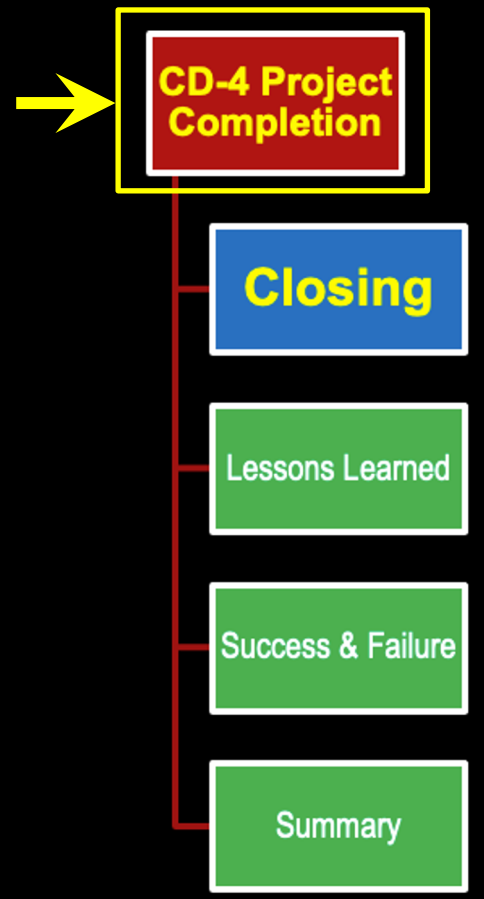
CD-4 Approve Start of Operations / Project Completion



DOE/SC CD-4 Requirements from Decision Matrix

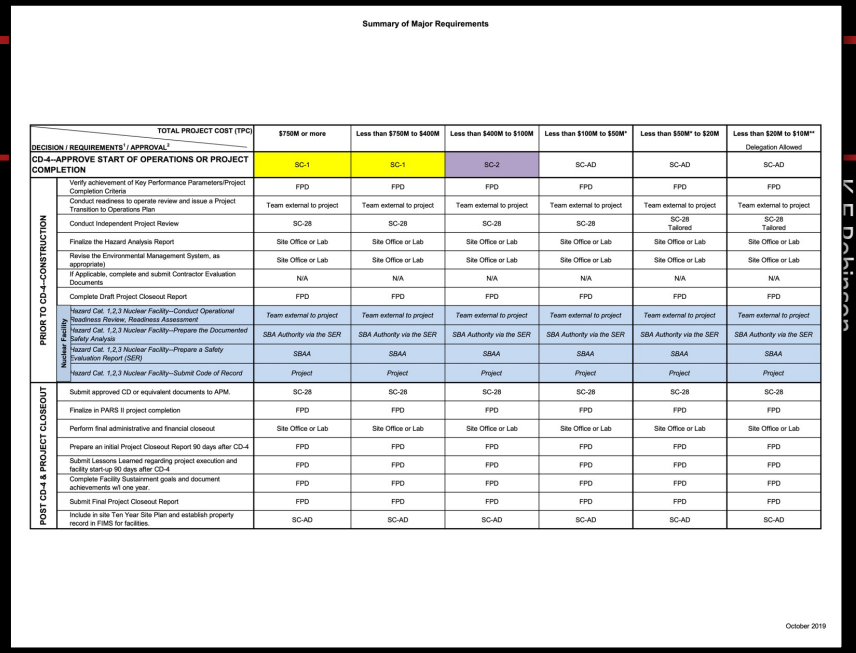
Ending the project / transitioning to operations

For CD-4

- KPPs Achieved – FPD
- Readiness to operate / Transition to Operations Review
- CD-4 OPA Independent Project Review
- Final Hazards Analysis Report
- Revised Environmental Management System*
- Draft Project Closeout Report

Final Closeout – Post CD-4

- Finalize PARS-II project Completion
- Final administrative and financial closeout
- Initial Project Closeout Report (≤90 days after CD-4)
- Project Lessons Learned (≤90 days after CD-4)
- Final Project Closeout Report



Summary of Major Requirements

DECISION / REQUIREMENTS[1] / APPROVAL[2] \ TOTAL PROJECT COST (TPC)		$750M or more	Less than $750M to $400M	Less than $400M to $100M	Less than $100M to $50M*	Less than $50M* to $20M	Less than $20M to $10M** Delegation Allowed
CD-4--APPROVE START OF OPERATIONS OR PROJECT COMPLETION		SC-1	SC-1	SC-2	SC-AD	SC-AD	SC-AD
PRIOR TO CD-4--CONSTRUCTION	Verify achievement of Key Performance Parameters/Project Completion Criteria	FPD	FPD	FPD	FPD	FPD	FPD
	Conduct readiness to operate review and issue a Project Transition to Operations Plan	Team external to project	Team external to project	Team external to project	Team external to project	Team external to project	Team external to project
	Conduct Independent Project Review	SC-28	SC-28	SC-28	SC-28	SC-28 Tailored	SC-28 Tailored
	Finalize the Hazard Analysis Report	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab
	Revise the Environmental Management System, as appropriate)	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab
	If Applicable, complete and submit Contractor Evaluation Documents	N/A	N/A	N/A	N/A	N/A	N/A
	Complete Draft Project Closeout Report	FPD	FPD	FPD	FPD	FPD	FPD
	Nuclear Facility: *Hazard Cat. 1,2,3 Nuclear Facility--Conduct Operational Readiness Review, Readiness Assessment*	*Team external to project*	*Team external to project*	*Team external to project*	*Team external to project*	*Team external to project*	*Team external to project*
	Nuclear Facility: *Hazard Cat. 1,2,3 Nuclear Facility--Prepare the Documented Safety Analysis*	*SBA Authority via the SER*	*SBA Authority via the SER*	*SBA Authority via the SER*	*SBA Authority via the SER*	*SBA Authority via the SER*	*SBA Authority via the SER*
	Nuclear Facility: *Hazard Cat. 1,2,3 Nuclear Facility--Prepare a Safety Evaluation Report (SER)*	*SBAA*	*SBAA*	*SBAA*	*SBAA*	*SBAA*	*SBAA*
	Nuclear Facility: *Hazard Cat. 1,2,3 Nuclear Facility--Submit Code of Record*	*Project*	*Project*	*Project*	*Project*	*Project*	*Project*
POST CD-4 & PROJECT CLOSEOUT	Submit approved CD or equivalent documents to APM.	SC-28	SC-28	SC-28	SC-28	SC-28	SC-28
	Finalize in PARS II project completion	FPD	FPD	FPD	FPD	FPD	FPD
	Perform final administrative and financial closeout	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab
	Prepare an initial Project Closeout Report 90 days after CD-4	FPD	FPD	FPD	FPD	FPD	FPD
	Submit Lessons Learned regarding project execution and facility start-up 90 days after CD-4	FPD	FPD	FPD	FPD	FPD	FPD
	Complete Facility Sustainment goals and document achievements w/i one year.	FPD	FPD	FPD	FPD	FPD	FPD
	Submit Final Project Closeout Report	FPD	FPD	FPD	FPD	FPD	FPD
	Include in site Ten Year Site Plan and establish property record in FIMS for facilities.	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD

October 2019

Project Closeout Report (SC-28 Template)

A DOE FPD *submitted* document
(like the MNS and Acquisition Strategy (AS) requires *significant* input from project and laboratory)

- Acquisition Approach
- Project Organization
- Project Baseline at Completion
  - Scope
  - Cost
  - Schedule
  - WBS
  - Funding Profile
  - Staffing Profile
  - Environmental
  - Safety Record
- Closeout Status
- Lessons Learned
- Photos
- Project archives
- Appendices
  - Detailed WBS Dictionary
  - Detailed Technical Performance
  - Major External Reviews
  - Detailed Safety Information
  - Project Risk Registry

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CD-4 Reviewer Checklist – Summary

DOE/SC-OPA Reviewer Checklist

The purpose of CD-4 review is to ensure that the project goals have been successfully completed, lessons learned have been captured, and that the project is ready for closeout.

- ✓Verify that the Threshold KPPs have been met.
- ✓Verify the Draft Project Closeout Report with lessons learned is complete?
- ✓Are there any contract claims, how much and is there sufficient contingency to cover the costs?
- ✓Is there a plan for the remaining project fund or contingency to be used?
- ✓Is the project ready for operations? Have all the requirements and activities been completed?

