SE for S&T

Applications of System Engineering to Pre-Milestone A Projects

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Agenda

- What does “Pre-Milestone A” mean?
- Can you do SE at this point?
- Why should you do SE at this point?
- How do you do SE at this point?

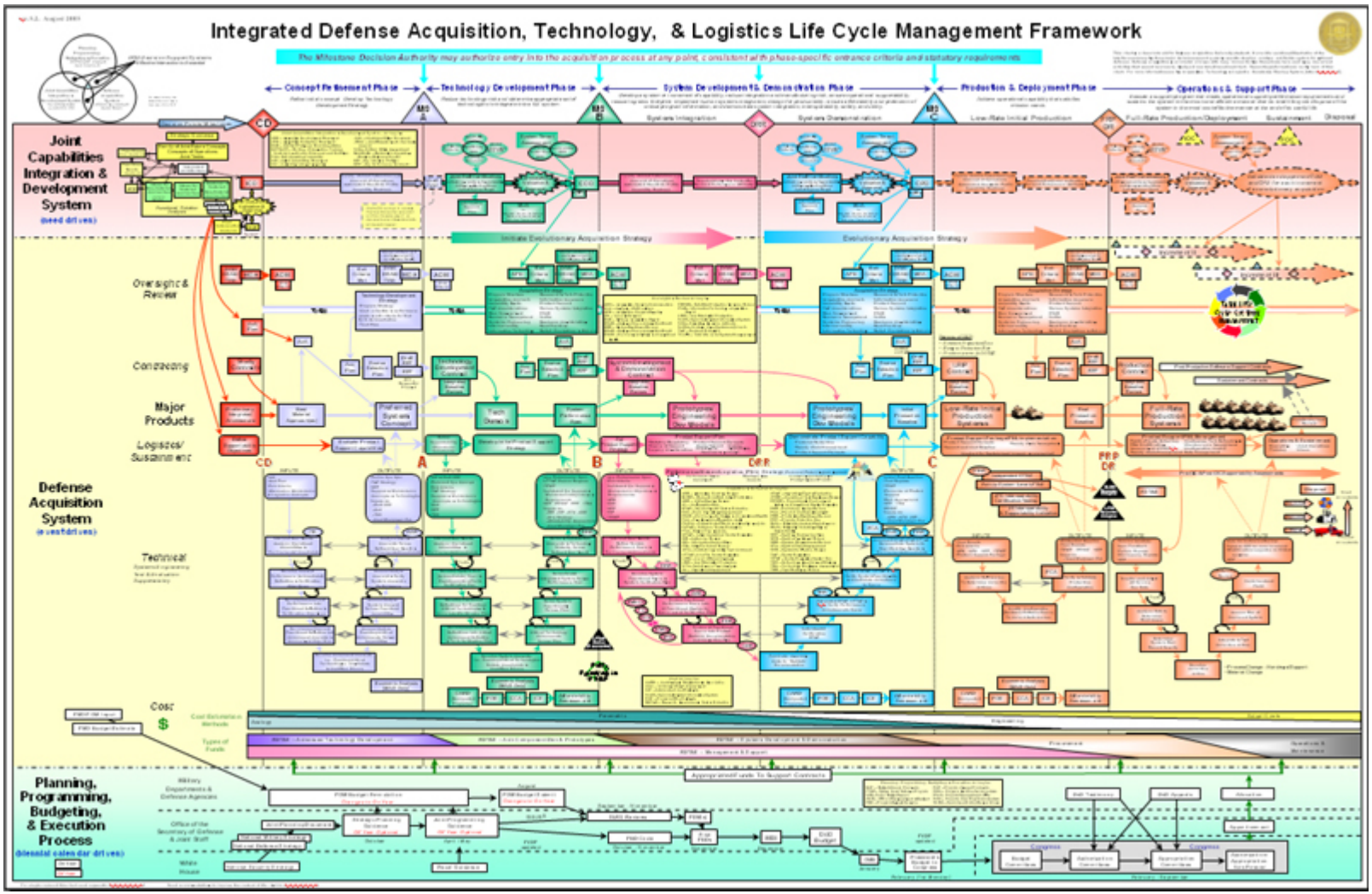
Pre-Milestone A

A DoD term that captures the concept development and concept refinement stages

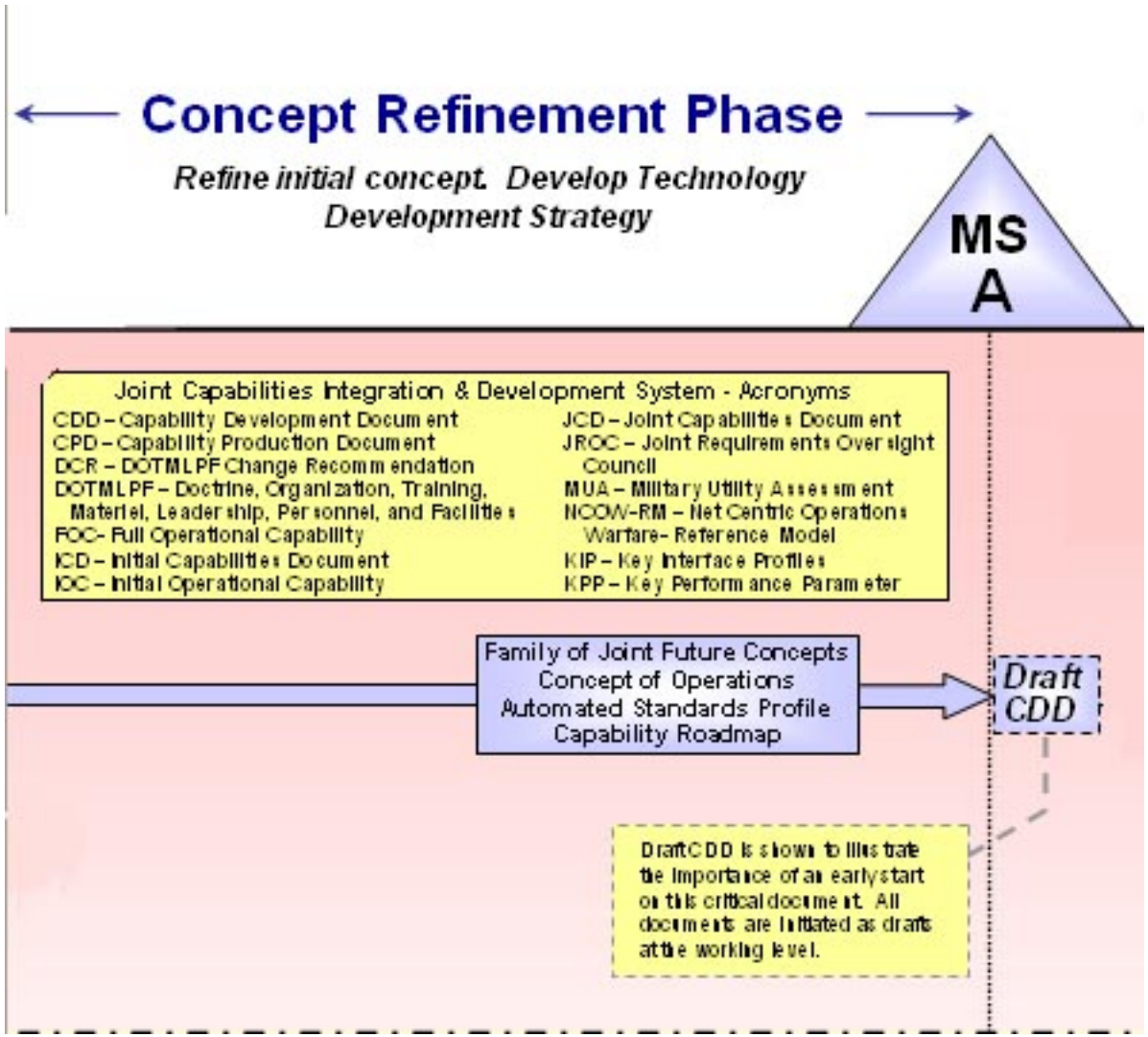
INCOSE (handbook/15288) equivalent is “Concept” stage

Often known in industry as “Study Period”

