



**Transitioning to CMMI<sup>SM</sup>:  
Another Fork in the Road on our  
Unending Journey**

**30 April 2002**

**U.S. AIR FORCE**



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# Topics of Discussion



**Who We Are**

**Process Improvement Background**

**WR-ALC CMMI<sup>SM</sup> Involvement**

**Pilot Assessments**

**Lessons Learned**

**CMMI<sup>SM</sup> Implementation at WR-ALC**

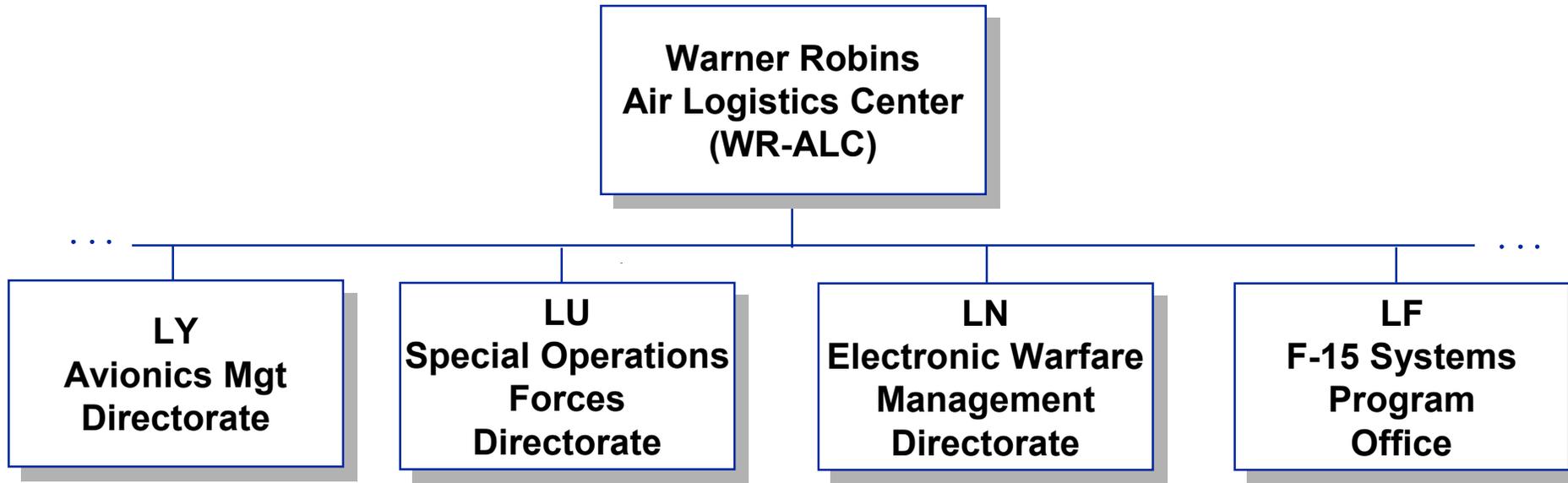
**Transition Approach**

**Summary**



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# Who We Are





# Process Improvement Background



## Software Engineering

Individual software organizations assessed at various levels of the Software Capability Maturity Model (CMM<sup>R</sup>)

- Avionics Management Directorate - Level 3 (March 1995)
- Electronic Warfare Directorate - Level 2 (May 1996)
- F-15 Directorate - Level 2 (December 1996)

Software organizations consolidated into Software Engineering Division (LYS) in April 1997

Goal established to develop common processes using “Best Practices” from each organization

Infrastructure established to support process improvement

LYS assessed at SW-CMM<sup>R</sup> Level 3 in April 2000



# Process Improvement Background, cont'd



## Acquisition

Special Operations Forces (SOF) Directorate assessed in June 1997 using Software Acquisition CMM<sup>R</sup>

Infrastructure established to support process improvement

Implemented the Acquisition and Sustainment Process Improvement/Re-engineering Effort (ASPIRE)

Established common processes encompassing hardware and software



# WR-ALC CMMI<sup>SM</sup> Involvement



Air Force Representative to draft CMMI<sup>SM</sup> Reviewer Team

Air Force Member on CMMI<sup>SM</sup> Configuration Control Board

Participated in Alpha Testing of CMMI<sup>SM</sup> Training at OO-ALC

Participated in OO-ALC pilot appraisal

Participated in two WR-ALC pilots – Phase I and Phase II

Authorized Standard CMMI<sup>SM</sup> Appraisal Method for Process Improvement (SCAMPI<sup>SM</sup>) Lead Appraiser by SEI

Authorized CMMI<sup>SM</sup> Instructor by SEI



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# CMMI<sup>SM</sup> Appraisals



## Phase I Pilot (Enterprise – Wide)

- Conducted 12-30 June 2000 across 4 Directorates (LF, LN, LU, LY)
- Utilized draft CMMI-SE/SW/IPPD V0.9, Continuous Representation

