FE302
Advanced Facilities Engineering

Lesson 1

REQUIREMENTS DEVELOPMENT

TLO/ELO

Given a mission statement and alternatives, prepare requirements documents for congressional approval, in accordance with DoD policies and procedures.

- Given MILCON and a Civil Works project, determine the statement of need
- Given a DD-1391 requirements document, identify its basic building blocks
- Given a DD-1391, review and evaluate for accuracy and completeness

DoD Acquisition

"Acquisition is the conceptualization, initiation, design, development, test, contracting, production, deployment, logistics support, modification, and disposal of weapons and other systems, supplies, or services ***(including construction)*** to satisfy DoD needs, intended for use in or in support of military missions." *

*From the (Defense Acquisition Guide Book)

Construction Definitions (FAR 2.101)

“Construction” means construction, alteration, or repair (including dredging, excavating, and painting) of buildings, structures, or other real property. For purposes of this definition, the terms “buildings, structures, or other real property” include, but are not limited to, improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, cemeteries, pumping stations, railways, airport facilities, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, canals, and channels. ***Construction does not include the manufacture, production, furnishing, construction, alteration, repair, processing, or assembling vessels, aircraft, or other kinds of personal property*** (except that for use in Subpart 22.5, see definition at 22.502).

“Building or work” means construction activity ***as distinguished from manufacturing***, furnishing of materials, or servicing and maintenance work. The terms include, without limitation, buildings, structures, and improvements of all types, such as bridges, dams, plants, highways, parkways, streets, subways, tunnels, sewers, mains, power lines, pumping stations, heavy generators, railways, airports, terminals, docks, piers, wharves, ways, lighthouses, buoys, jetties, breakwaters, levees, canals, dredging, shoring, rehabilitation and reactivation of plants, scaffolding, drilling, blasting, excavating, clearing, and landscaping. The manufacture or furnishing of materials, articles, supplies, or equipment (whether or not a Federal or State agency acquires title to such materials, articles, supplies, or equipment during the course of the manufacture or furnishing, or owns the materials from which they are manufactured or furnished) is not “building” or “work” within the meaning of this definition unless conducted in connection with and at the site of such building or work as is described in the foregoing sentence, or under the United States Housing Act of 1937 and the Housing Act of 1949 in the construction or development of the project.

Acquisition Strategy

Addresses technical, business, management and other considerations, such as:

- Corporate direction, providing overall corporate goals, strategies and approaches related to program execution
- Provides direction in the form of business rules and initiation of innovative practices
- Should begin as soon as the agency need is identified, preferably well in advance of the fiscal year in which contract award or order placement is necessary

Acquisition Plan Defined

- A procurement specific document required by DFARS for a specific procurement action
- Involves all responsible personnel in an coordinated/integrated manner to fulfill agency needs (timely manner and reasonable cost)
- Technical considerations include:
  - Statement of need
  - Requirements document
  - Goals and objectives
  - Work classification
  - Project delivery

Statement of Need

- What is the underlying human need?
- A building is often the answer, but it is almost never the need
- This is the basis for all that follows, so, investing time at this stage is critical to success
- Detail the problem, not the solution (Defining the problem by offering a solution limits the options available later)

Statement of Need (continued)

- Brief statement of need to introduces the acquisition strategy
- The need statement is used throughout the entire acquisition process
- Formalized with the DD Form1391 (or DD 1391), Facilities Planning Document for all MILCON and most general construction projects
- With regard to your planning, be able to answer the seminal questions:

WHY HERE? WHY NOW?

Ted Talks – Determining Requirements

Alastair Parvin – Architecture for the People - highlight innovative thinking about requirements and solutions or

Janet Sadik Kahn – NY streets not so mean any more!?

- Who determines requirements? Customer or service provider?
- Who measures success? Customer or service provider?

Lesson 1, Exercise 1 – Developing the Statement of Need

- Purpose:
  - Developing a Statement of Need for a MILCON and Civil Works Program:
    1. DOD's Medical Center Replacement Program
    2. A navigable river lock and dam replacement (e.g., USACE's Civil Works Infrastructure Program)
- Action:
  - Each team must develop a one-paragraph Statement of Need
    - Team: 15 minutes to complete and 5 minutes to present findings
    - Class: 10 minutes for general discussion

Lesson 1 Exercise 1
Statement of Need Development

1. Need Statement from the DoD's Medical Center Replacement Program:

The Department of Defense needs to provide comprehensive medical support to beneficiaries; including Wounded Warriors, active duty, retirees, and dependents, a major command headquarters, the U.S. Reserve and National Guard; a Marine USACE organization and a U.S. Air force activity. In addition the project will include health care facilities for emergency medicine with an in-patient observation unit; birthing pavilion; same-day surgery; primary and specialty medical care.

2. Need Statement from Army's Civil Works Infrastructure Program:

The country needs to replace its old and antiquated locks and dams on many of the country's navigable inland waterways which are inefficient and at risk of failure due to age and deterioration. This replacement will reduce the transportation costs of delivering goods and materials that use inland waterways by reducing lockage times and the risk of a significant failure occurring.