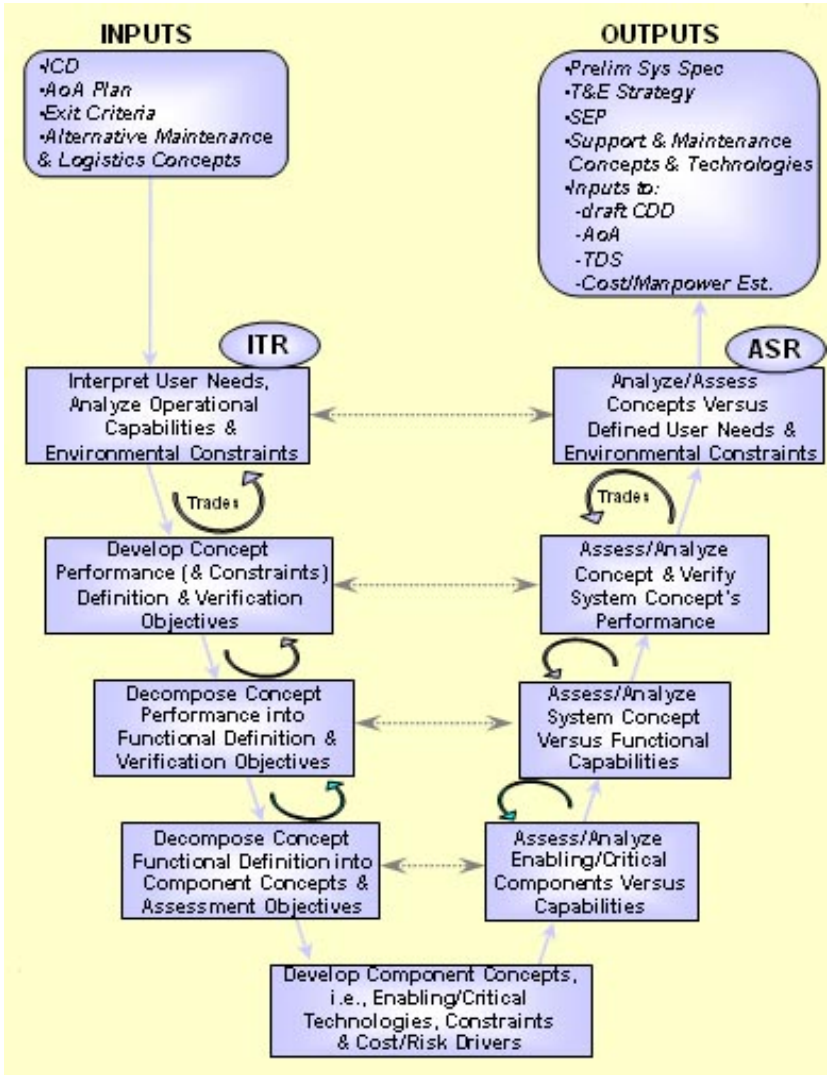
JCIDS “wall chart”



