U.S. DEPARTMENT OF ENERGY

Cost Estimating in DOE for Capital Asset Projects

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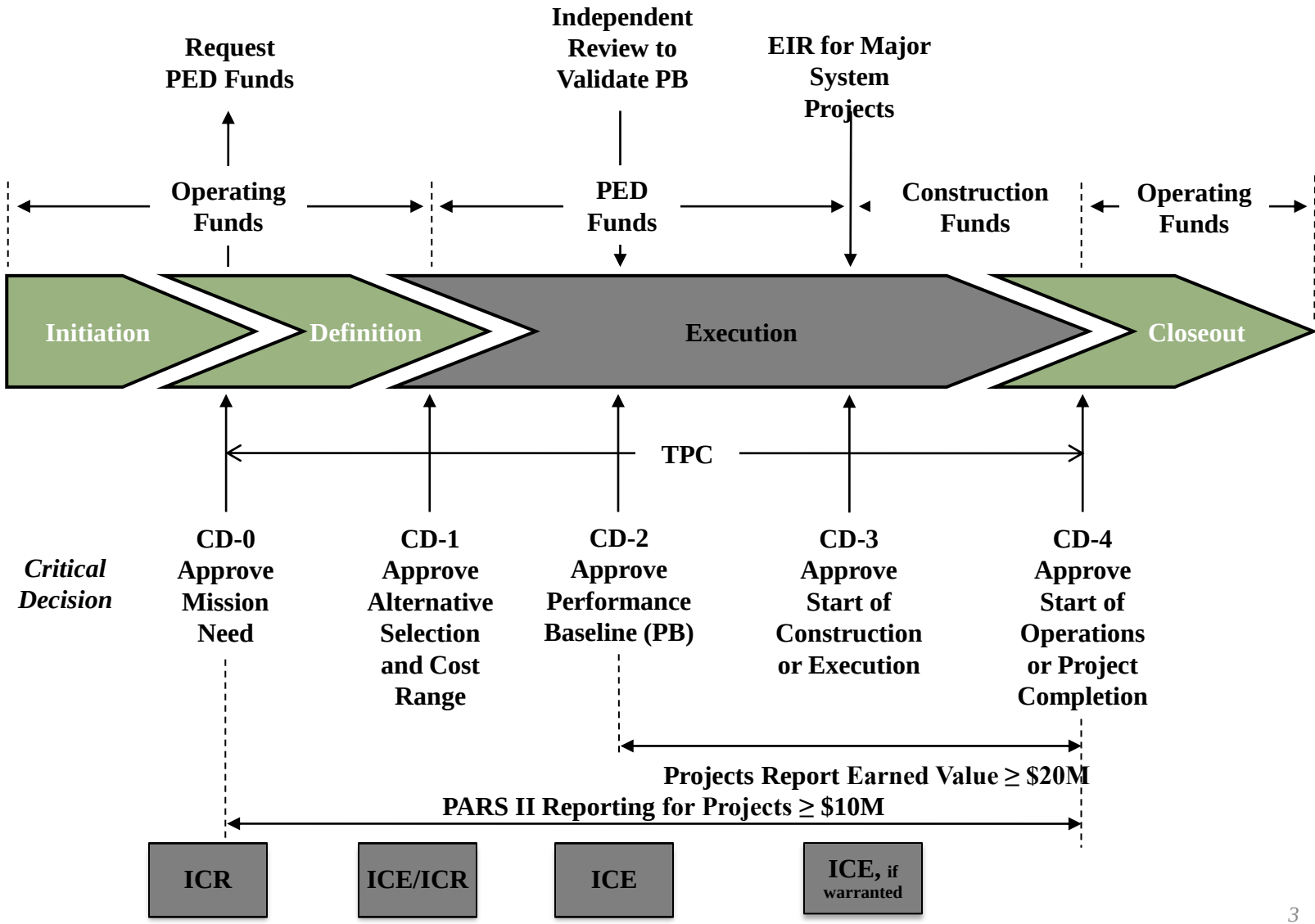
Outline of Presentation