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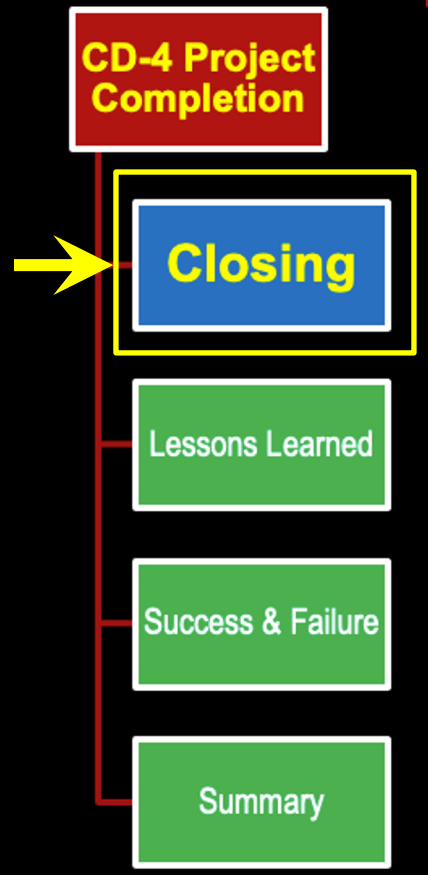
Project Closing Phase



Project Closing Phase Processes

- Close Project
  - Deliverables validation
  - Turning over deliverables
  - Lessons learned
  - Project data files for future reference
  - Disposition and placement of project team
- Contract Closure
  - Resolution of any open items
  - Final settlement of all subcontracts

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Mapping PM processes to PM Knowledge Areas – Significant intersections

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	Integration	Scope	Time	Cost	Quality	Human Resources	Communications	Risk	Procurement	Stakeholder
Initiating	✓	+					+	+		✓
Planning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Executing	✓				✓	✓	✓	✓	✓	✓
Monitoring & Controlling	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Closing	✓	+			+	+	+		+	+

Lessons Learned –
After Action Review (a military perspective)

- Learning happens at the end of the project

Learning happens throughout the project

- Called for after failure or high stress

Planned for any project that is core to business goals

- One meeting with all participants in one room

Meetings with smaller task focused groups

- Reviews the entire process

Focuses on key issues relevant to going forward

- Produces a report with recommendations

Produces an action plan participants will implement

- Focuses more on dissecting past performance

Focuses more on planning of future success

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Lessons Learned –
After Action Review (a military perspective)

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- What was supposed to happen?
- What did happen?
- Why did it happen? (don’t point fingers)
- What are your recommendations? (constructive)

Project Completion

- Near the end of the project the tracking process must be intensified to ensure that everything is brought to completion
  - In many systems, it is only at the end that it is possible to demonstrate the performance has been achieved
  - May require prolonged commissioning and testing
- Maintain a complete list of all tasks left to complete ("*punch list*")
  - Create the list "bottom up" looking at what needs to be done
  - Do not just look at the original task list
    - This is a reality check – maybe you forgot something at the start
- Keep careful, frequent track of every remaining task
  - Follow each task through to completion
- Re-estimate the duration of the work still to be completed
  - Do not just copy the original estimates
    - Looking at the actual work usually gives a clearer picture

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Project Closeout – Transition to Operations

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- With scientific projects and accelerators in particular, commissioning and operation at ultimate performance shouldn't define the close of the project

- 5-year power ramp-up to achieve full FRIB capability
  - Year 1: 10 kW
  - Year 2: 50 kW
  - Year 3: 100 kW
  - Year 4: 200 kW
  - Year 5: 400 kW

Year one

Beam	Notional Weeks/Year	Abundance (%)	Bench-marks
^{238}U	12	99.27	7,10,12,15
^{48}Ca	6.34	0.19	2,14
^{78}Kr	2.21	0.35	3,8,9,16,17
^{124}Xe	1.3	0.1	1,11,17
^{18}O	0.86	0.2	2,8
^{86}Kr	0.63	17.3	1,3,4,6,14,15
^{16}O	0.44	99.76	2,8
^{36}Ar	-	0.33	8
^{82}Se	5.25	9.4	1,3,4,5,6, 13,14,15
Total	23.8		

Year two

Beam	Notional Weeks/Year	Abundance (%)	Bench-marks
^{92}Mo	2.45	14.84	1,3,9,11, 16,17
^{58}Ni	1.64	68.27	1,3
^{22}Ne	0.54	9.2	2
^{64}Ni	0.5	0.91	1,13,14
Total	10.4		

Project Closeout – Transition to Operations

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- As the project approaches its close all stakeholders are strongly vested in success
  - Project team
  - Project manager/director
  - Institution
  - Funding agency

Project Closeout – Agency / Institutional Obligations

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- Summary closeout reports are often required (see examples in materials)
- Historical information if preserved in a manner which can be exploited by others can serve as a basis of estimate, design, and management for future projects
- The goal of closeouts is that projects become better than simply repeating stochastic *Monte Carlo* simulations

Reward Loyalty – Take Care of Your Team

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- As the end of a project approaches the project team must be carefully managed
  - Determining planned subsequent assignments
  - Phased transitions
  - Celebrations of accomplishment
  - Lending support to collaborators for follow on work
- Be generous with credit and acknowledgement of contributions
  - A project is **always** a team effort and that team includes the funding agency representatives
  - The quality of your next project team depends on how well you take care of your present team

And the Curtain Falls …

- Again:

  "A project has an end, and a sausage has two"

- It is essential to push a project to completion
  - The final *punch lists*, action items, must be hounded
  - To be a success, a project **must end**
  - A project that does not end *smartly* will become an albatross for the institution and the project manager

- The final clean up is both physical, managerial, and emotional – **respect all three**

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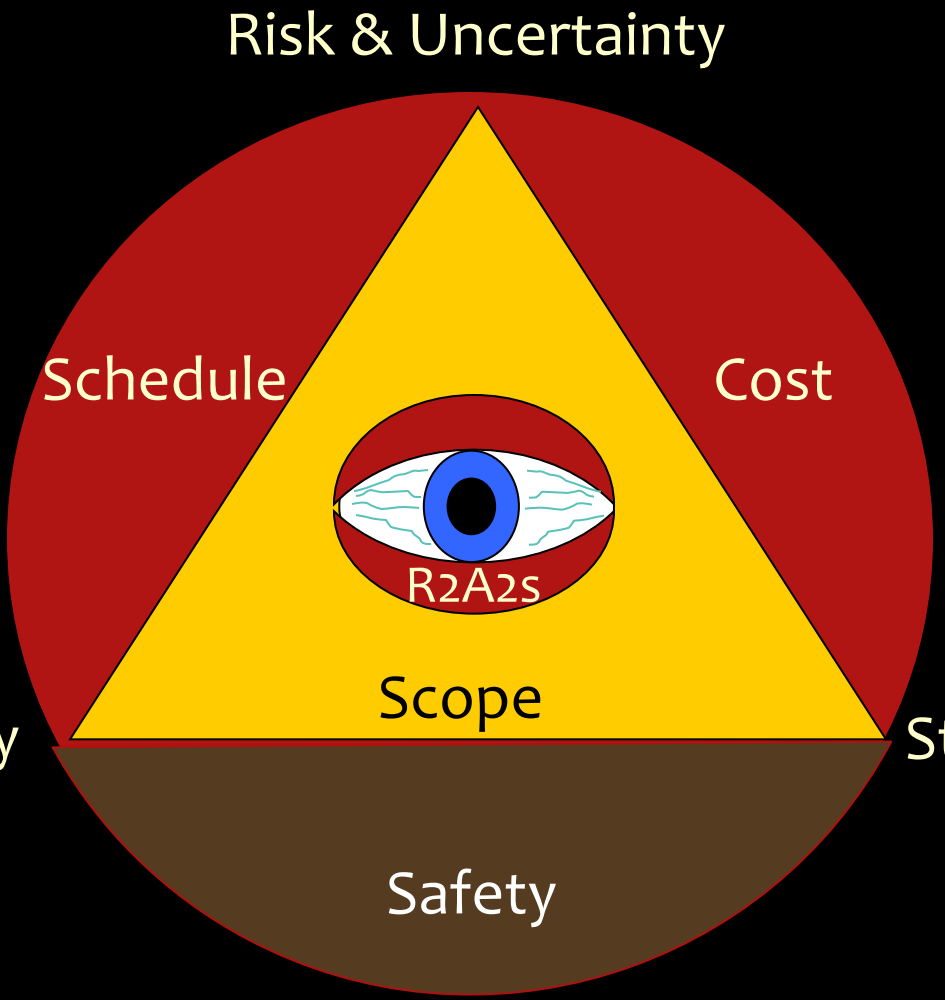
Project Success & Failure

