



# Systems Engineering Plan and Systems Engineering Management Plan Alignment

NDIA 11<sup>th</sup> Annual  
Systems Engineering Conference  
October 21, 2008

Chet Bracuto  
DoD OUSD A&T (SSE)

Bob Scheurer P.E., P.M.P.  
Boeing Integrated Defense Systems



# Purpose



---

Present efforts of SE Working Group discussions with recommendations for improving Acquirer and Supplier technical planning



# Outline



- 
- Problem Definition
  - Background
  - Future State
  - Approach
  - Traits of SEPs and SEMP
  - SEP – SEMP Comparisons and Findings
  - Vision of the Ideal SEMP
  - Data Item Description Update
  - Benefits
  - Way Forward
  - Questions/Answers



# Problem Definition



## *The Need:*

- Improved SE planning discipline to better facilitate program execution
- Better communication, integration, and efficiency between acquirer and suppliers
- Early technical planning (i.e. in RFP) to ensure that SE is scoped and priced adequately in the contractors' proposals
- Better planning alignment between acquirer and suppliers

Programs Need Improved Guidance  
That Will Yield More Effective Planning



# Background



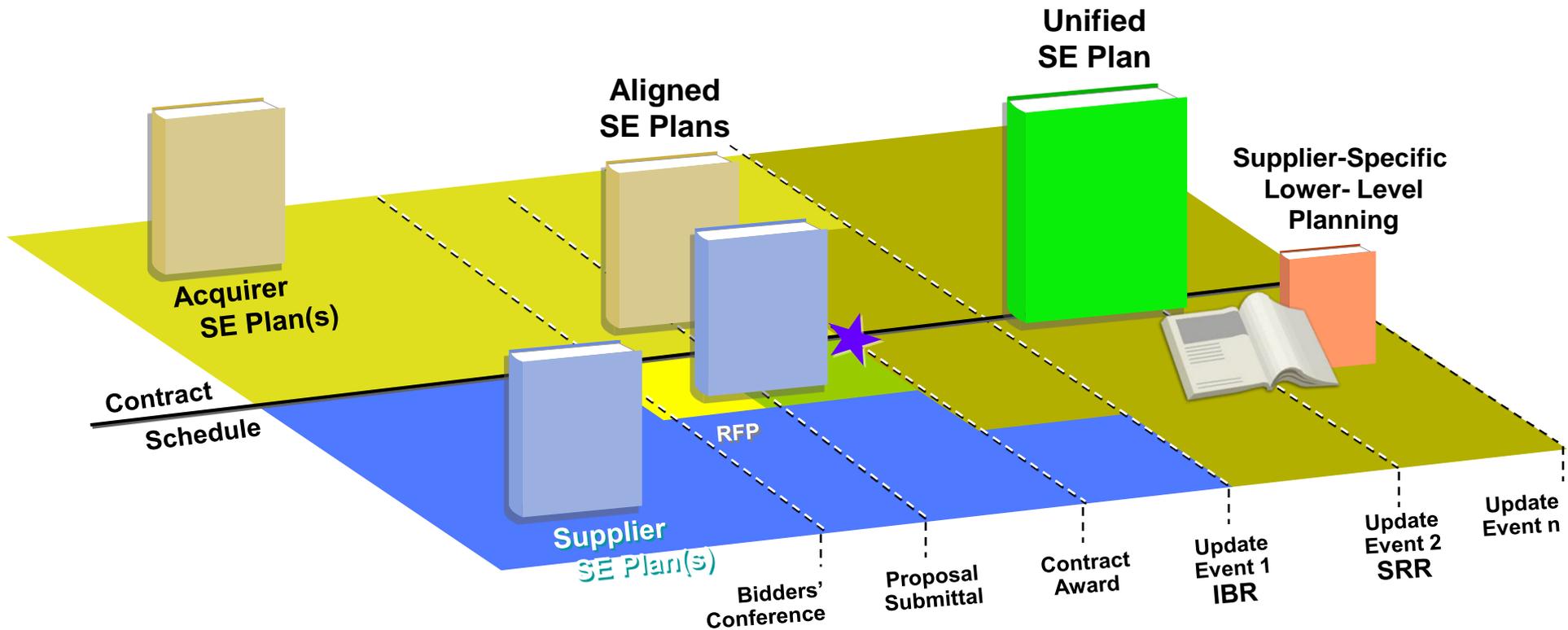
- Systems Engineering Plan (SEP) is a DoD-developed (acquirer) technical planning document required for milestone approval
- Systems Engineering Management Plan (SEMP) is a contractor-developed (supplier) plan for the conduct, management, and control of the integrated engineering effort
- DoD SEP Preparation Guide was updated in October 2007 to improve completeness and consistency in SE planning
  - Highlighted five (5) key areas of SE planning
- Briefed NDIA SE Conference in October 2007 on feasibility of a single, unified plan
- Questions raised if other DoD policy and guidance needed updating (e.g., DI-MGMT-81024)