- Senior Level Concerns/Thoughts
- Project Success
- Recent Policy Changes
- Cost Estimating Framework
- Bosco's Cost Estimating Thoughts and Pet Peeves

Project Management (PM) Process

DOE's Acquisition Management System



Congressional Concerns

- No policy establishing estimating standards
- No policy for performing ICEs and ICRs
- Consolidate DOE's cost estimating organization
- Perform ICE's on "Program" before constructing smaller project components
- Design maturity standards too subjective

Concerns (mostly) addressed in 413.3B

Deputy Secretary

In His Own Words

- The authority and accountability for any project, including its costs, must be vested firmly in the hands of the federal project manager. *(Appendix A, Section 1. ,Objective and Appendix C, Section 18., Reviews)*
- Some cost estimate, or cost range, should be provided at each CD gateway, but the degrees of rigor and detail for a cost estimate should be carefully defined, depending on the degree of confidence in project scale and scope that is reasonable to expect at that stage. Whatever figure or range that is provided should explicitly note relevant caveats concerning uncertainties inherent in estimates at CD-0 and CD-1 stages. *(Appendix A, Section 1., Objective and Appendix C, Section 18., Reviews)*
- A project sponsor should never be the sole cost estimator, at any stage (i.e., from CD-0 on) given inherent conflict of interest. *(Appendix A, Section 1., Objective and Appendix C, Section 18., Reviews)*
- The second cost estimator should come from outside of the line manager's chain of commend, to avoid conflict of interest. *(Appendix A, Section 1., Objective and Appendix C, Section 18., Reviews)*

Project Delivery:

Objective vs. Project Success

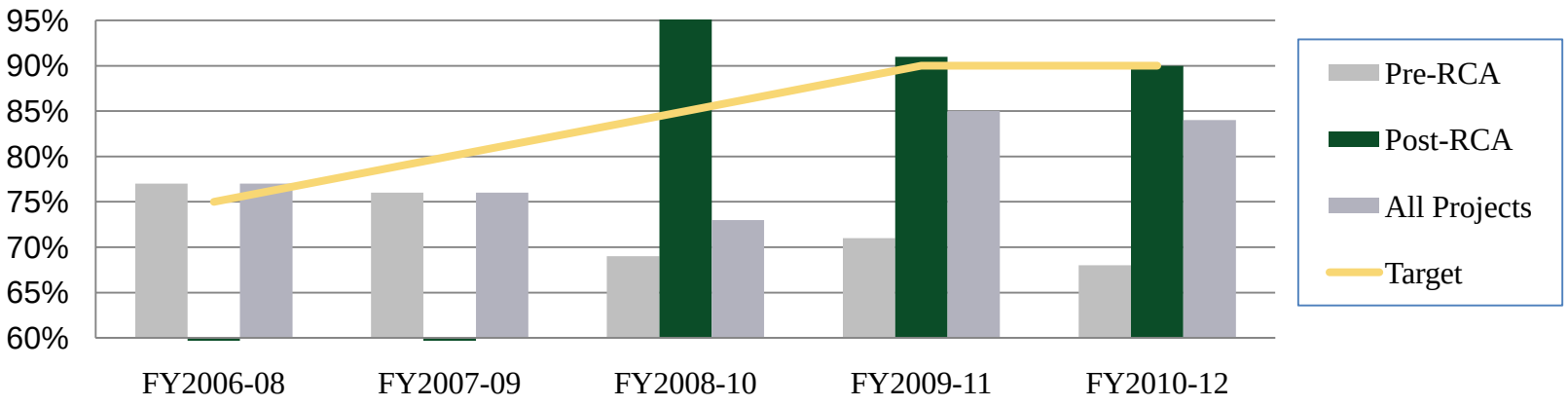
- DOE O 413.3B: OBJECTIVE
  - Projects will be delivered within original CD-2 Performance Baseline (cost and schedule) and be fully capable of meeting mission and key performance parameters.

- PROJECT SUCCESS: (For "Capital Asset Projects")
  - Project completed within the ORIGINAL approved scope baseline, and not to exceed 110% of the ORIGINAL approved cost baseline at project completion (CD-4), unless otherwise impacted by a directed change.