Scope of Work (SOW)

- A written statement:
  - Describes all work needed in a construction project
  - Designed to inform the project team what needs to be completed
  - Created during the first step of planning a project
  - Prepared by the government and is given to companies bidding on the project
  - Genesis of the SOW is in the Requirements Document (RD) such as a DD-1391

Classification of Work for the SOW

Construction	**New capability or footprint**
Alteration	• **Changing existing facility to meet a new mission** • **Potentially new footprint when done**
Renovation	• **Changing existing facility to meet new codes** • **Same function and facility structure when finished!** • **No change in facility footprint or function.**

Classification of Work for the SOW 2

Repair:	**The restoration for use for a designated purpose by overhauling, reprocessing, or replacing parts or materials that have deteriorated by action of the elements or by wear and tear in use, and which have not been corrected through maintenance. Implication: if failure has occurred or is immanent, the FAR calls this construction**
Maintenance:	**Recurring work to prevent deterioration. FAR 37.101 defines this as service contract work required to preserve or maintain a facility in such a condition that it may be used for its designated purpose.**
Demolition:	**Demolishing the facility and leaving a green field behind vice combining it with new construction. In the first instance it is a service contract. In the second instance it is a construction contract.**

Practical Examples of Service and Construction Contracting

You have a contract for replacing carpet, is that a service or construction?

- If this work is designed to replace the carpet as a single and separate action (really and truly), then it could be performed as a service contract. The reality is that it is most likely part of a larger renovation contract involving paint, systems furniture, etc., which makes it a construction action.

What kind of contract is it to demolish a building and not perform further construction?

- The demolition of facilities is subject to Congressional approval and will undoubtedly have safety and environmental hazards not addressed by commercial contracting FAR Part 12 rules. It would be best to do this as a FAR Part 36 contract.

At what point does a contract for painting change from service to construction

- DFARS 222.402-70(d) 200 SF

Requirements Analysis (RA)

Process that takes the force structure, equipment of units and activities and translates that to a facilities requirement, making maximum use of existing facilities.

- Lays the foundation for consistent and auditable planning and programming documentation
- Not required for all projects
- Provides basis for follow-on Charrette efforts

Planning Charrettes

"The planning charrette process is accomplished during the formative stage of a project and facilitates the identification of issues that impact functionality, scope, cost and execution."

- The product of this effort should be a complete and effective DD Form 1391.
- A Planning Charrette is comprised of a multi-disciplinary team of all stakeholders.
- Planning Charrettes (OMA funded) are to be utilized for the preparation of documentation for approved MC projects in the FYDP program
  - Service HQ to centrally budget and manage to ensure resources are available

Requirements Document (RD)

RDs can be submitted a variety of forms:

- MILCON Projects use a DD-1391
- Civil Works Projects use a different process (more later)
- Operation and Maintenance Construction projects use agency specific documents
- Operation and Maintenance Service projects use Agency specific documents

Requirements Document (RD) 2

Purpose of RD is to:

- Provide the designer a basis for understanding the project requirements.
- Provides the framework for executing this project through the team members including the user.
- Requires the designer to verify the accuracy of the information contained within this document.
- Briefly explain the project's purpose and state user specific goals the designer should consider.

RD Goals and Objectives

They are:

- Quality
- On-time Delivery
- Funding Limitations
- Safety
- Protecting the environment
- Energy efficiency
- Satisfy User’s needs
- Project Delivery Methods
- Etc.

Civil Works (CW) Requirements Document

- CW projects begin with the identification of a need for flood protection, navigation, or other water-related infrastructure
- Congress directs USACE to study the need and determine if a project is warranted.
  - The study process is a feasibility study to determine a feasible solution/best alternatives and to assesses the Federal Government's interest
- Congress must authorize the project and provide appropriate funding (usually WRDA)

MILCON RD – DD Form 1391

- Purpose
  - Define work
  - Justify project
- Function
  - Programming Document
  - Budgeting Document
  - Contract
  - Part of Public Law

DD Form 1391 (Blocks 1-11)

1. COMPONENT	FY MILITARY CONSTRUCTION PROJECT DATA	2. DATE
3. INSTALLATION AND LOCATION	4. PROJECT TITLE	
5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($OOO)

9. COST ESTIMATE

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
PRIMARY FACILITY				
SUPPORTING FACILITIES				
ESTIMATED CONTRACT COST CONTINGENCY PERCENT (.00%) SUBTOTAL SUPERVISION, INSPECTION & OVERHEAD (.00%) TOTAL REQUEST TOTAL REQUEST (ROUNDED) INSTALLED EQT-OTHER APPROPRIATIONS				

