
	Project (Capital)																			
	Total Sunk Costs								\$ 30,000				\$ 40,830				(\$10,830)			
	Project Management (To-go)								\$ 4,500				\$ 4,700				(\$200)			
	Title I & II Design (To-go)								\$ 500				\$ -				\$500			
	Procurement (To-go)								\$ 5,200				\$ 4,000				\$1,200			
	Execution (To-go)								\$ 29,000				\$ 30,000				(\$1,000)			
	Authorization Basis (To-go)								\$ 900				\$ 1,000				(\$100)			
	Subtotal Project (Capital)								\$ 70,100				\$ 80,530				(\$10,430)			
	Project (Expense)																			
	Operational Readiness (To-go)								\$ 4,000				\$ 5,000				(\$1,000)			

Also Included - Expectations matrix

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- One file shows all the expectations
- Shows source of information

Expectation (Shall), Suggestion, GAO # Guidance		Source	Category	Sections of 413.3 Covering GAO Item	Notes	Suggested Re-Write (strong and direct expectation language - avoid long complicated statements)	Expectation Unique ID
1	Define the estimate's purpose	GAO	Purpose	413.3 Guidance related to the purpose of the estimate is found in Sections 2.3, 3.2, 6.2, & 6.7.1.			
	Determine estimate's purpose, required level of detail, and overall scope.	GAO	Purpose				
	Determine who will receive the estimate.	GAO	Purpose				
	Support long-term portfolio cost projections;	DOE G 413.3-21A Section 2.3	Purpose		Expectation	Recombined with 1.c above {how does this get written?}	1.d
	Provide data for value engineering/value analysis studies, independent reviews, and baseline changes.	DOE G 413.3-21A Section 2.3	Purpose		Expectation	The responsible NNSA office (DOE Program Office before FPD is assigned or NA-APM after FPD is assigned) shall work with M&O on any deviations from original design and requirements.	1.a

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Where can you find CAEF?

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- NA-MB-92 Training Pages –
<https://community.max.gov/x/C2t5fw>
 - Other Training Pages and Document Templates (box lower left)
 - Cost Estimate Reviewer (CER) Handbook and Training Material
 - Weapons Systems Cost Estimating Guidance Templates
 - Lewis and Clark Project Management Material
 - Basis of Estimate (BOE) Training
 - Schedule and Cost Uncertainty and Risk Analysis (SCURA) Training
 - Cost Estimate Training
 - Capital Acquisition Estimating Framework

Where can you find it?

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PERMISSIONS COLLABORATION SPECIFIC

Dashboard / ... / Office of Analysis & Evaluation (NA-MB-92) 🔒 📄

NA-MB-92 TRAINING

Created by Dipali Amin (DOE,Ctr) (INACTIVE), last modified by Kathleen Lane (NONFED) on Dec 15, 2021

MB-90	NA-MB-92	AoAs	Planning Studies	BCAs	Portfolio Analysis	LEPs	CEAG	Stockpile Modernization Support	Special Studies	Train
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Department of Commerce Fundamentals of Cost Estimating

1. Lesson 01 Analytical Frameworks.pptx
2. Lesson 02 Cost Data Resources.pptx
3. Lesson 03 Goals of cost Analysis.pptx
4. Lesson 04 Escalation and Discounting.pptx
5. Lesson 05 Net Present Value.pptx
6. Lesson 06 Work Breakdown Structures.pptx
7. Lesson 07 Top Down Methods of Cost Estimation.pptx
8. Lesson 08 Case study Range Estimate.pptx
9. Lesson 08a Case Study Developing and Using a CER.pptx
10. Lesson 09 Schedule Based Methods of Cost Estimation.pptx
11. Lesson 10 Software and Integration.pptx
12. Lesson 11 Cost Risk Analysis - Part1.pptx
13. Lesson 12 Estimating and Reporting Process.pptx

Other Training Pages and Document Templates

1. Cost Estimate Reviewer (CER) Handbook and Training Material
2. Weapons Systems Cost Estimating Guidance Templates
3. Lewis and Clark Project Management Material
4. Basis of Estimate (BOE) Training
5. Schedule and Cost Uncertainty and Risk Analysis (SCURA) Training
6. Cost Estimate Training
7. Capital Acquisition Estimating Framework

1. L2-C CSEA HDT 1 B
2. L2-C CSEA HDT 2 C
3. L2-C CSEA HDT 3 C
4. L2-C CSEA HDT 4 Li
5. L2-C CSEA v2.3 Feb
6. L2-C CSEA v2.3 Feb
7. L2-C CSEA v2.3 Feb
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24. L2-C CSEA v2.3 Feb
25. L2-C CSEA v2.3 Feb
26. L2-C CSEA v2.3 Feb
27. L2-C CSEA v2.3 Feb

CAEF Next Steps

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- Help improve this framework - what are your ideas?
- PA&E will continuously update CAEF
- PA&E is looking for a capital acquisition project to serve as a pilot
- Contact info
 - Gabriel Sandler (NNSA): gabriel.sandler@nnsa.doe.gov (301) 820-2081
 - Kathy Lane (SNL): kelane@sandia.gov (505) 252-0974

Questions/Comments?