Understanding the nature of projects is essential to understanding success in projects

Back to Project Graphic #1



Project Success:
Easy to Define – Hard to Achieve

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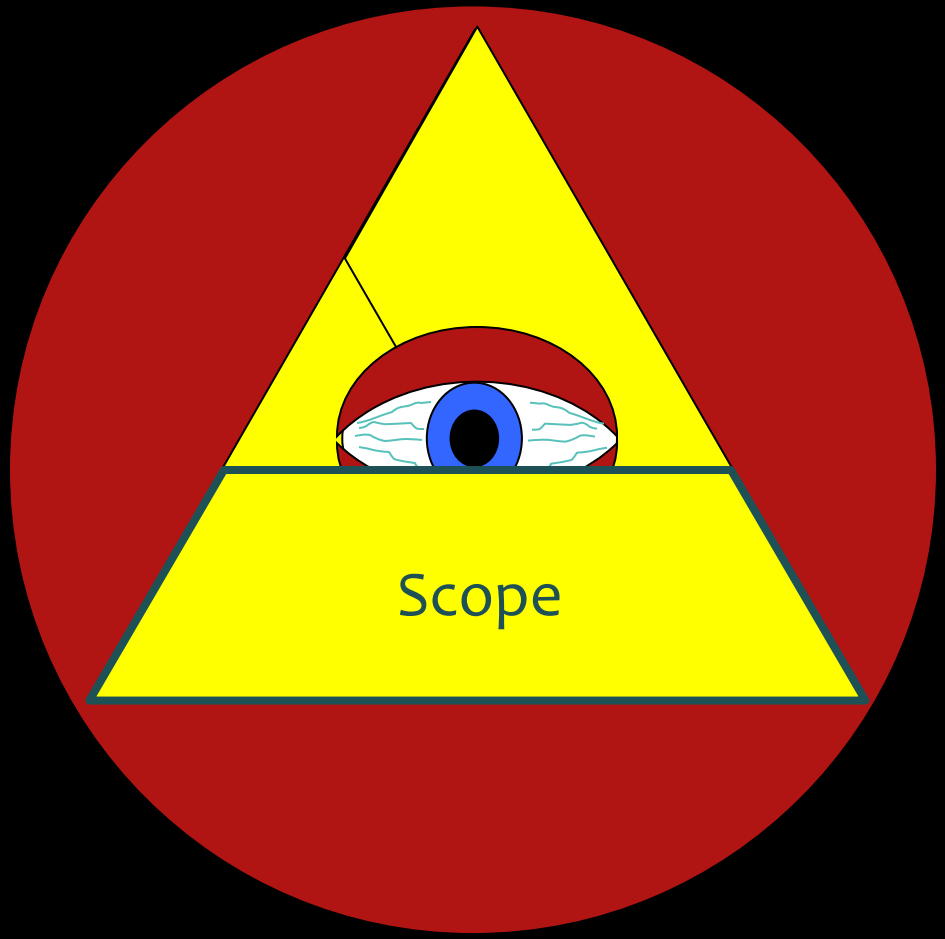
- Dependent variable constraints are met
  - Scope
  - Cost
  - Schedule
- Principal Stakeholder (customer) requirements met
  - Identified requirements (needs)
  - Unidentified requirements (expectations)
- Quality at an appropriate level
- Organization is improved

Scope

*"If you don't know what you're doing,
do it neatly and with style."*

— Author Unknown

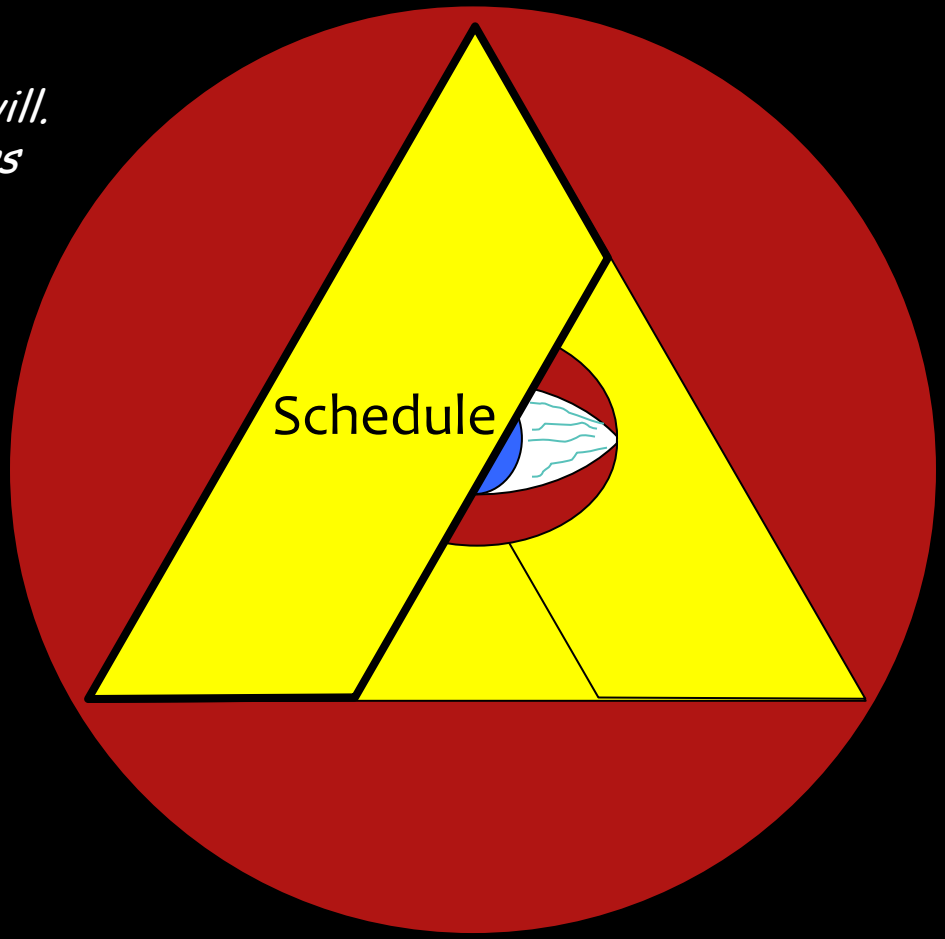


Scope – Key Success Attributes

- Complete Work Breakdown Structure (WBS)
- Established prioritized requirements
- Clearly delineated
- Sufficient detail before engagement
- Specification only to necessary and sufficient
- Controls against scope creep
- Quality of scope deliverables understood
- Clean interfaces

Schedule

#74: All problems are solvable in time, so make sure you have enough schedule contingency—if you don't, the next project manager that takes your place will.
— 100 Rules for NASA Project Managers



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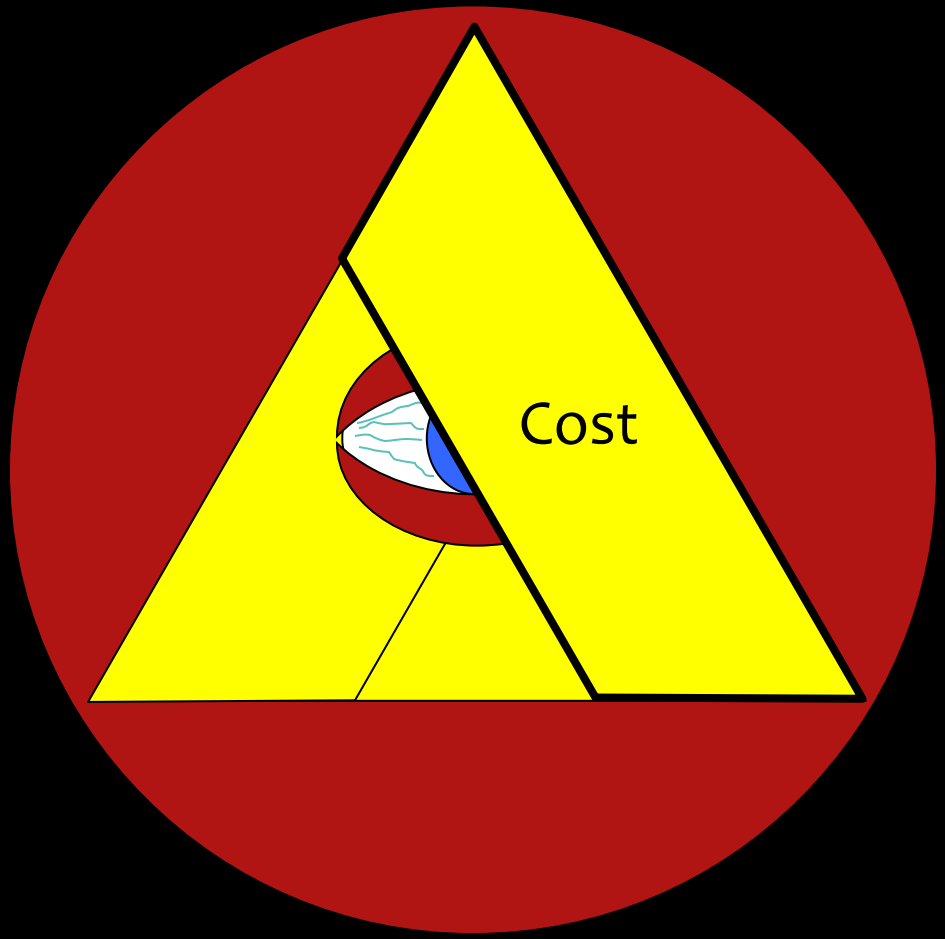
Schedule – Key Success Attributes