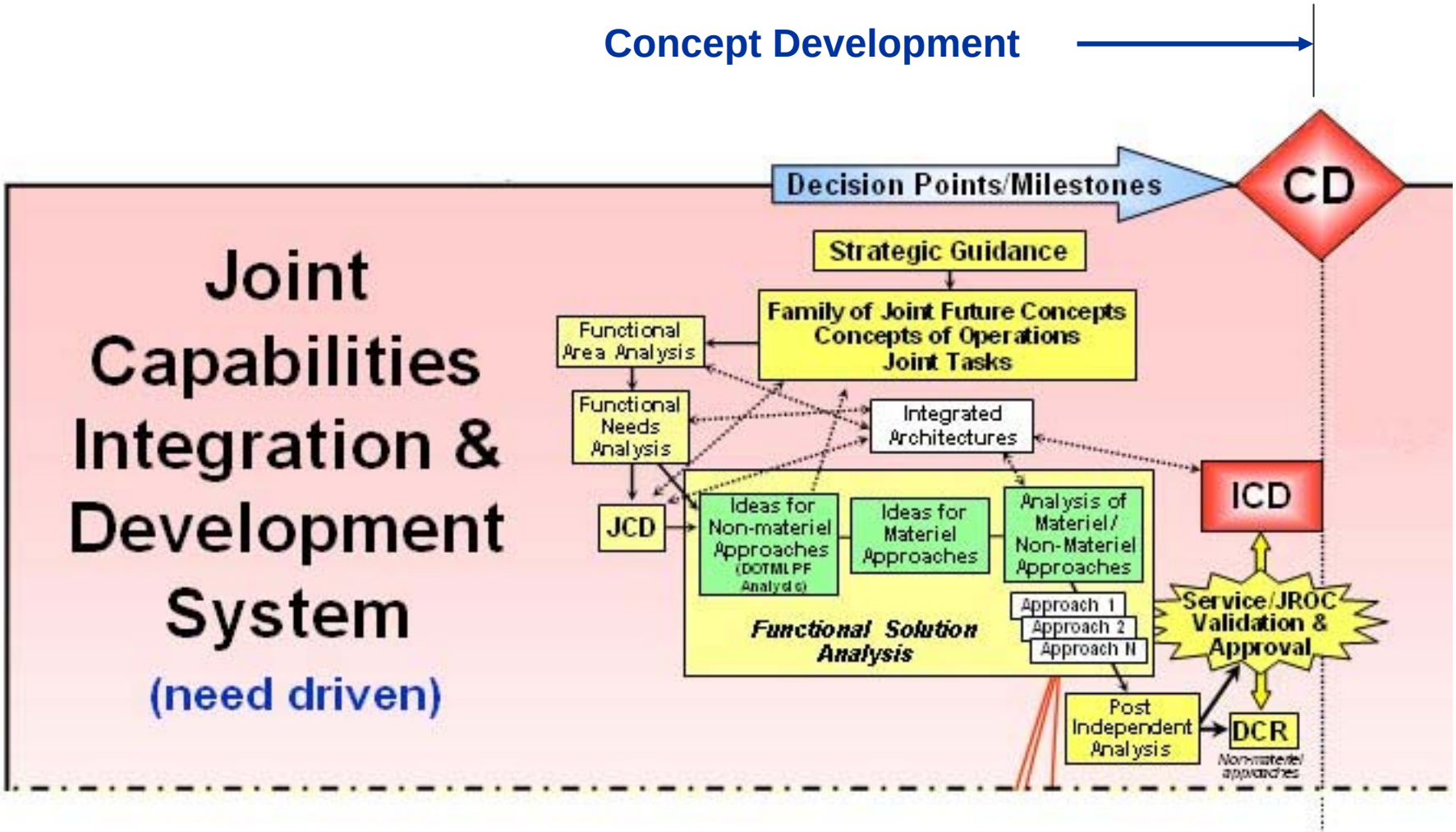
Zoom to Pre MS A



Pre MS A engineering aspects



Zoom to *before* Pre MS A



Can you do SE at this point?

- Not a lot of people do….

Can you do SE at this point?

- Not a lot of people do….

….but, YES!

Why should you do SE at this point?

- Typical Pre- MS A situation:
  A. A new technology looking for a problem
  B. A problem with a potential solution concept that leverages one or more technologies. There is a vision that needs some detailing and proving.

Why should you do SE at this point?

- Q. So why can't you just "play around" with the ideas & technologies until you get them robust enough to warrant "real" system engineering activities?

- A. You can, but you might miss out on some important things.

Common Vision

- Do all team members understand the end goal?
- Is there a documented “big picture” technical approach?

A notional example

- New concept to use underwater ultrasound to measure ship hull thickness
  - Transducer mfr
  - COTS scope
  - Cables & misc COTS/custom as needed

But

- If the transducer mfr is not aware this will be diver-held, he may make something with great resolution, but unmanageably large.
  - He needs the big vision so he can make proper development tradeoffs, even within his own “sandbox”

But

- If you don’t do good requirements development, you might find out too late that divers have certain racks or cases all their equipment fits into, and the scope you chose does not fit!

But

- If you don’t talk to a logistician, you won’t know that there is a hull cleaning system that you might easily attach to or integrate with, making your concept much more attractive to users.

How to do SE at this point

- Things to focus on:
  - System Engineering Plan *to include:*
  - Requirements Development
  - Configuration Management
  - Risk Management
  - Quality Assurance

SEP

- Follow the OSD guidance: Systems Engineering Plan Preparation Guide

http://www.acq.osd.mil/se/publications.htm

Section 3 will guide you through.