10. Description of Proposed Construction

11. REQ: ADQT: SUBSTD:

DD FORM 1391
2 DEC 76

PREVIOUS EDITIONS MAY BE USED INITIALLY
UNTIL EXHAUSTED

PAGE NO. 1

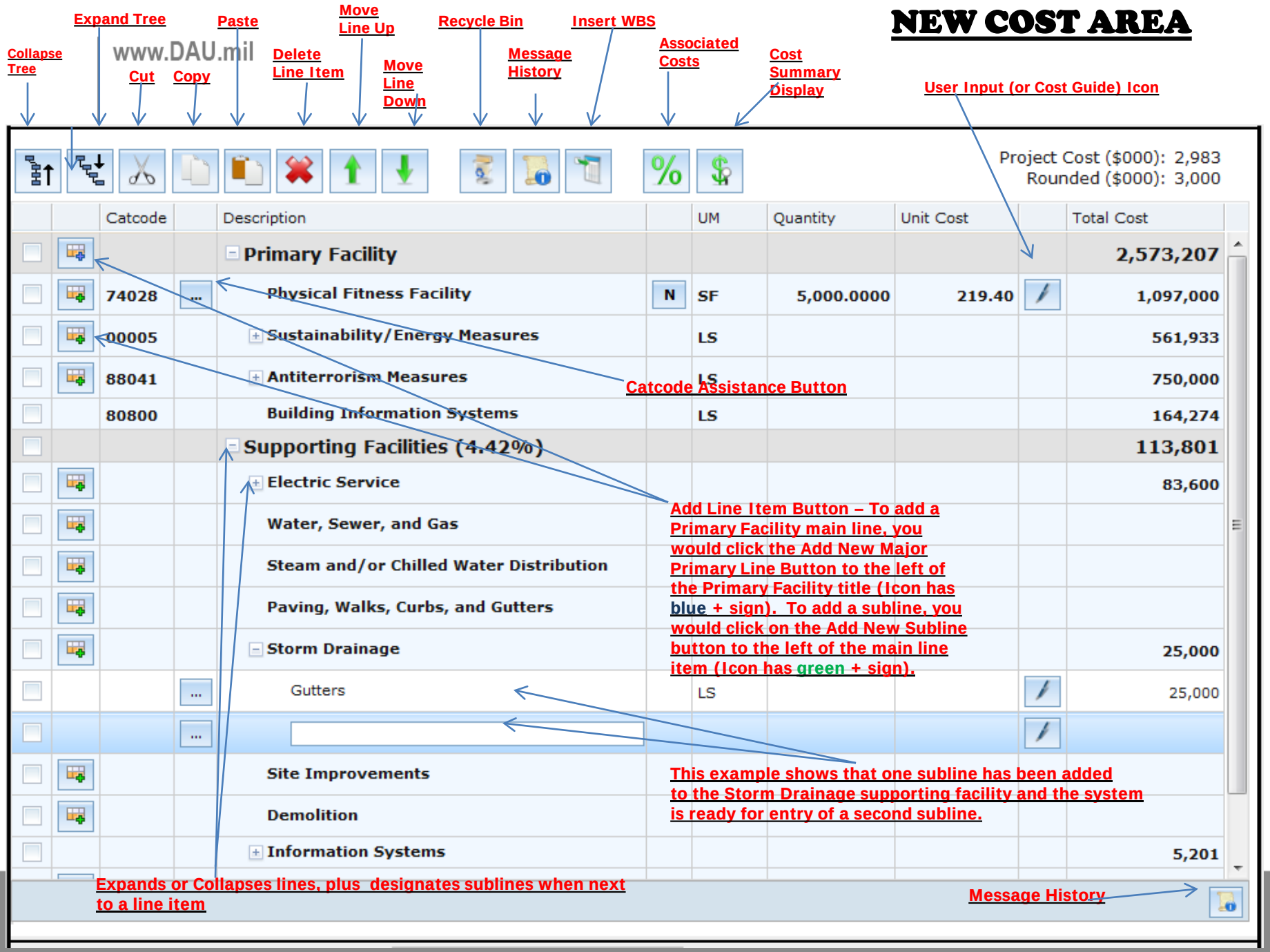
MILCON Key Points

- The process is deliberate and methodical
- The DD Form 1391 is the key document in the MILCON process that defines and justifies the project
- Military construction projects are line item authorized and appropriated
- Funding for construction design and architect/engineering services is authorized and appropriated in aggregate, rather than on a project-by-project basis.

MILCON Key Points (Continued)

- Individual MILCON project authority expires after three years, and may be extended twice.
- MILCON appropriations expire after five years.
- The Army Corps of Engineers and the Naval Facilities Engineering Command are the construction agents for all DoD
- For simplicity, we will look at how the Army develops and utilizes the DD Form 1391. However, all the services are similar and follow the same basic process.