- Realistic
- Dependencies understood
  - Exploding
  - Integrating
- Adequate float/contingency in schedule
- Phased detail
- Critical and near critical activities understood

Cost

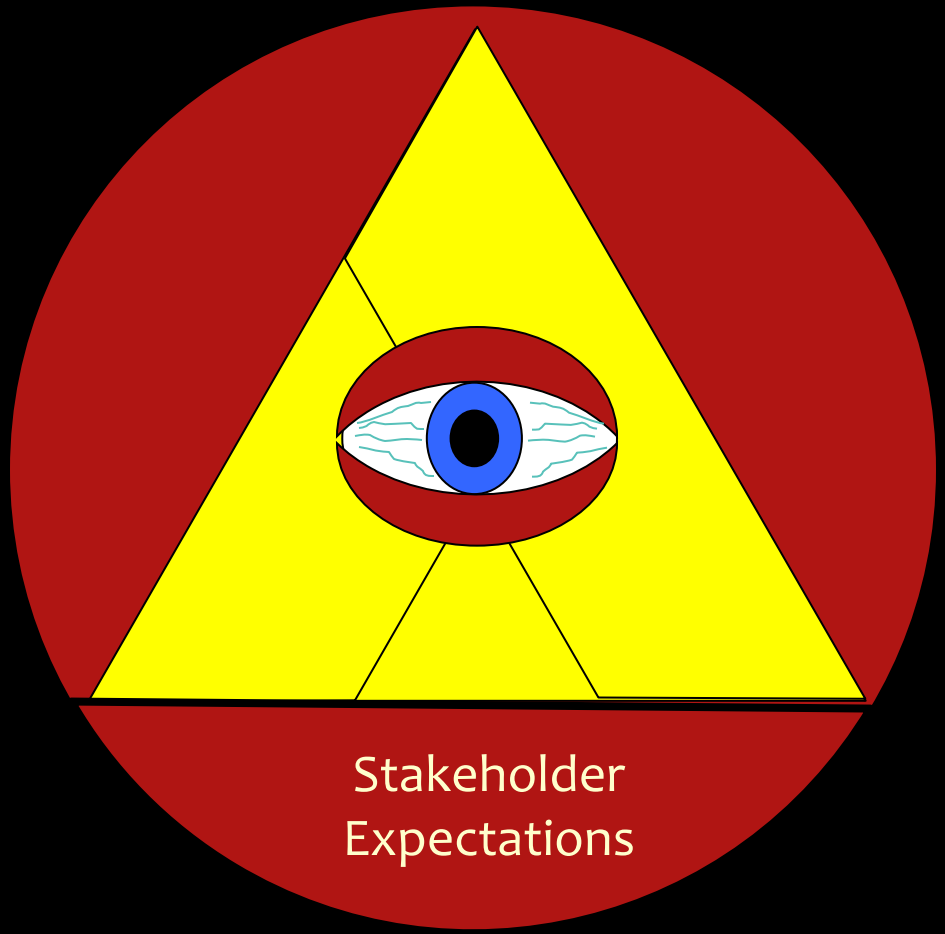
The same work under the same conditions will be estimated differently by 10 different estimators or by 1 estimator 10 different times.



Cost
– Key Success Attributes

- Completeness
- Quality of estimates understood
- Uncertainty understood
- Cost risks understood
- Contingency
  - Explicit
  - Centrally controlled
  - Adequate

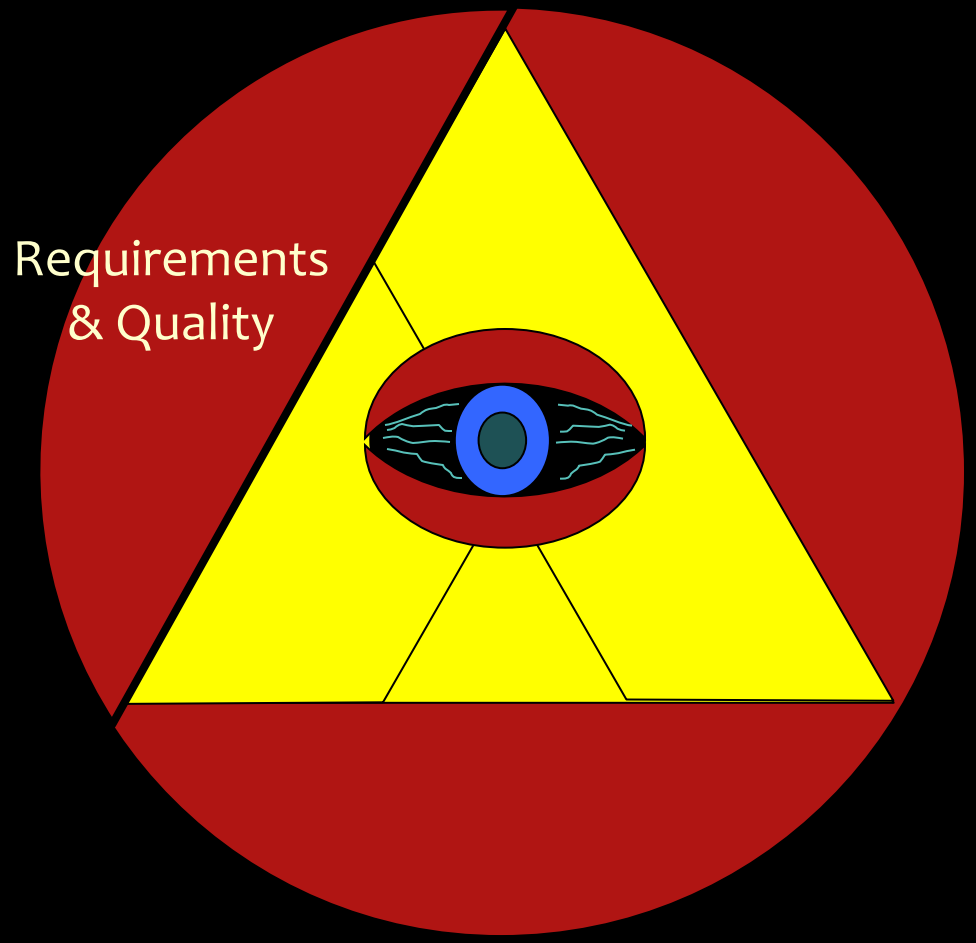
Stakeholder Expectations



Stakeholder Expectations — Key Attributes

- Understanding who are the stakeholders
- Clear identification
- Open Communication
- Requirements
- Continued Involvement
- Clarity of deliverables