The plan need not be burdensome.

Evolve it as you progress.

Requirement Development

- Identify and document the source of your requirements, then determine if you really have them all!
- How did you, or will you, validate them (who are your users and stakeholders?)
- How will you manage them?
- *Do you need to, or want to "architect" your system?*

Configuration Management

- Identify what types of info require CM
  - SEP, Proj Plan, Work Packages, Reqmts
  - Final Reports, Design Baselines
- Plan for version control (1.x or date or…)
- Define a review/change/approval process
- Where will they be stored?

Sample CM content

Document Title	Author	Signature Authority
Project Plan	PM	Sponsor
Systems Engineering Plan	Lead Systems Eng.	PM
User Requirements Doc	Systems Engineer	Sponsor

This list will be updated as needed during execution of the project. Documents subject to formal configuration control will be required to pass through peer review and signature for both initial generation and any subsequent revisions. Formality and breadth of the peer review will be at the discretion of the document author with concurrence from the signature authority. All formal configuration controlled documents will include version and date information on the title page, and a revision history page. Version numbers shall be 0.X until first signature approval. Thereafter minor revisions shall be numbered by iterating the numeral to the right of the decimal, major revisions shall increment the number to the left of the decimal.

The Project Manager shall be responsible for maintaining accurate knowledge of and access to the most current version of each formally controlled project document.

General configuration control for all working level documents will be executed via the use of a collaborative data site. Users will be responsible for maintaining current versions of documents they post for team use. The team will utilize the site as the primary source for working level information, to minimize version control issues created by the e-mailing or other uncontrolled distribution of documents.

As this project advances, a more robust configuration management process may be required, to include specific tools. This section will be updated accordingly at that time.

Risk Management

- Consider: schedule, cost, resources, **technical**
- Suggestion: PM identifies schedule, cost & resource risks. SMEs identify technical risks.
- Plan for assessment, mitigation…
- Suggestion: review risks at team meetings

Risk Information Form sample

Risk Information Form

Risk Identification Number		Date Entered:
Risk Title:		
Priority:		
Statement of Risk		
Description of risk:		
Causes:		
Relationship to other risks:		
Probability of Occurrence:		
Consequence:		
Time Sensitivity (when mgiht risk occur):		
Risk Handling Plans:		
Status Information:		

Risk Information Form

Risk Information Form

Risk Identification Number	SNS_RI-001	Date Entered: 06 June 06
Risk Title:	Un-approved requirements	
Priority:	Medium	

Statement of Risk

Description of risk:

Requirements remain unapproved/prioritized by the user community. Several remain poorly defined: "in stride" breaching capability, geographic location for environmental specifics.
Some are of questionable/unclear importance: very small mine (<6") neutralization / success rates, command detonation requirement.

Causes:

Broad search was done to gather requirements, some findings conflict, some are lacking verifiable source, have not yet had the opportunity to vet with operational community to resolve these issues

Relationship to other risks:

Uncertainty of requirements impact decision making, particularly during tradeoff efforts

Probability of Occurrence:	B	Unlikely
Consequence:	D	Major Impact
Time Sensitivity (when mgiht risk occur):		4Q 2006

Risk Handling Plans:

Continue effort to make contact with operational community. If no validation meetings have been scheduled by 15 Sept 2006, inform sponsor of situation.

Status Information:

09/11/06 Contact made with Route Clearance Training school at Ft Leonard Wood, MO (Army); tentative requirements validation meeting week of 10 Oct 2006. Contact made with MCES Lejeune NC (USMC); tentative requirements validation meeting week of 27 Sept 2006.

Quality Assurance

- Suggestion: Set basic standards for things like meeting agendas, minutes, action items & follow up

Don’t make them burdensome, but have some simple expectations & make sure they are followed.

Other thoughts…

- Strongly recommend periodic team meetings, particularly if team is geographically dispersed.
- Don’t make any of the “process” work unnecessarily burdensome. Use common sense, follow SE principles.

Parting Thought

“Plan your dive; dive your plan”

Questions, comments?