NEW COST AREA



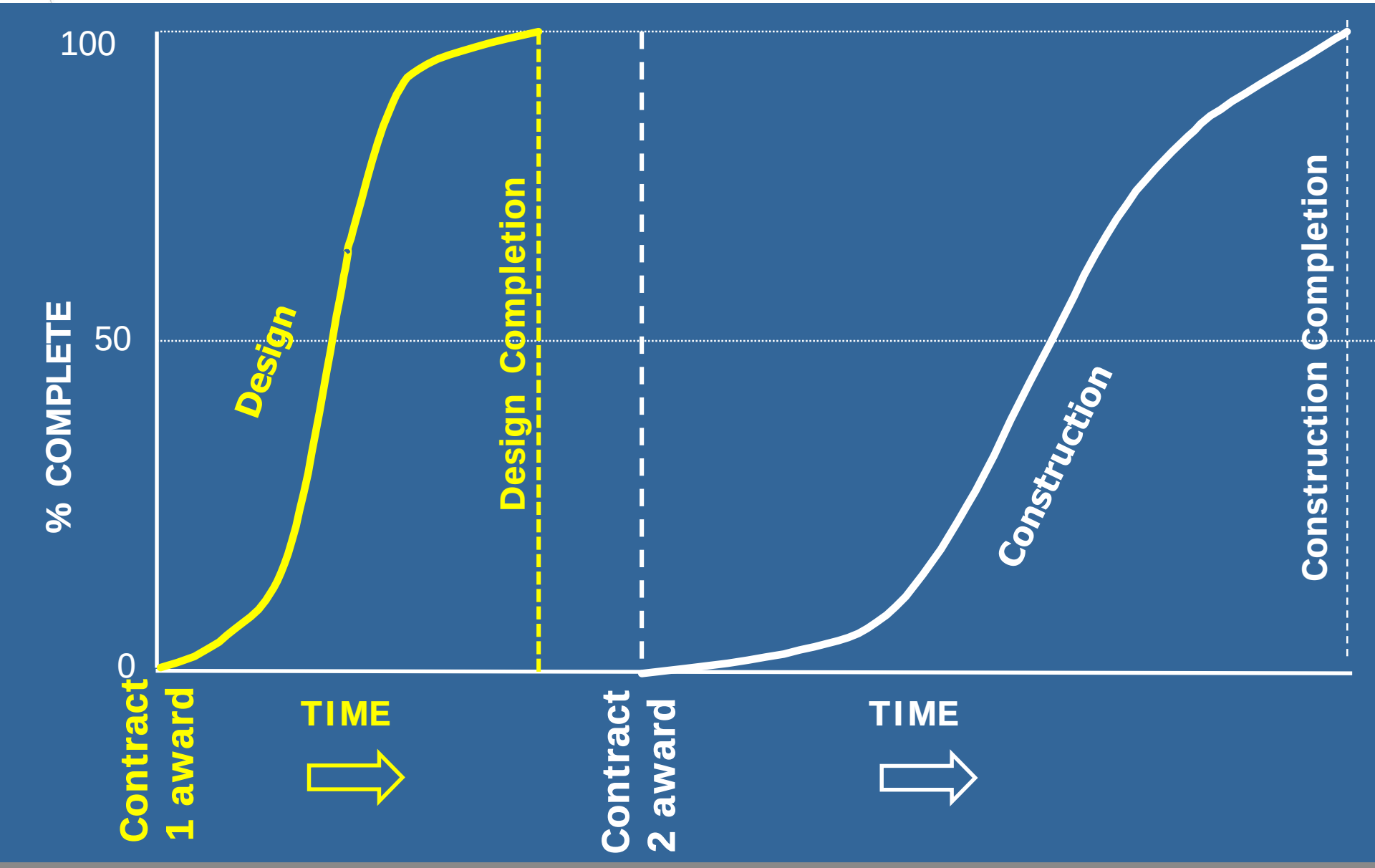
Project Delivery Methods

- Design-Bid-Build:
  - One contract to an A/E firm (or in-house) to design, and
  - One contract to a construction contractor
- Design-Build:
  - One construction contract awarded for design and construction
- Early Contractor Involvement:
  - One contract to designer for the design
  - One contract to a construction contractor to provide constructability review during the design process and an option for the actual construction

Design-Bid-Build

- Design done either in-house or contracted A/E firm
- A/E contracts for a design follows in FAR Subpart 36.6, *Architect-Engineer Services*
- Final design used as SOW for the follow-on construction contract
- Follow-on construction contract follows procedures in FAR Subpart 36.104