- Portfolio Success:
  - 90% of all projects meet project success criteria.

Primary Performance Metrics

Project Success Based on 3-Year Rolling Timeline

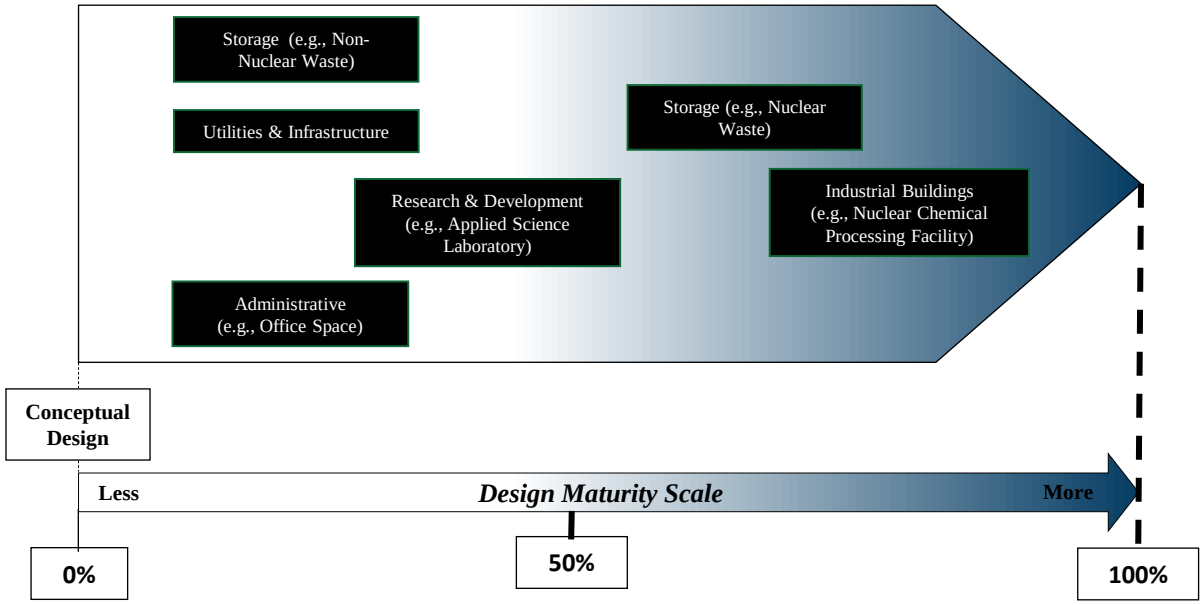


	FY2010 Target	FY2010 Actual	FY2011 Target	FY2011 Actual
Capital Asset Construction Success	85%	72%	90%	84% (projected)
Capital Asset Cleanup Success	70%	100%	80%	86% (projected)
Certified EVMS by CD-3 – Construction	90%	97%	95%	97% (To Date)
Certified EVMS by CD-3 – Cleanup	75%	86%	85%	85% (To Date)
Certified FPDs at Right Level by CD-3	88%	89%	90%	79% (To Date)

Front-End Planning: Req’ts Definition

(Accurate Cost Estimates Start Here)

- DOE O 413.3B requires:
  - Design sufficiently mature prior to Critical Decision (CD-2)
  - Enhanced External Independent Review (EIR) procedures for (projects >$100M)
    - Project Definition Rating Index, PDRI
    - Technology Readiness Assessment and Maturation Plans
    - GAO’s 12-step cost estimating process



Project Size and Structure

(Focus on the Work at Hand – Reduce Time Horizon & Risk)

- DOE O 413.3B requires:
  - Decision to break up large projects made at CD-1; must be documented
    - Independent Cost Estimate (ICE) and/or Cost Review (ICR) prior to CD-1 (for programs / projects > $100M)
  - Acquisition Executive (AE) must determine that funding profile is affordable and executable within budget
  - Each small project must have its own distinct performance baseline (CD-2)

- Distinguished program and project management; most appropriate for environmental remediation work

- Useable segments for intended purpose…reduce time, risk and span of control; better defined scope; and funding profiles that meet the mission need