Requirements & Quality



Requirements & Quality – Key Attributes

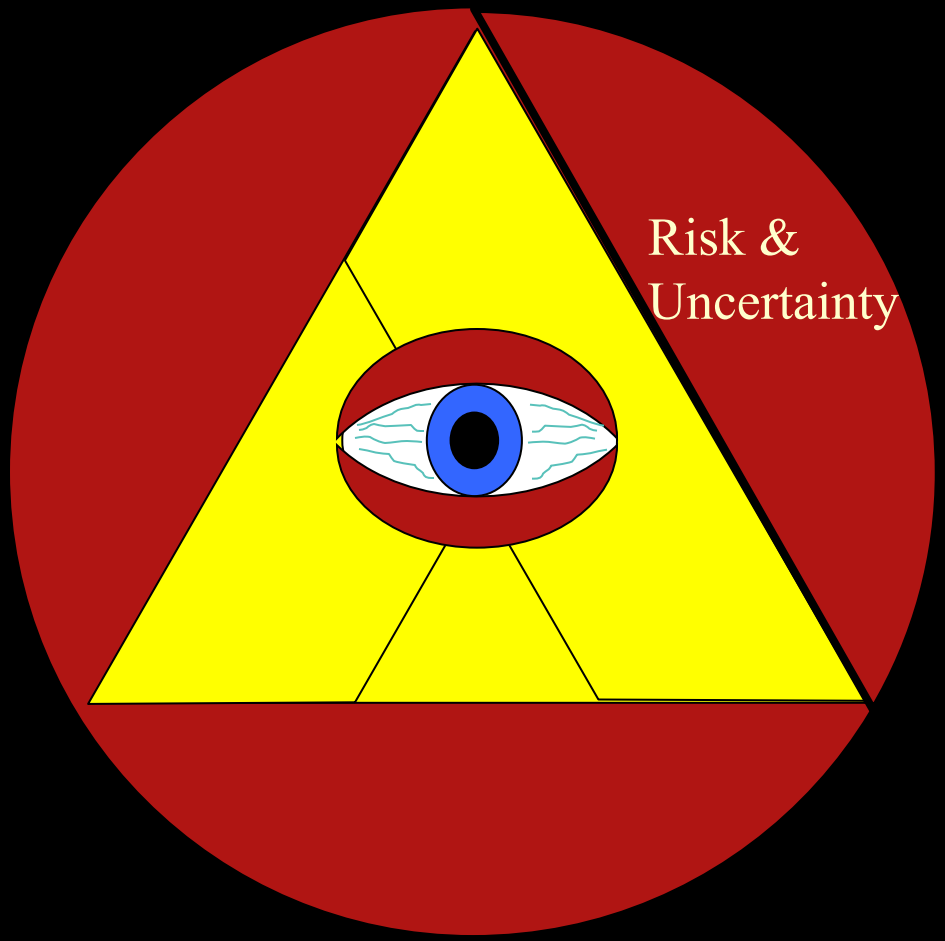
- Requirements, Constraints, and Assumptions clearly understood
- Quality matched to
  - Fitness of purpose
  - *Good enough*
- Established at inception emphasized during project design and development
- Does not attempt to inspect or rework quality in after execution
- Matches quality rigor to the characteristics
  - Critical
  - Major
  - Minor
  - Incidental

Risk & Uncertainty

Y = Set of all projects

X = Subset of projects that are 100% known & executed as planned

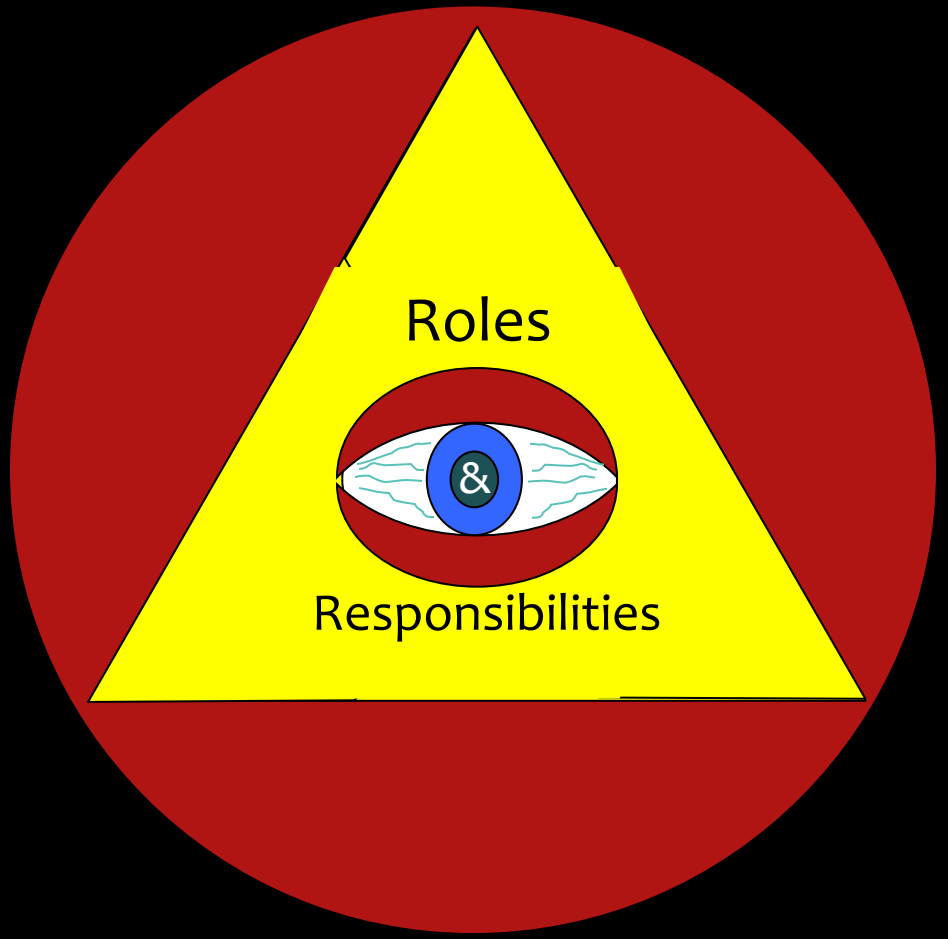
X = Ø (null set)



Risk & Uncertainty – Key Attributes

- Acceptance
- Understanding the nature
- Active feedback management
- Prioritized effective mitigation
- Exploitation

Roles & Responsibilities



Roles & Responsibilities – Key Attributes

- Governance clearly established and understood
- Authority is delegated
- Decision process understood
- Change management firmly established
- Interfaces / handoffs clean, obvious, communicated

Successful Project Leadership is Based on Trust and Communication

- All of the PM tools designed to illuminate and facilitate communication of project directions and goals
- Except 1-person projects, all projects need communication for success
- Without a basis of trust, project leadership cannot function
  - Meaningful delegation not possible
  - Individual authority not given
  - Responsibility not accepted

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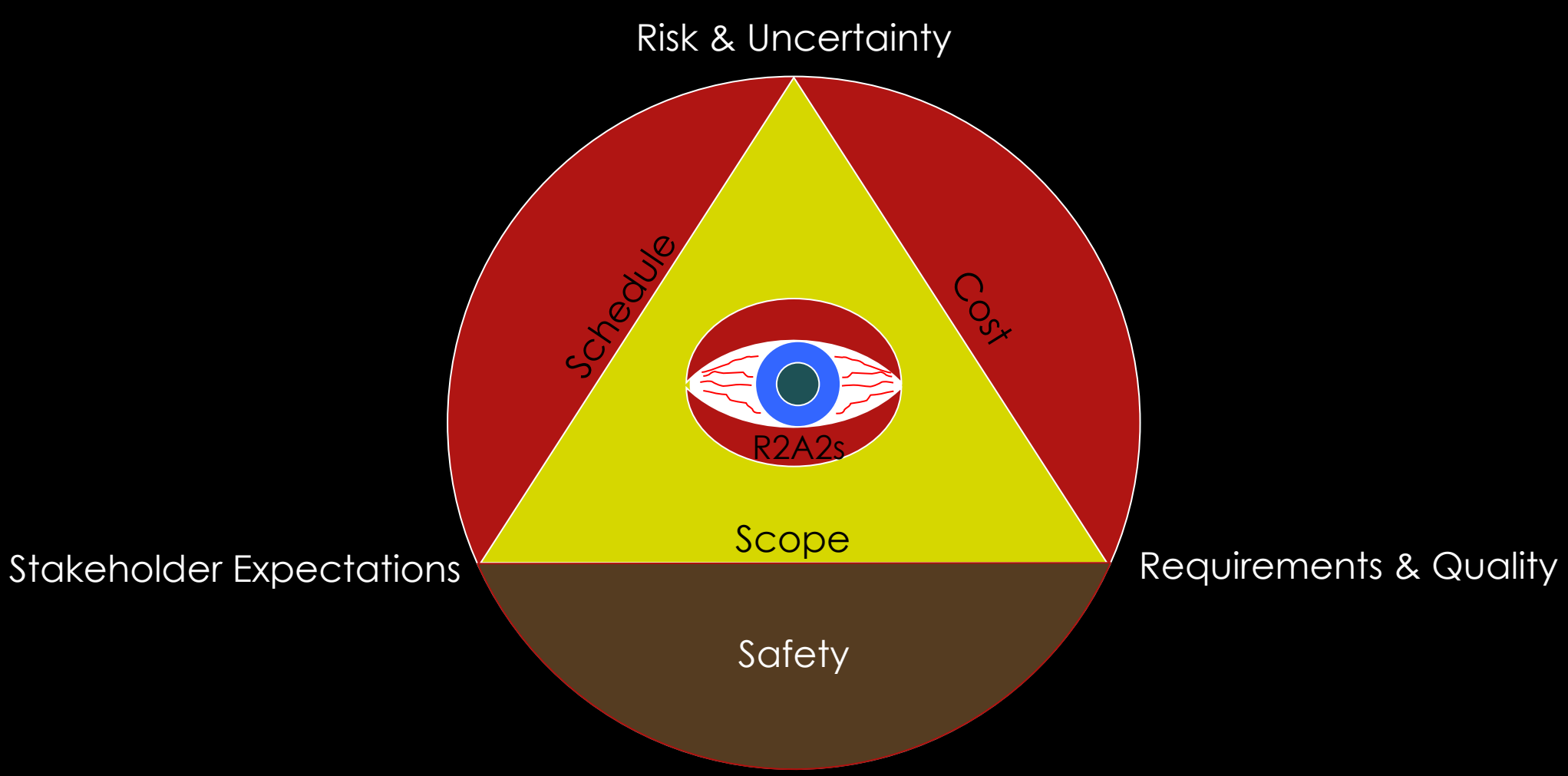
Summary