Design-Bid-Build Flow Chart



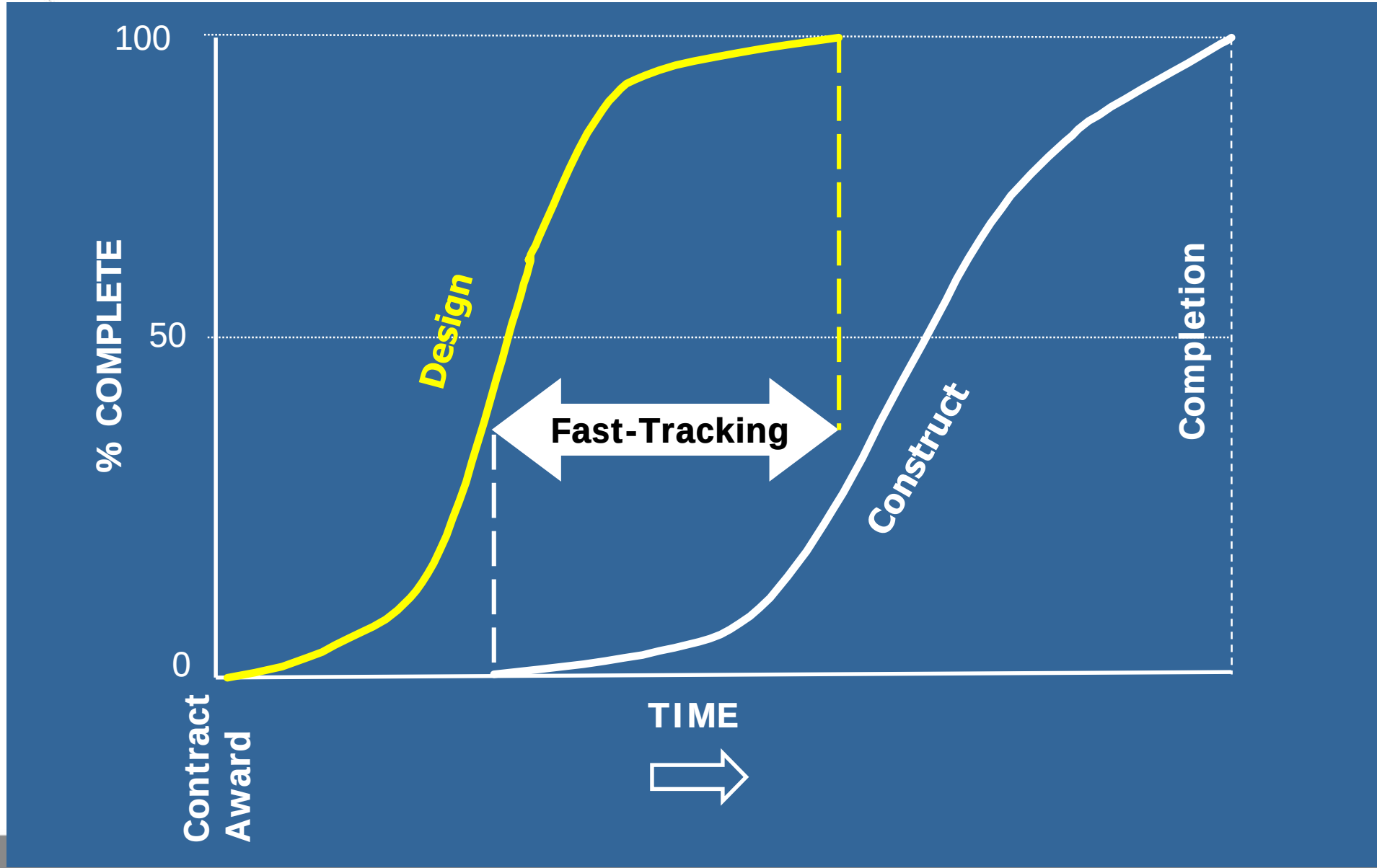
Design-Bid-Build Advantages

- One design contract and one construction contract
- Preaward is quicker; but requires two contracts
- Funding –no wait time for entire project funding to complete design - design one year, construct the next
- Specialized facilities – ensures that the facility is designed exactly as they need it

Design-Bid-Build Disadvantages

- Design can be put “on the shelf”
- A/E may not be on contract when needed during construction
- Design limited by statute to 6% of ECC
- Design deficiencies require the redesign at no added expense to government
- Post award, the redesign will result in contract modifications which can be very time consuming
- Poor design may cause RFIs, REAs, and claims
- Construction contractors might try to “buy-in”

Design-Build Flow Chart



Design-Build Advantages

- Time and Cost
  - Little delay between complete design and work starting
  - Potential for “fast-tracking”
  - Potential for less cost growth (KR owns the design)
- Contract Administration
  - One contract is issued and administered
  - Who resolves issues with design? – the general contractor

Design-Build Disadvantages

- Gives up control to the contractor
- Requires a customer-generated design concept
  - Risk: What stage of design does your agency give to the DB contractor?
- GC usually subs the design, so little direct access to designer of record (DOR)
- GC's design submission becomes the SOW for the contract
  - So, a change to design will require a contract modification
- Increased proposal prep costs may limit SB participation

Early Contractor Involvement (ECI)

- Modeled after private sector's project delivery method: Construction Manager@Risk.
- Design contract IAW FAR Subpart 36.6, *Architect-Engineer Services*
- Construction contractor provides a constructability review similar to an "over the shoulder" review process
- Construction contract awarded as an option
- Useful for highly complex, schedule-driven, and specialty projects

When To Use Either

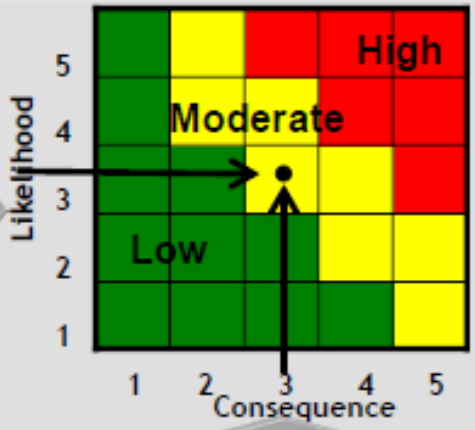
- D-B-B: Time available to develop detailed design and get it at the lowest price. (FAR defaults to this unless exceptions arise)
- D-B: Know what you want (by at least the 35% design
- ECI: If you need input from the construction contractor during the design process and still want to have privity with the designer.