- Multiple projects that collectively support one mission need; one project data sheet for construction projects for full cost visibility

Funding/Budgeting & Cost Estimating

(Get Estimates Right – Stabilize Funding)

- DOE O 413.3B outlines cost estimating and budgetary requirements:
  - Full funding of projects <$50M, if feasible (execution window < 2 yrs)
  - Acquisition Executive: endorse changes to approved funding profile
  - **Prior to CD-0 (Mission Need):** OECM conduct ICR for major system projects (>$750M)
  - **Prior to CD-1 (Alternative Selection and Cost Range):** OECM prepare ICE and/or conduct ICR for projects >$100M
    - If top of approved CD-1 cost range exceeds 50%, must reassess alternatives
  - **Prior to CD-2 (Performance Baseline):** OECM prepare ICE for projects >$100M
  - **Prior to CD-3 (Start of Construction/Execution):** OECM prepare ICE, if warranted or requested by AE, for projects >$100M

- Leveraging experienced, certified cost estimators from industry to augment staff in conduct of ICRs/ICEs, as needed; Utilizing DOE historical costs, when possible

Management and Oversight

(Constantly Monitor Cost / Schedule Performance)

- DOE O 413.3B requires:
  - Project Assessment and Reporting System (PARS II) enhanced
    - Project performance data uploaded monthly directly into PARS II from contractor's project management systems
    - Monthly project status reporting by:
      - Federal Project Director (FPD)
      - Program Manager
      - OECM
  - OECM central repository and compliance office; retain all critical decision, baseline change documents, lessons learned
    - Manage, Monitor and Report on the "Project Success" Metric
  - Project peer reviews – Exported "Best Practice" from Science
  - Earned Value Management System (EVMS) certification & surveillance reviews

GAO Cost Estimating and Assessment Guide – The "12-Steps"

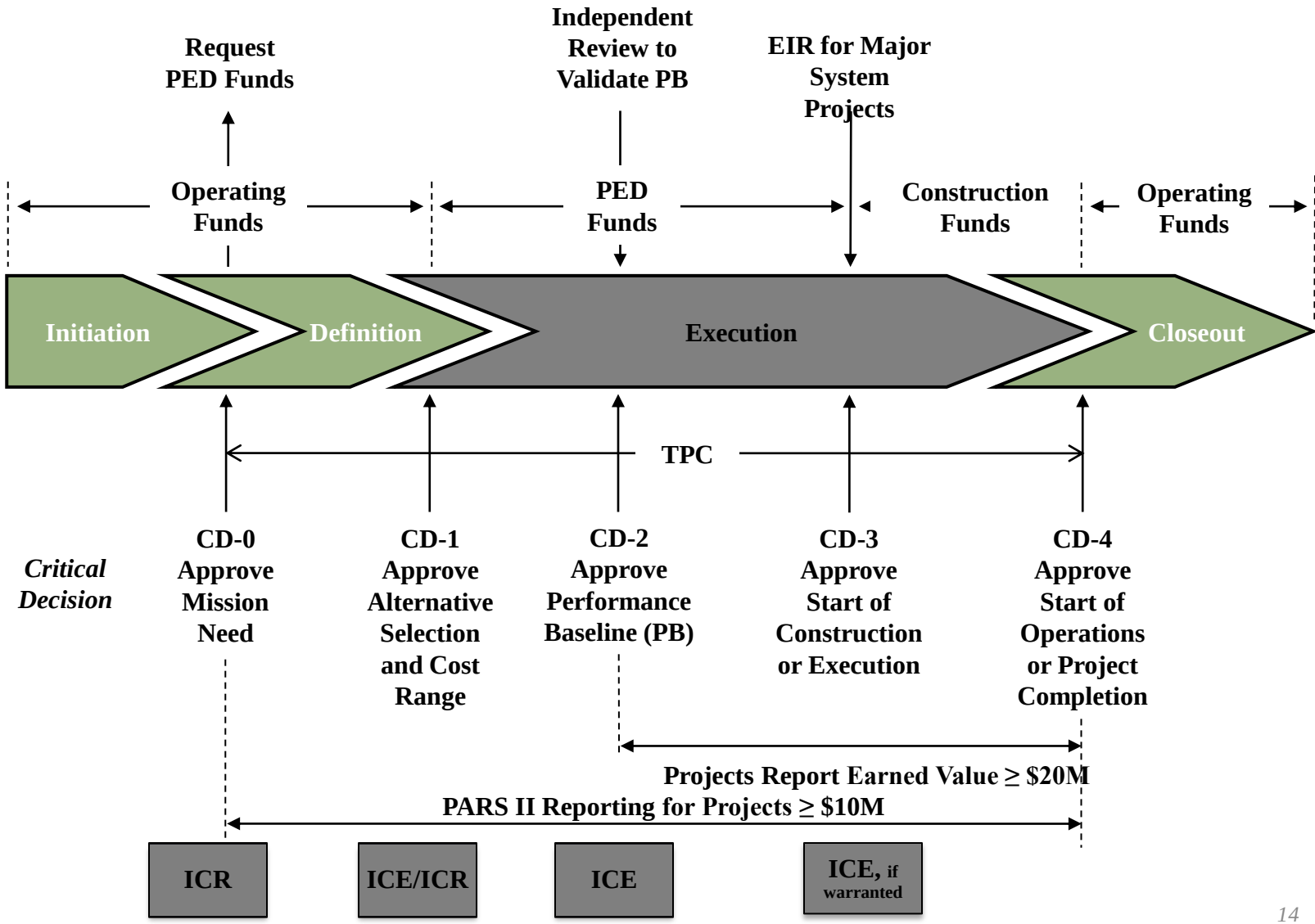
1. **Cost estimating (CE) purpose**
2. Cost estimating plan
3. Define program characteristics
4. Determine estimating structure
5. Identify ground rules and assumptions
6. Obtain data
7. Develop point estimate; compare to ICE
8. Conduct sensitivity analysis
9. Conduct risk and uncertainty analysis
10. Document the estimate
11. Present estimate to management for approval
12. Update the estimate to reflect actual costs/changes