## Phase II Pilot (SOF SPO/LU)

- Conducted 2-13 April 2001
- Utilized CMMI-SE/SW/IPPD/A V1.02d, Continuous Representation

## CMMI Quick Look (F-15 SPO/LF)

- Conducted 23-26 October 2001
- Utilized CMMI-SE/SW/IPPD V1.02d, Continuous Representation



# Pilot Appraisal Objectives



Provide feedback to the CMMI<sup>SM</sup> Product Development Team on:

- appropriateness of CMMI<sup>SM</sup> model
- appropriateness of SCAMPI<sup>SM</sup> method

Provide findings to understand strengths & improvement opportunities relative to CMMI<sup>SM</sup>

Provide data to make business decision to support new CMMI<sup>SM</sup> model



# Lessons Learned from Pilot Appraisals



Appropriately scope the appraisals

- 1<sup>st</sup> pilot – 24 process areas; 148 hours in 10 days
- 2<sup>nd</sup> pilot – 17 process areas; 129 hours in 10 days

Business objectives play a bigger role in CMMI<sup>SM</sup> than in SW-CMM<sup>R</sup>

Upfront decisions need to be made concerning process areas that are fully or partially contracted or accomplished by another organization

- Bring in contractor as part of appraisal
- Handle through Supplier Agreement Management
- Document alternative practice
- Consider the process area or practices out of scope

CMMI<sup>SM</sup> needs to be tailored for maintenance organizations



# CMMI<sup>SM</sup> Implementation at WR



Weapon system programs are evaluating CMMI<sup>SM</sup>

- Apply continuous representation
- Obtain capability level rating for specific process areas

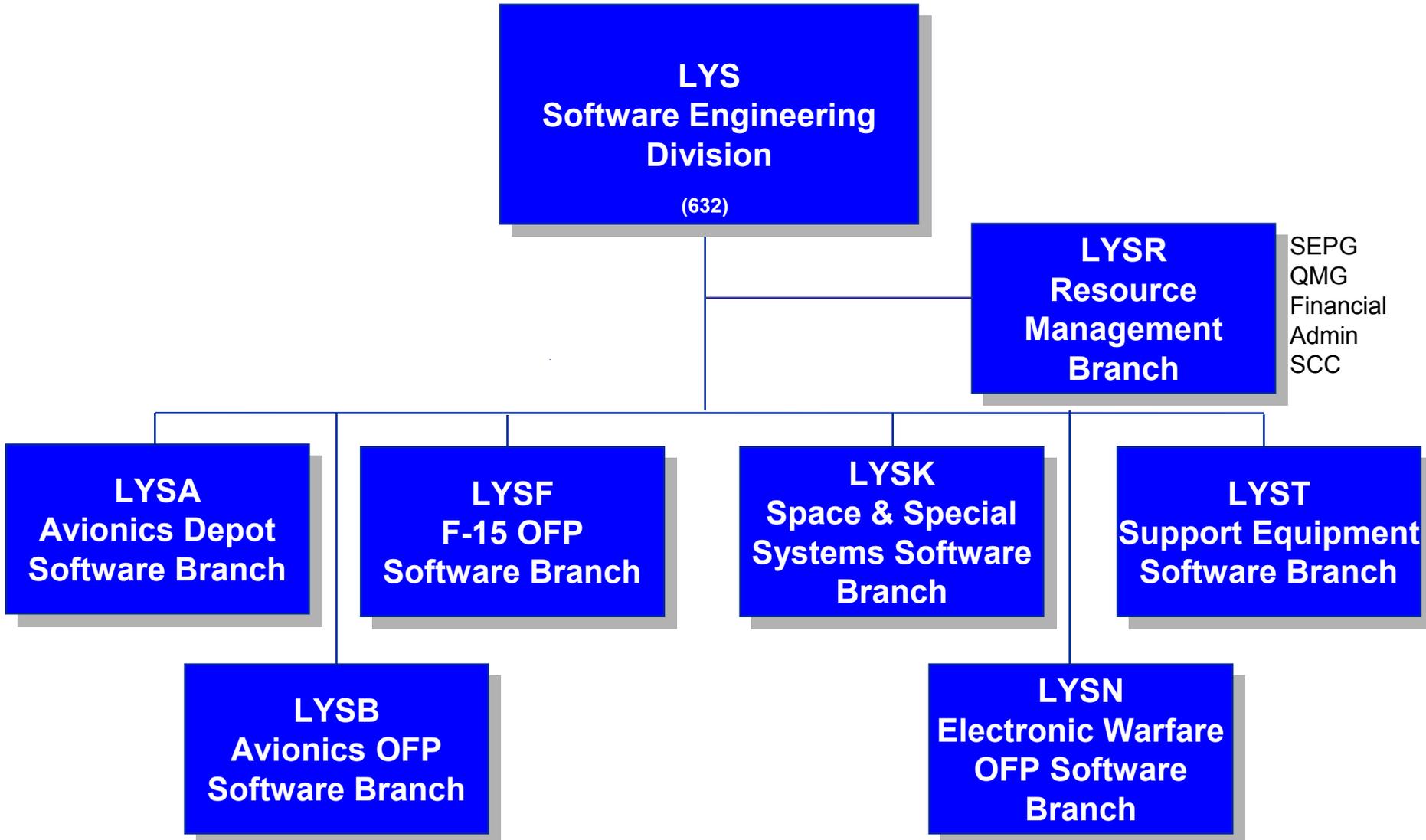
Software providers are transitioning to CMMI<sup>SM</sup>