Analysis of Alternatives

- Required in DD 1391 submission
- Explains alternatives considered regardless of the type of facilities required
- Explains economic factors and the reasons the selected option is judged best
- Answers the question – **“What alternative to construction was examined, evaluated and rejected before requests for new or replacement facilities were submitted on this DD 1391”**

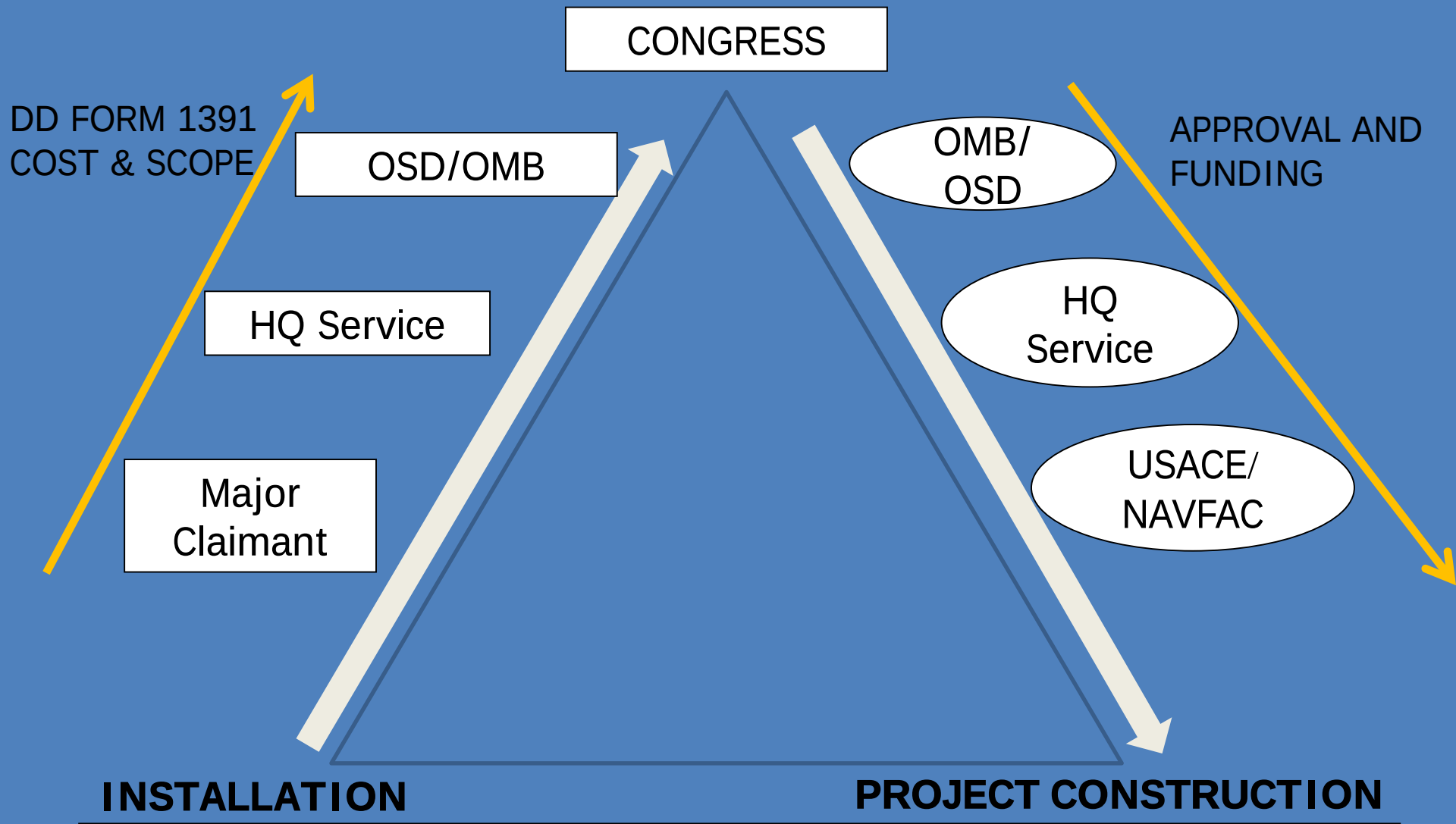
DOD Risk, Issue, and Opportunity Guide

Level	Likelihood	Probability of Occurrence
5	Near Certainty	> 80% to ≤ 99%
4	Highly Likely	> 60% to ≤ 80%
3	Likely	> 40% to ≤ 60%
2	Low Likelihood	> 20% to ≤ 40%
1	Not Likely	> 1% to ≤ 20%