# Background



## Path to a Unified SE Plan October 2007





# Approach



- 
- Evaluated Feasibility of a Unified SE Plan
    - Launched Study to Explore the Current Environment on Programs Regarding SEPs and SEMP
    - Selected Five Boeing Programs for Review
    - Gained Understanding of Differences and Similarities Between the Two Documents (SEP / SEMP) in the Current Environment



# Traits of the SEP



- 
- Defines government (customer) technical planning expectations
    - What needs to happen from customer perspective
  
  - Describes overall approach in key areas
    - Requirements
    - Technical Staffing and Organizational Planning
    - Technical Baseline Management
    - Technical Review Planning
    - Integration with Program Management
  
  - Provides contractor guidance for systems engineering as applied to the acquisition program at hand
  
  - Identifies to program management and contract personnel the essential systems engineering activities and products required



# Traits of the SEMP



- 
- Responsive to the contract and the SEP
  - Defines contractor (supplier) technical planning
    - How it will be accomplished from the contractor perspective
  - Contractor further develops planning outlined in the SEP
  - Project (Supplier) team articulates details of their
    - Processes
    - Tools
    - Organization
    - etc.
  - Describes activities involved in the transformation from requirements to solution
  - Includes integration of subcontractor planning



# SEP-SEMP Paragraph Comparisons



Common Areas of Discussion

Unique Areas of Discussion

SEP

SEMP

A Majority of SEP Sections Could Readily be Mapped to SEMP Sections



# Specific Findings from SEP & SEMP Comparisons

---



- SEP and SEMP both deal with SE planning but from different perspectives
  - SEP focus is acquirer problem space
  - SEMP focus is supplier solution space
- Documents discuss similar subjects but are disconnected
  - Different language/terminology
  - Different paragraph structures

Alignment of Plans is Preferred Over Unification



# SEP-SEMP Comparison Specific Findings

---



## Over-all

- Stakeholders are different
  - SEP: Owner is Government (Acquirer)
  - SEMP: Owner is Contractor (Supplier)
- Details are different
  - SEP: Acquirer-focused problem definition
  - SEMP: Supplier-focused solution description
- Perspectives are different
  - SEP: Oversight focus
  - SEMP: Delivery focus



# SEP-SEMP Comparison

## Specific Findings

---



- **Requirements**
  - Emphasis is different
    - SEP: Key program requirements
    - SEMP: Translating requirements into product deliverables
  
- **Technical Staffing and Organizational Planning**
  - Differing types of talent needed by each organization
  - Organizational interfaces are key for alignment
  - Combined organizational details are unnecessary
  
- **Technical Baseline Management**
  - Different focus
    - SEP: What the Baselines are (descriptions)
    - SEMP: Achievement of the Baselines with Supporting Processes