Germane aspects of a project within a DOE lab



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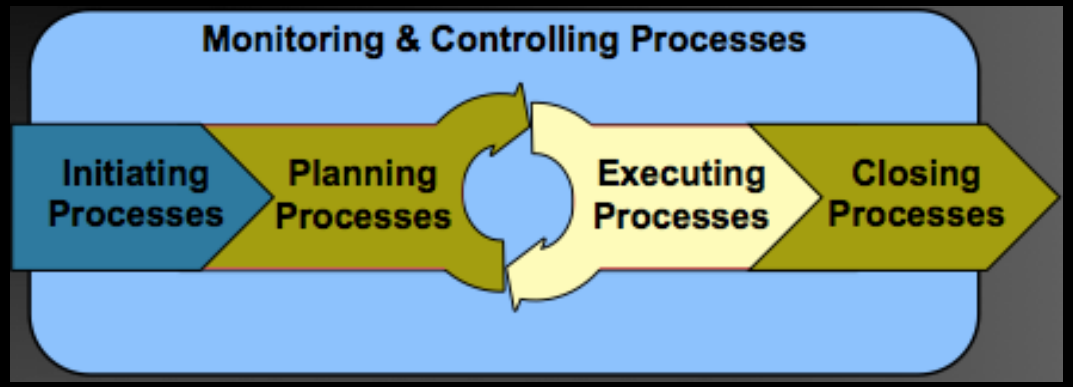
Projects Summary

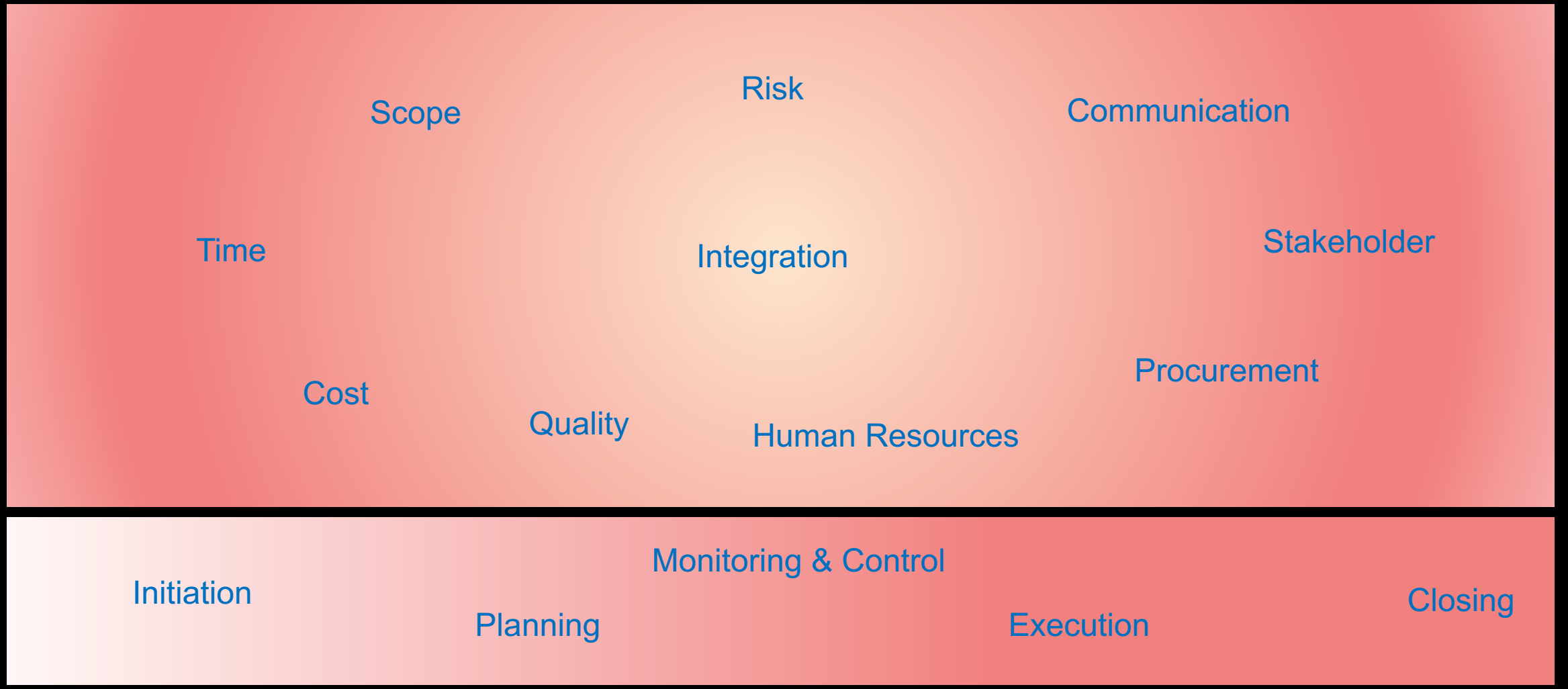
- All projects have risk and uncertainty
- All projects have 5 process groups
  1. Initiating
  2. Planning
  3. Executing
  4. Controlling
  5. Closing



- All projects have a client / key stakeholder
- All projects exist in a context that must be understood
- All projects necessarily require teams
  - Clear roles and responsibilities
  - Effective delegation

A successful project manager pays attention to all knowledge areas at all phases of a project

There is no firm boundaries between areas or any set phases when they aren't needed