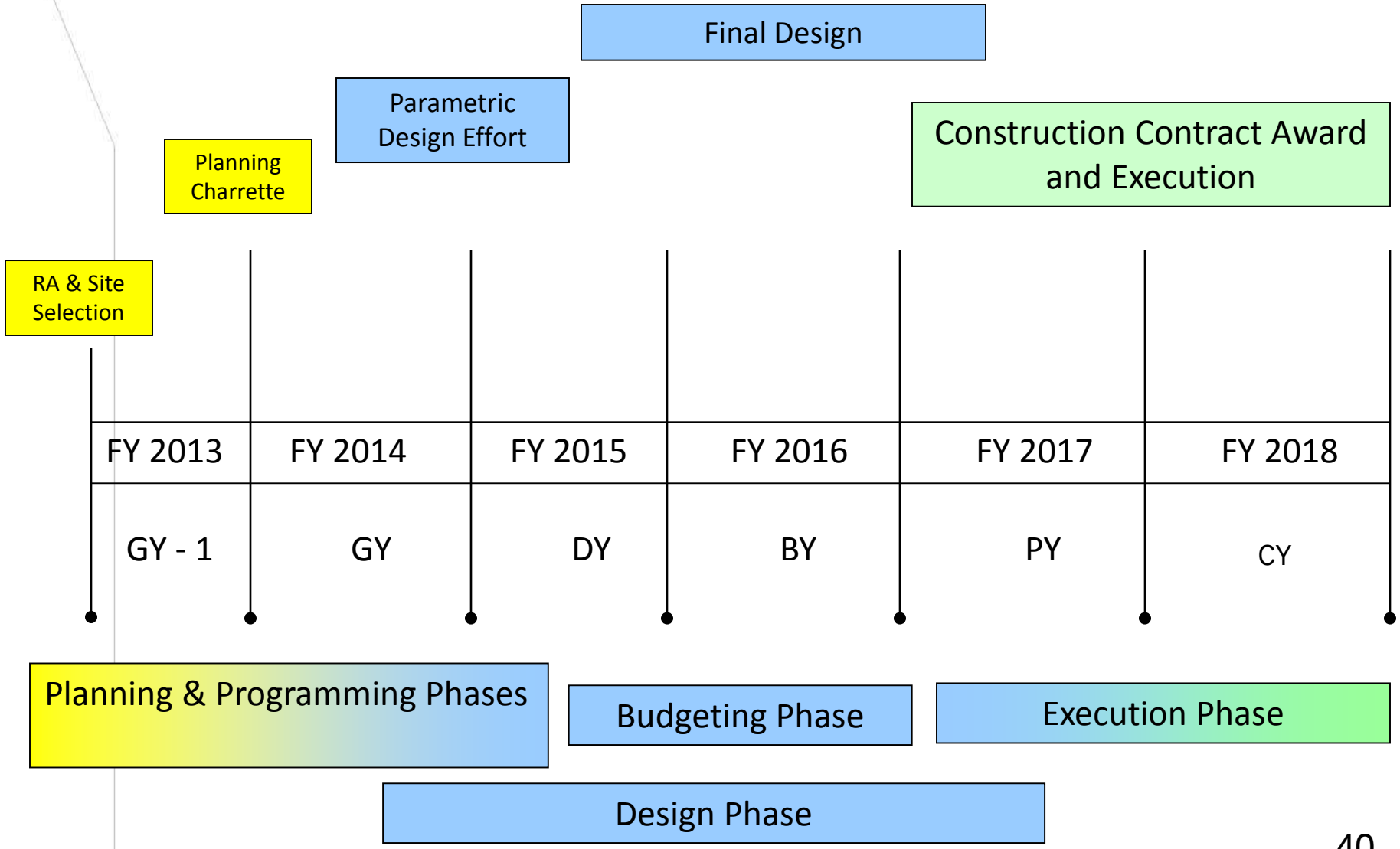


Level	Cost			Schedule	Performance
	RDT&E	Procurement	Operations & Maintenance/Sustainment		
5	Major impact. 10% or greater increase over APB threshold; or >SD. Management reserve depleted.	Major impact. Budget or unit production cost (e.g., APUC) increasing to a significant Nunn-McCurdy breach; or increase of more than XX in programmed dollars (POM)	Costs exceed life cycle ownership cost by 10%. Ability to sustain system in jeopardy.	Schedule slip that requires a major schedule re-baselining; precludes program from meeting its APB schedule objectives by more than 6 months; negative float to program completion	Severe degradation precludes system from meeting a KPP or key technical supportability threshold; will jeopardize program success; design or supportability margins exceeded; unable to meet mission objectives (defined in mission threads, CONOPS, OMS/MP)
4	Significant impact. 5% -<10% increase over APB threshold; or SC-≤SD. Requires use of significant management reserves.	Significant impact. Costs that drive a unit production cost (e.g., APUC) increasing to an APB threshold breach of SC - ≤ SD; or increase of SYY-XX in programmed dollars (POM)	Costs drive increase of more than z% over program's lifecycle cost estimate; costs drive program to exceed life cycle ownership cost KSA.	Significantly impacts ability to meet planned milestones and/or other key dates. Established acquisition decision points or milestones will be delayed, impacting APB schedule objectives by less than 6 months. Slip puts funding at risk; <5% float to major milestones or program completion	Significant degradation impairs ability to meet a KSA; Technical design or supportability margin exhausted in key areas; able to meet one or more mission tasks . (defined in mission threads, CONOPS, OMS/MP); workarounds required to meet mission objectives
3	Moderate impact. 3% -<5% increase over APB threshold; or SB - ≤ SC; manageable with reserves; inability to meet key cost metrics	Moderate impact. Costs that drive unit production cost (e.g., APUC) increase of SB -≤ SC; or SZZ-YY in programmed dollars (POM); inability to meet key cost metrics	Costs drive increase of y - 2% over program's lifecycle cost estimate or within 2% of life cycle ownership cost KSA; inability to meet key cost metrics	Minor schedule slip; able to meet key milestones. Total program float decreased by X-Y% with float remaining positive, but nearly consumed; <10% float to major milestones or program completion; inability to meet key schedule metrics	Moderate reduction in technical performance or supportability; unable to meet lower tier attributes (e.g. PAs); planned design or supportability margins reduced; inability to meet key TPMs, CTPs.. Workarounds required to achieve mission tasks (defined in mission threads, CONOPS, OMS/MP)