# SEP-SEMP Comparison Specific Findings

---



- **Technical Review Planning**
  - Common interests
  - Different preparation approach
    - SEP: Review Strategy; What's to be Reviewed
    - SEMP: 'How' it's Reviewed; 'What' is deferred to the IMP; 'When' is deferred to IMS
  
- **Integration with Program Management**
  - Different detail levels and focus
    - SEP: Integration of Planning between Government and Contractor
    - SEMP: Total Integration of Engineering Effort with Government and between Contractor, Associated Contractors, and Sub-Contractors



# Vision of the Ideal SEMP



- Used regularly by the program for:
  - Consistency with DoD SEP
  - Communicating with the program personnel
    - How things get done on the program
  - Maintaining the baseline of program technical planning concepts
  - Introducing new team members to program objectives
  
- Improves program efficiency by:
  - Creating a uniform understanding of the program approach
  - Establishing a common program lexicon
  - Maintaining support of the technical margin (boundaries)
  
- Has on-going relevance via
  - Periodic updates, e.g., program reviews
  - Consistency with the contractor's goals and environment

SEP Content or Paragraph Leads to  
SEMP Content / Paragraphs Containing Supporting Details



# Data Item Description Update

---

- DID DI-MGMT-81024 (Systems Engineering Management Plan)
  - Last released in August 1990
  - Based on MIL-STD-499A
- DID outdated due to changes in DoD acquisition environment, lessons learned, references, etc.
- DID drives contractor to divert from newer Government SE policy and guidance



# Data Item Description Update

---

- Team assembled June 2008 to investigate possible improvements
  - Emphasis to align SEMP DID with the SEP Prep Guide Topics
  - Team consisted of OSD and Services



# Data Item Description Update

## 10 PREPARATION INSTRUCTIONS

10.1 Format. The SEMP format shall be selected by the contractor. Unless effective presentation would be degraded, the initially used format arrangement shall be used for subsequent submissions.

10.2 Content. The SEMP shall describe the contractor's planned systems engineering processes and approach, tailored as necessary to the program's contract, objectives, and overall technical and management approach. The SEMP shall describe the contractor's detailed operational plan for executing systems engineering and include, at a minimum the following SE related topics and processes:

- 1) Alignment with SEP Prep Guide Topics →
  - The topics detailed in the latest version of the Systems Engineering Plan (SEP) Preparation Guide as put forth by the Office of the Secretary of Defense, Systems and Software Engineering Directorate.
- 2) Alignment with Program SEP →
  - Government planning as detailed in the government SEP.
- 3) Contractor-Specific Planning →
  - Planning associated with application of the contractor's systems engineering processes as tailored to the program and at a level of detail necessary for the contractor to manage and execute the technical effort.
- 4) Plan Completeness →
  - Referenced lower-level and subcontractor technical plans, for example in the areas of risk management, requirements management, or configuration management, as determined necessary by the contractor to plan and execute a total systems engineering effort.
- 5) Planning Flexibility →
  - Other areas deemed necessary to execute systems engineering to meet the program's contract, objectives, and overall technical and management approach.