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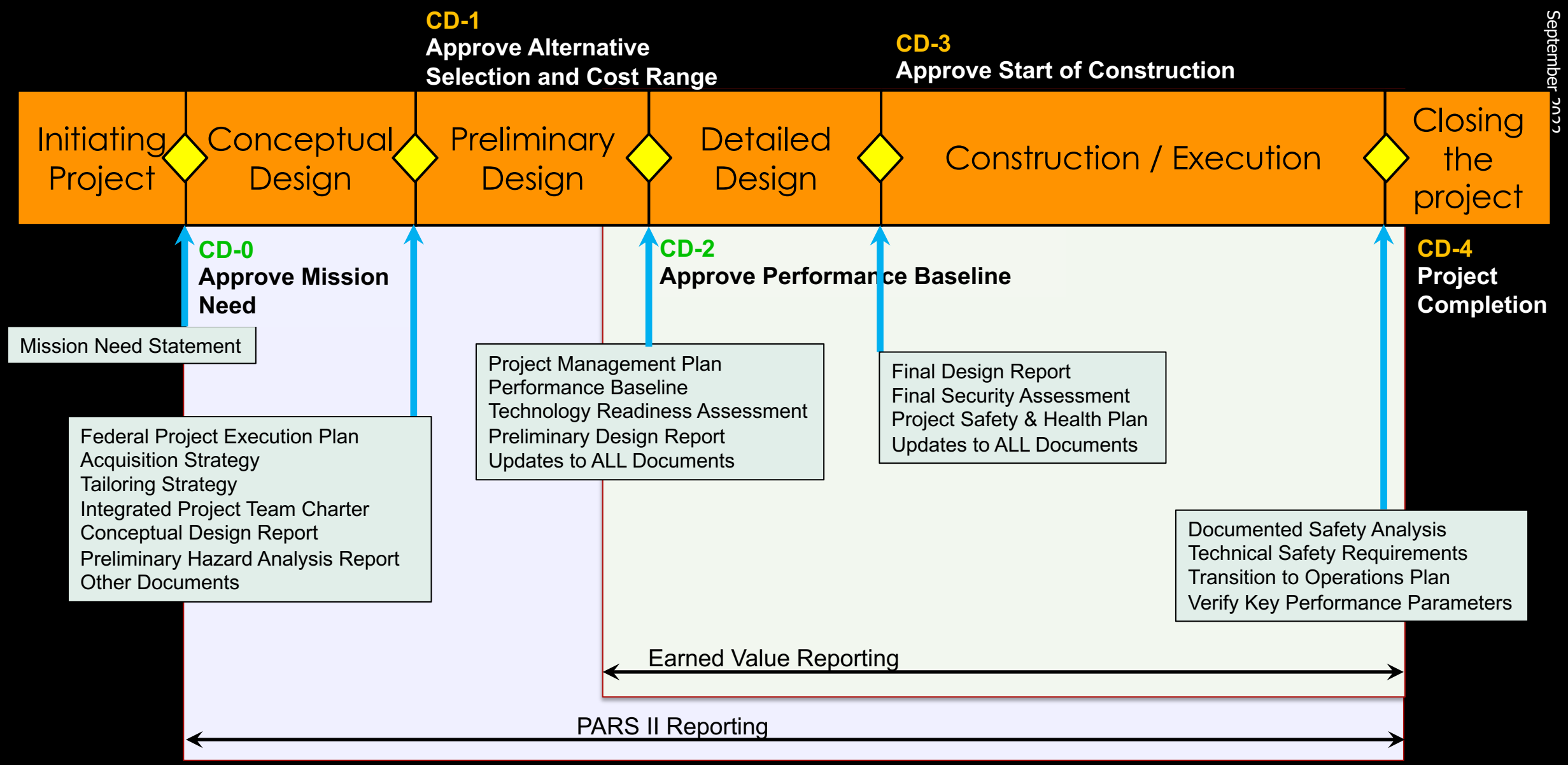
This applies throughout the DOE 413.3B Project Timeline



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DOE O 413.3B is based on accepted practices

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- Evolved as a result of the risks realized and challenges faced by DOE with its portfolio
- Formalized the phased development and critical decision (phase gate)
- CD-0 Mission Need = Business Case
- CD-1 Approve Alternative = Conceptual design / Requirements & Scope
- CD-2 Performance Baseline = Fixing the dependent variables of the project
- CD-3 Approve Start of Construction
- CD-4 Project Completion / Transition to Operations

The DOE/SC–OPA the steward of O 413.3B

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Home | Programs | Project Assessment (OPA) | Project Management | Processes and Procedures

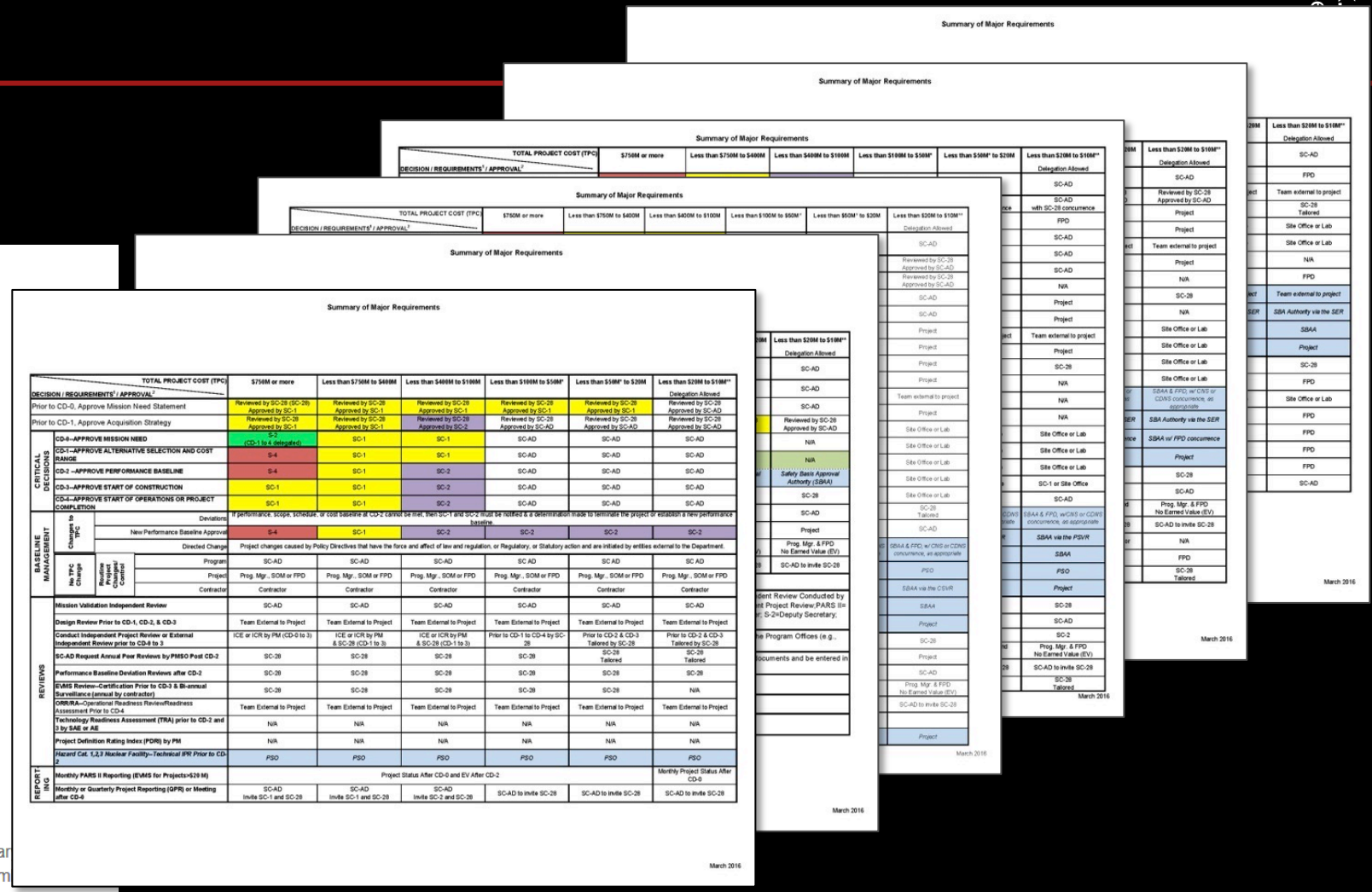
Processes and Procedures

Project Management Processes and Procedures:

- Department of Energy
- Office of Science
- Various Project Management Reports

Most Requested Documents:

- Memorandum from J. Stephen Binkley: 171130 Binkley SC PM Expectations, November 30, 2017
- Project Scope Definition: Spares
- DOE/SC Energy Systems Acquisition Advisory Board (ESAAB) Process, June 2013
- DOE/SC Independent Project Review Process, January 2012
- SC Template for Closeout Report, March 2012
- SC Template for Mission Need Statement, March 2012
- SC Template for Acquisition Strategy, April 2012
- SC Template for Project Execution Plan, May 2018
- SC Template for Lessons Learned, March 2012
- SC Template for BCPs, February 2013
- DOE Guide 413.3-21: Cost Estimating
- FAQ for DOE Order 413.3B, December 2018
- SC Project Decision Matrix, October 2019
- Memorandum from W.F. Brinkman: SC is Exempt from DOE Order 413.3B, February 2, 2011
- Approval by Daniel B. Poneman, Deputy Secretary: SC Exemption from DOE Order 413.3B, Januar
- DOE Order 413.3B: Program and Project Management for the Acquisition of Capital Assets, Decem 2016