2	Minor impact. 1% - <3% increase over APB threshold; or $A- ≤ $B; exceeding cost metrics tripwires	Minor impact. Costs that drive unit production cost (e.g., APUC) increase of $A-≤ $B; or $AA-ZZ in programmed dollars (POM); exceeding cost metrics tripwires	Costs drive increase of x- y% over program's lifecycle cost estimate; exceeding cost metrics tripwires	Able to meet key dates. Total program float decreased by less than X%, with 10% or greater positive float remaining.; exceeding schedule metrics tripwires	Minor reduction in technical performance or supportability; can be tolerated with little or no impact on program objectives. Design margins will be reduced, but within limits / tradespace; exceeding key TPMs, CTPs tripwires
1	Minimal impact. <1% increase over APB threshold; or <$A. Costs expected to meet approved funding levels, not projected to increase above thresholds	Minimal impact. Costs that drive APUC increase of ≤ $A ; or less than $AA in programmed dollars (POM). Costs expected to meet approved funding levels, not projected to increase above thresholds	Costs drive increase of ≤lx% over program's lifecycle cost estimate.	Minimal or no schedule impact.	Minimal or no consequences to meeting technical performance or supportability requirements. Design margins will be met; margin to planned tripwires.

DD-1391 Review and Approval



Planning, Programming, Budgeting, Execution (PPBE) Process and Project Timeline (FY18 Project)



DD-1391 Stages/Process/Skills

PLANNING	DESIGN	CONSTRUCTION
Studies OMA/OMN/RDTE	DB/DBB/ECI P&D BCOES	Authorization & Appropriation
Skills: Env Eng; Geol; Biol; PDT; CE; EE; Cost Est; Acoustical Eng; Sched; SE; Ind Eng; Com Engr; ME; Master planner; Customer; LEED; SHIPO; Arch; RE	Skills: Env Eng; Geol; Biol; PDT; CE; EE; Cost Est; Acoustical Eng; Sched; SE; Ind Eng; Com Engr; ME; Master planner; Customer; LEED; SHIPO; Arch; VE; Legal	Skills: Env Eng; Geol; Biol; PDT; CE; EE; Cost Est; Acoustical Eng; Sched; SE; Ind Eng; Com Engr; ME; Master planner; Customer; LEED

DD Form1391 Review

- Purpose:
  - Identify the basic building blocks of a DD-1391
- Action:
  1. Using the provided DD-1391 take 5 minutes to individually review it.
  2. As a group take 10 minutes to discuss how to use a DD-1391
  3. As a class take 15 minutes to discuss the important blocks of the DD-1391

Example: Naval Station Anywhere USA, found in student references.

DD-1391 Assessment Exercise

- Purpose:
  - Given a DD-1391, evaluate for accuracy and completeness IAW with DoD Regulations
- Action: Evaluate the DD-1391
  - Team: 30 minutes to complete and 10 minutes to present your findings
  - Class: 20 minutes for general discussion and review actual DD-1391

Use Red River Army Depot, TX DD 1391 found in student references.

Crucial Factors ("The Dominant Dozen")
Requirements Definition

- Clear, Concise, Logical Statement of NEED
- Full Exploration of ALTERNATIVES
- Current ECONOMIC ANALYSIS
- Complete ENVIRONMENTAL DOCUMENTATION
- Approved SITE
- Firm SCOPE Of WORK
- Conformity with CRITERIA/ALLOWANCES
- Valid COSTS
- UNUSUAL Conditions/Costs Explained
- Consequences IF NOT PROVIDED
- PLANNING CHARRETTE VALIDATION
- DESIGN Status