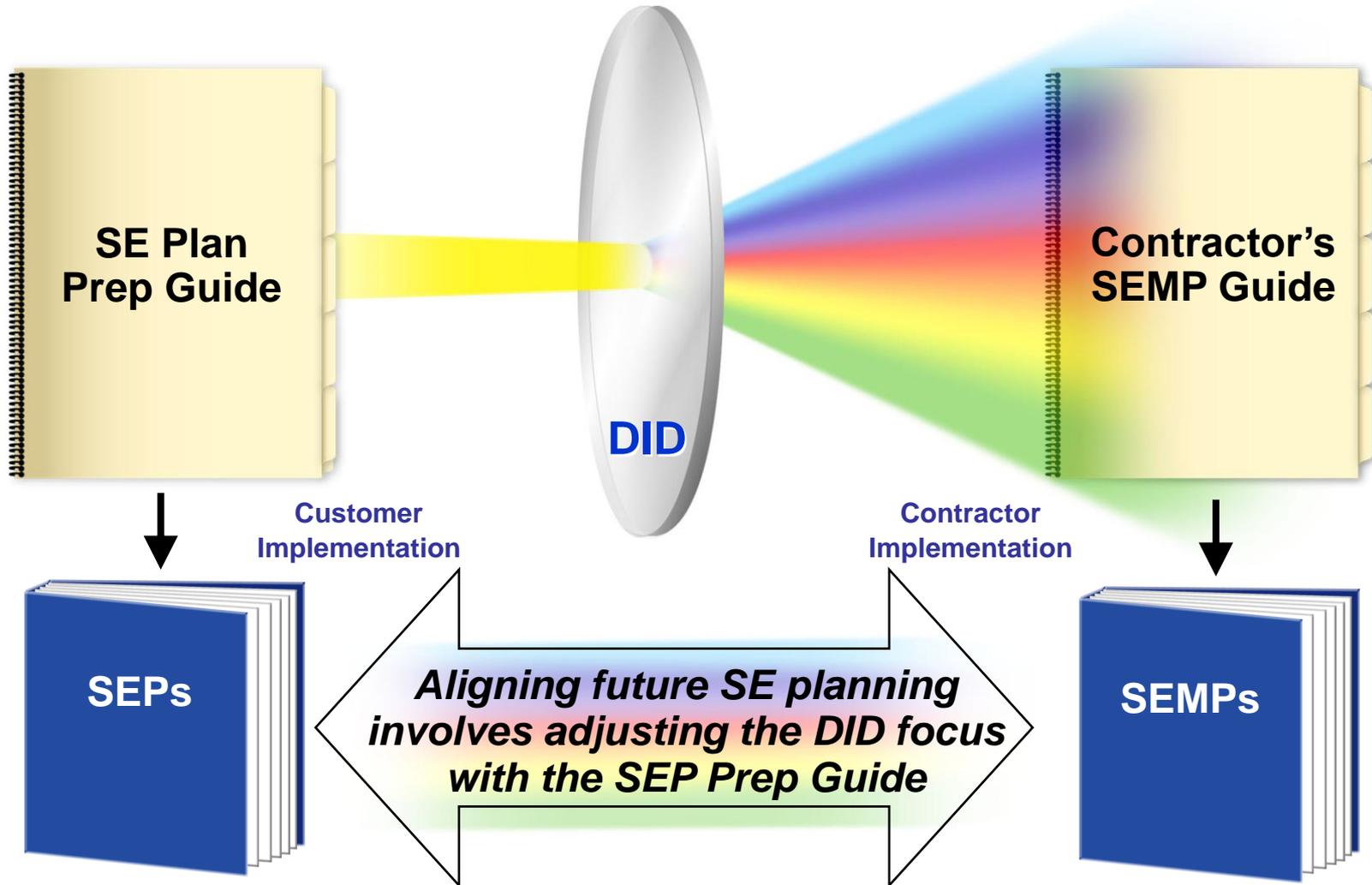
## 11. DISTRIBUTION STATEMENT

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

**New DID Update Strengthens Alignment Between SEP and SEMP**



# Alignment via the Update of SEMP DID (DI-MGMT-81024)

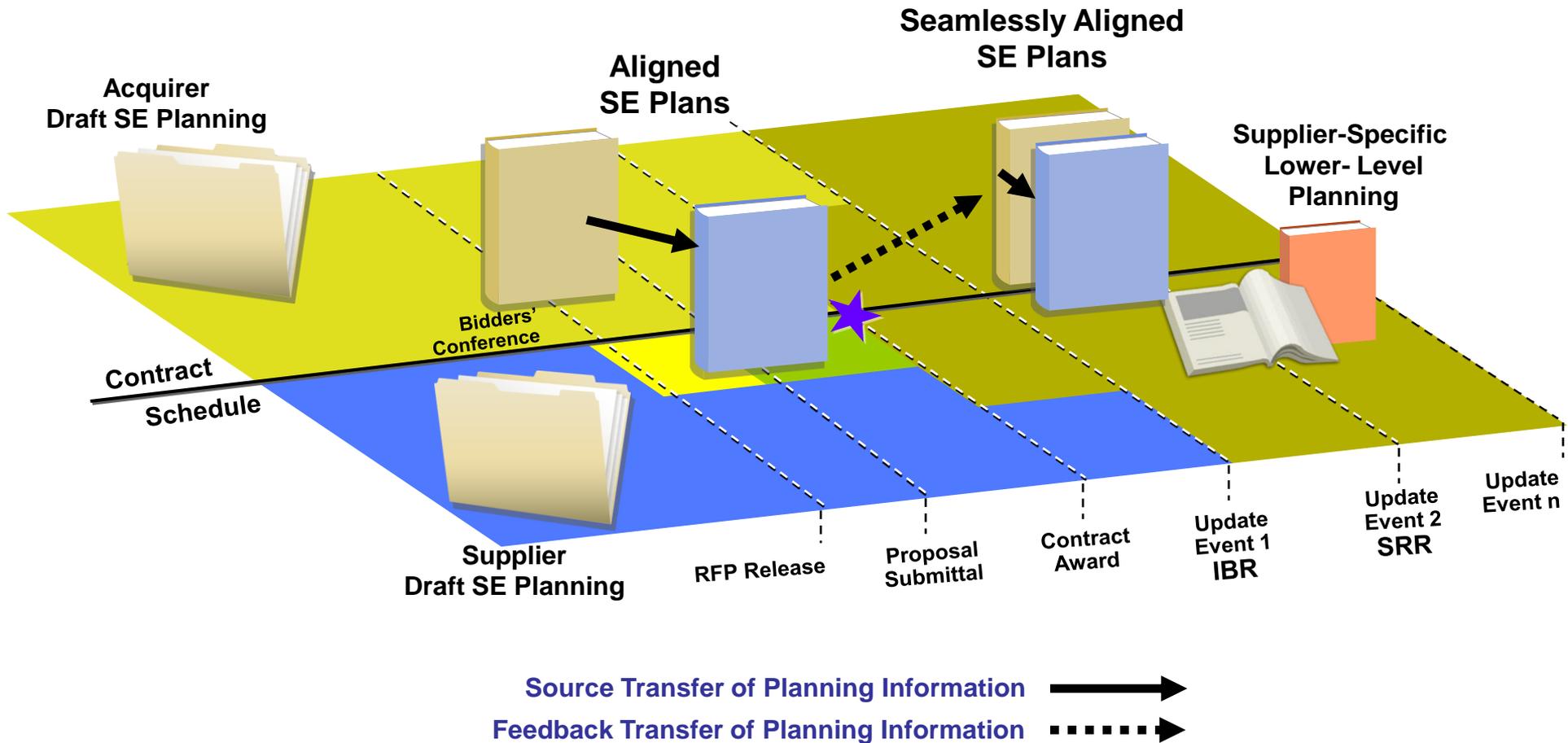




# Future State



## Path to a Seamlessly Aligned Set of SE Plans October 2008





# Benefits of SEP – SEMP Alignment

---



- Two good stand alone documents can be far better with alignment
  - Consistent planning
  - Reduction in duplication
  - Reasonable standardization
  - Continuity across plans



# Way Forward



- 
- Distribute Draft DI-MGMT-81024 for Industry and Government Comments
  - Consider Piloting on Programs
  - Revise and Release DI-MGMT-81024
  - Change Contractor Guidance in Response to Updated DID
  - Monitor Implementation and Feedback from Programs



# Questions/Answers

---



Does this approach appear viable?