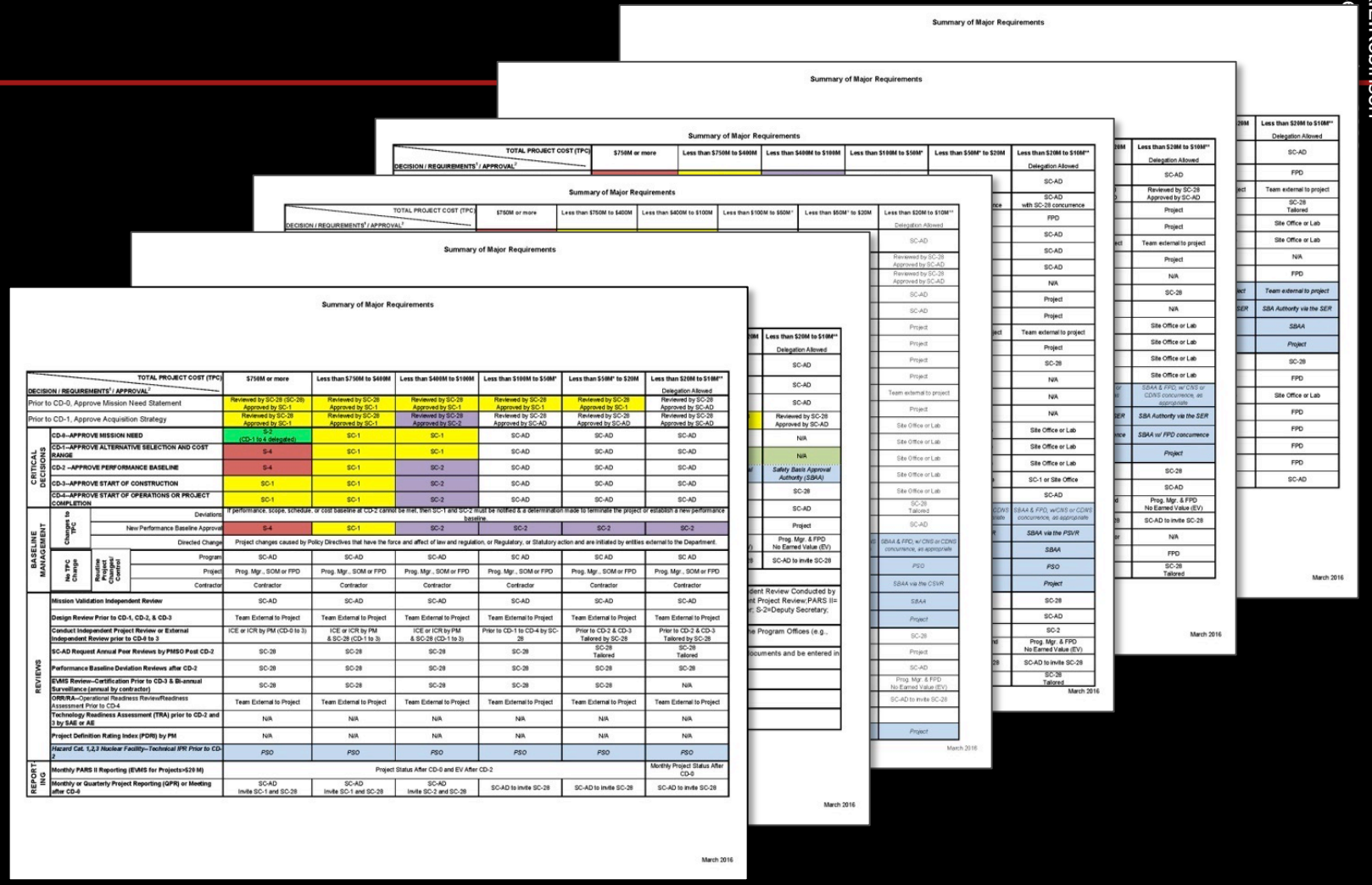


https://science.osti.gov/opa/Project-Management/Processes-and-Procedures

DOE/SC-OPA has distilled DOE O 413.3b

– The Project Decision Matrix

- Distills everything into a compact matrix
  - Authorities
  - Approvals
  - Applicability
  - Responsibility
- A very good checklist once a basic understanding is in place



https://science.osti.gov/-/media/opa/pdf/processes-and-procedures/project_decision_matrix.pdf

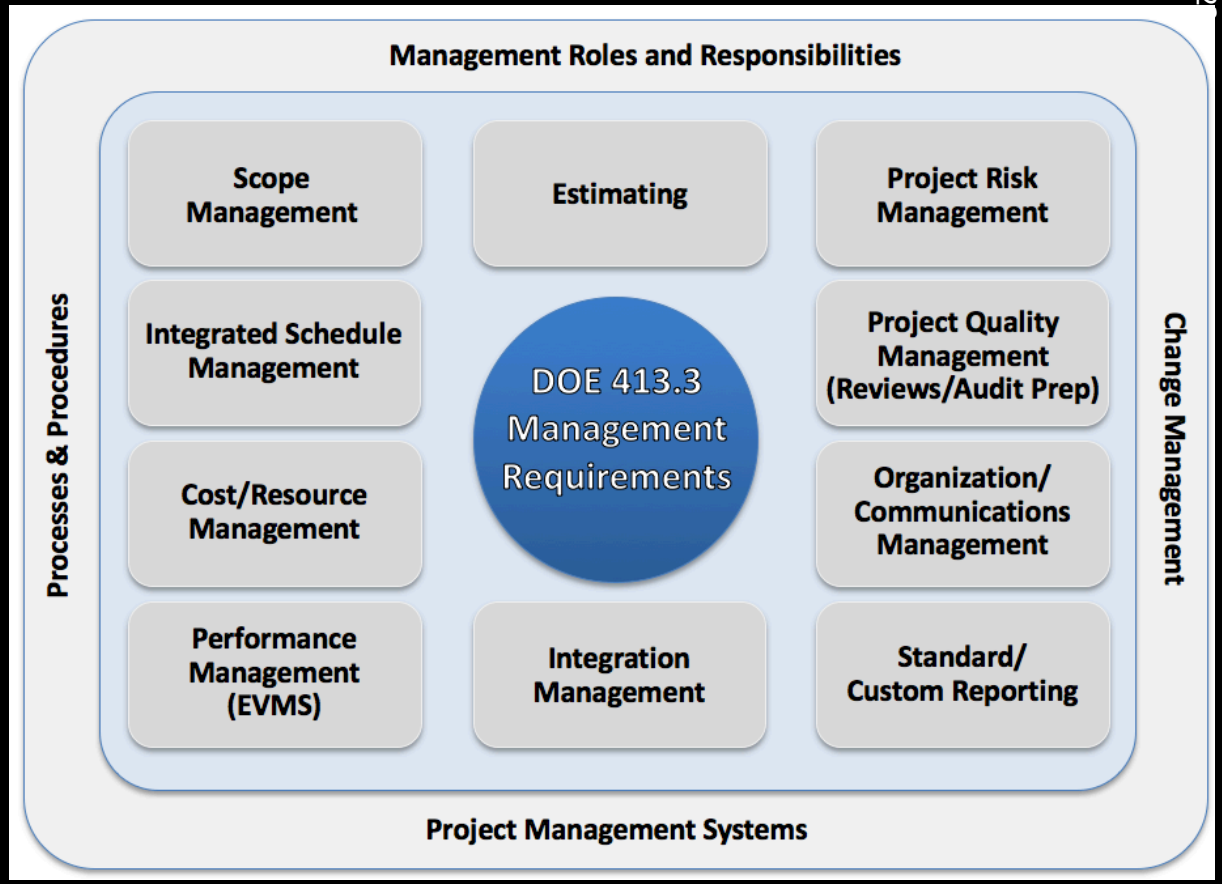
Recap DOE 413.3B Deliverables

DOE Order 413.3B defines both technical deliverables (design documents, occupational safety, etc…) as well as management requirements to be used throughout the life of the project.

Technical **and** management requirements must be met before approval to proceed beyond a Critical Decision point is granted.

It is based on general best practices,

Simple adherence ≠ Success



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510-590-1010

Questions and Discussion

https://science.osti.gov/opa

https://science.osti.gov/opa/Project-Management

https://www.directives.doe.gov/

https://www.energy.gov/projectmanagement/office-project-management

Thank you

…
May the funding come when you need it,
May the risks all be addressable,
May the scope be controllable,
May the schedules be realizable,
May the sun shine warm upon your face,
And the rain fall softly on your fields
Until we meet again…
– Irish project management blessing (paraphrased)