Association for the Advancement of Cost Engineering International (AACEI) Classifications

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**DEGREE OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 70%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	70% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

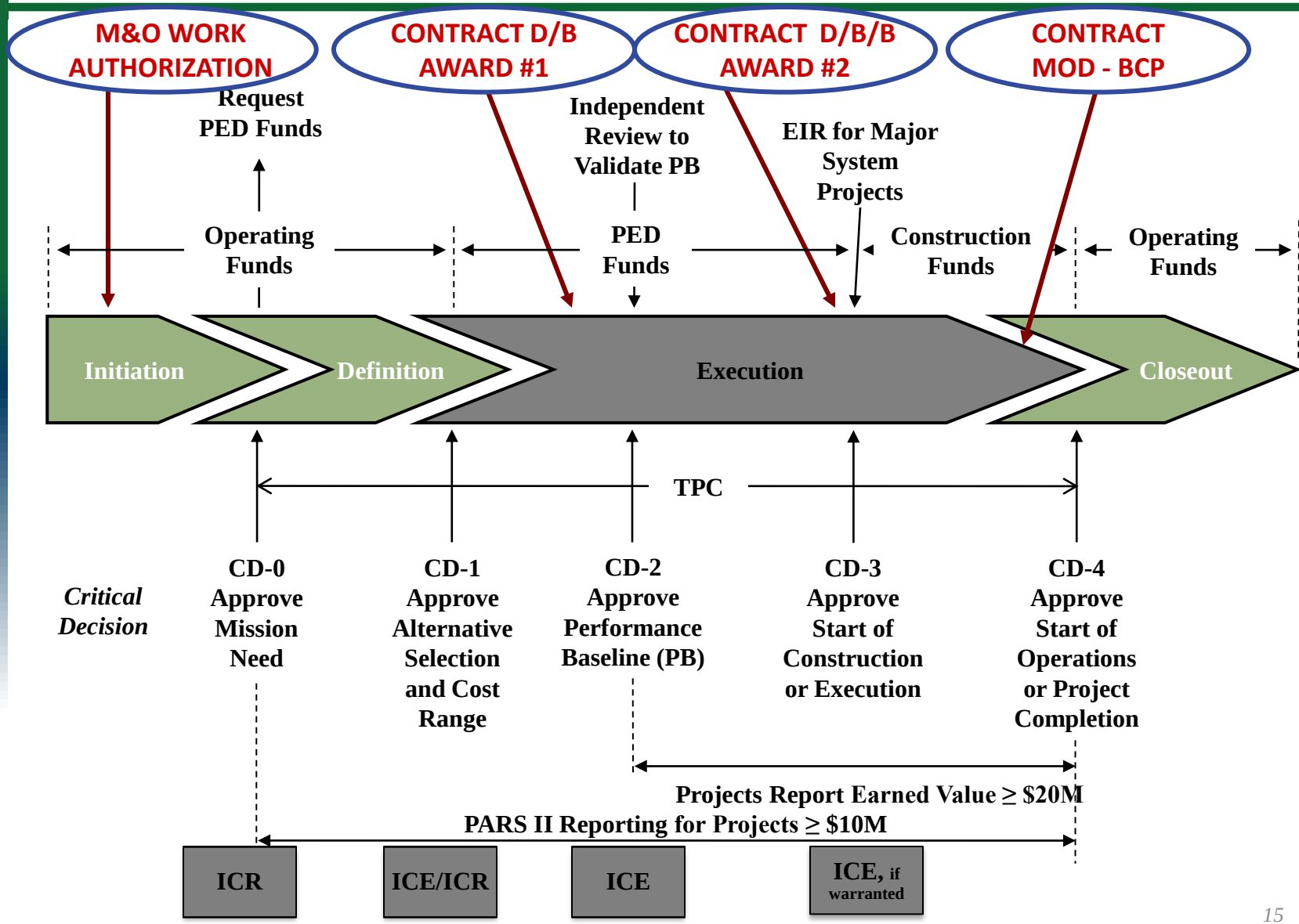
Project Management (PM) Process

When To Do a Project ICE and/or ICR



Project Management (PM) Process

How About Cost Estimates in Support of Contract Actions?