What improvements would you like to see?

What other recommendations would you make to achieve aligned planning?



---

# Backup/Reference Material



# SEP-SEMP Summary



SEP Prep Guide	Program SEP Comments	Program SEMP
1. Introduction	Consistent with SEP Prep Guide	Consistent with program SEP
2. Program Requirements	Consistent with SEP Prep Guide	<ul style="list-style-type: none"> <li>1. SEMP covers SEP requirements</li> <li>2. SEMP addresses design considerations in program plans and directives (section 8). Which are detailed plans.</li> </ul>
3. Technical Staffing and Organizational Planning	Consistent with SEP Prep Guide	1. SEP and SEMP are consistent
4. Technical Maturation and Planning	SEP Prep Guide emphasizes Requirements management and traceability while Program SEMP describes the SE process and RA/RM in context of the SE process.	1. SEMP has a strong description of how the SE process is adapted to the program.
5. Technical Review Planning	Program SEP provides good detail on technical reviews.	Doesn't appear to be covered in detail. References MIL-STD-1521B, May be covered in a detailed plan such as Quality Assurance Plan.
6. Integration with Overall Program Management	Program SEP	Mostly not covered in the SEMP. Does provide a brief mention of the use of the IMP and IMS and application to Risk Management. This potentially deserves a stronger emphasis. For example there is not mention of the WBS.
		Section 8 :Plans and Directives Process and Products – This section references more detailed plans.

Represent Gaps



# Specific Findings

## Requirements



### SEP

Output is management requirements

Over-all architecture for program lifecycle

Emphasizes program requirements specifics

- KPPs
- MOEs, e.g. Reliability or Maintainability
- Spiral Outs
- Capabilities
- Etc.

Defines lifecycle readiness of capabilities / requirement maturities

### SEMP

Executable process for how technical management is done on the program

Defines the process to develop the requirements, not the actual requirements

Emphasis on SE Process for Analysis

Identification of participants in requirements process

Methods for transforming abstract to real

Built around WBS structure

Integration of all subordinate plans



# Specific Findings



## Technical Staffing & Organizational Planning

---

### SEP

#### Acquirer-centric

- Govt. IPT Structure
- OIPTs
- WIPTs
- Govt LSI IPTs

#### Associated High-Level Contractor IPTs

### SEMP

#### Supplier-centric

- Contractor and Supplier IPT Structure

#### Program organizational structure

- Subordinate considerations to program plan

#### Partnerships

#### Critical Skills



# Specific Findings



## Technical Baseline Management

---

### SEP

Configuration Management / Data Management Activities

Responsible Entities

Specification Tree

Use of Technical Baseline and Technology Readiness Assessments

Identification of Relevant DIDs

### SEMP

Specific configuration changes/updates to system

Interface management

Supplier-specific change management processes

Change review boards



# Specific Findings

## Technical Review Planning

---



### SEP

Event-driven technical reviews

Management of reviews

Chairs, stakeholders

Facilitation of participation

Past Accomplishments and  
Future Expectations

### SEMP

Consistency with IMP

Events and Associated Reviews  
summary

Review Planning may rely on  
content of superior documents  
(e.g., Program Execution Plan)



# Specific Findings



## Integration with Program Management

---

### SEP

#### Integration with other planning

- Acquisition Strategy
- IMP/IMS
- External Functions
- Use of Technical Review Results (e.g., Baselines)

#### Execution requirements for SE activities

- Risk Management
- T&E Integration
- Verification & Validation Plan integration
- TEMP Traceability to Performance Reqmts