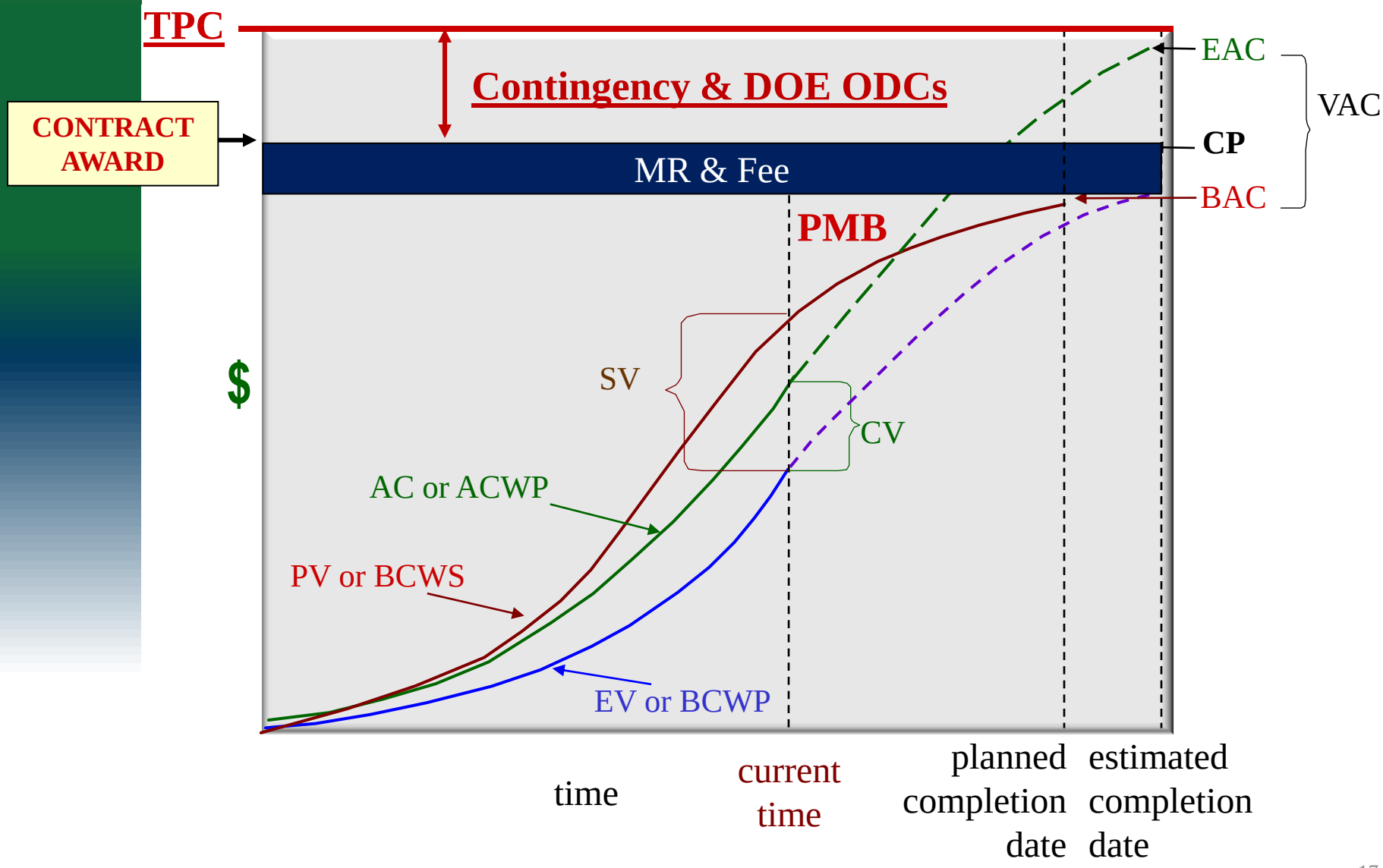


IGCE versus ICE?

- Independent Government Cost Estimate (IGCE)
  - Used to support contract negotiations
    - FAR 36.203(a) - An independent Government estimate of construction costs shall be prepared and furnished to the contracting officer at the earliest practicable time for each proposed contract and for each contract modification anticipated to exceed the simplified acquisition threshold. The estimate shall be prepared in as much detail as though the Government were competing for award.
- Project Independent Cost Estimate (ICE)
  - Used to support Congressional budget request

Baseline Confusion:PMB or PB(TPC)?

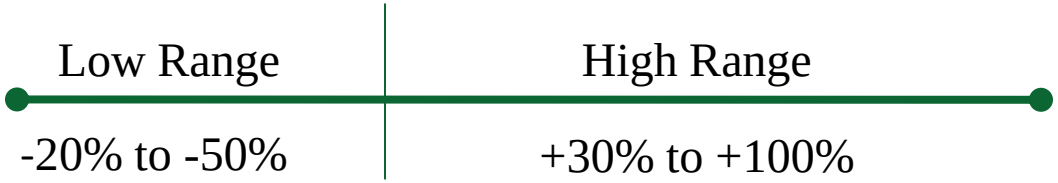
What's the Baseline? CD-0, CD-1 or CD-2?



“Precision without Accuracy”

CD-0 & CD-1 estimate ranges

- Cost Range examples
  - CD-0
    - $4.1B - $5.6B (20 years)
    - $502 - $552.7M (16 years)
    - $92.8 - $102.4M (8 years)
  - CD-1
    - $375M - $400M (14 years)
    - $67M - $73.2M (6 years)
- Class 5 Range (give (mostly) or take)



Contingency versus Management Reserve

- Contingency: Who owns it?
  - For Government directed scope addition or requirement change
  - Added to contract via Federal change control process
  - Outside of contract scope and risks
- Management Reserve: Who controls it?
  - Determined by the Contractor
  - For estimate uncertainties and risk events w/in contract scope
  - Maintained by Contractor and incorporated into PMB via Contractor's change control process

Final Thoughts/Comments

"Should Cost"

and

Art over Science