### SEMP

#### Integration between program stakeholders

- Suppliers
- IPTs
- Customer
- Associate Contractors

#### Integration of the engineering effort

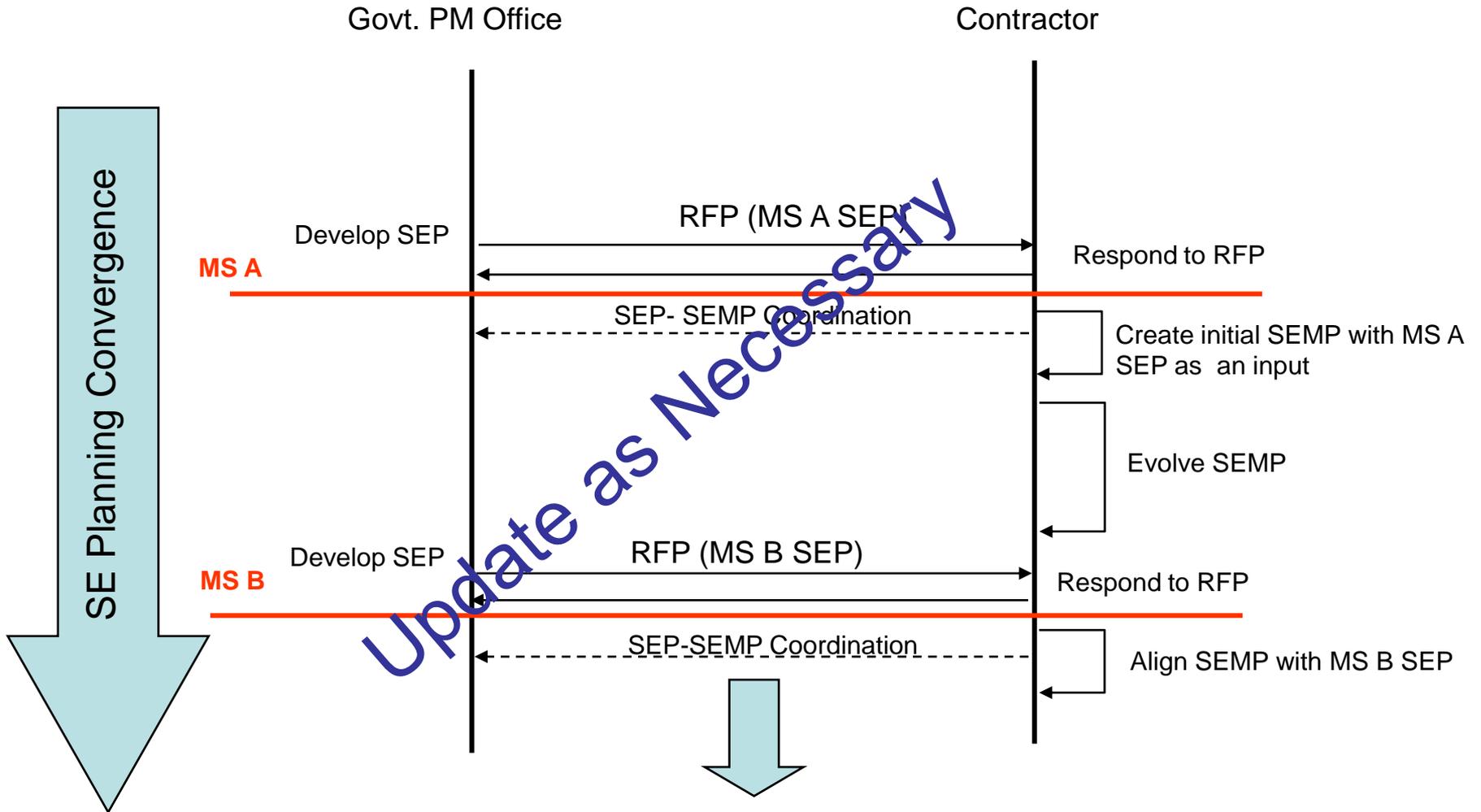
#### More detailed planning

- Scheduling
- Process integration
- Subcontract management
- Risk management



# SE Planning Alignment Vision

## Maturation Sequence



Continues for MS C and Full Rate Production