- Apply staged representation
- Obtain maturity level rating



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# Software Engineering Division





# CMMI<sup>SM</sup> Transition Approach (1)

## LYS



### Revise strategic plan

- Re-evaluate mission, vision, and goals
- Identify quantifiable measures

### Focus on lessons learned and recommendations from previous process improvement efforts

- Assessment findings
- Process improvement recommendations

### Restructure process improvement teams

- Establish Branch Process POCs
- Spread the wealth – get more people involved



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# CMMI<sup>SM</sup> Transition Approach (2)

## LYS



### Restructure documentation

- Simplify documentation
- Use more checklists, templates, and examples

### Begin with process architecture used for SW-CMM<sup>R</sup> Level 3

- Streamline processes
- Map practices to CMMI<sup>SM</sup>
- Identify holes
- Fill gaps
- Determine tailoring requirements



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# OSSP Architecture Example (1)

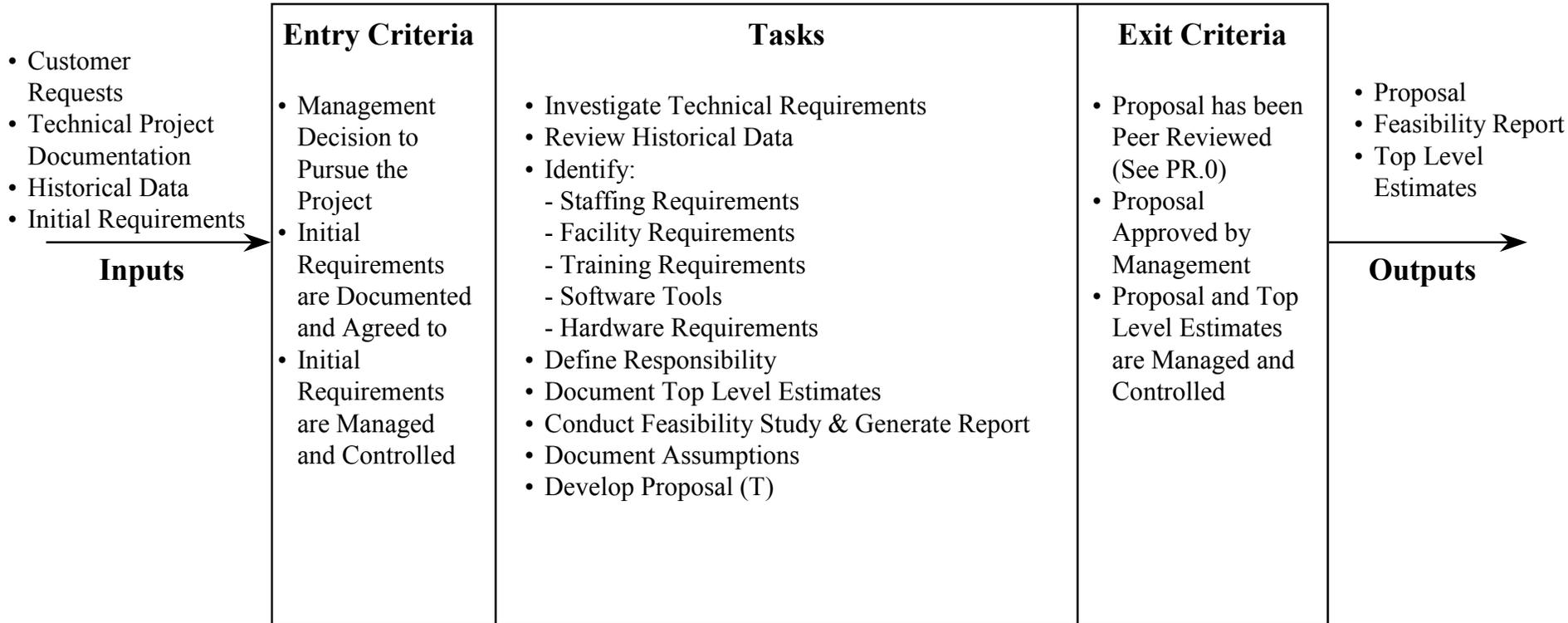
## SW-CMM<sup>R</sup>



### 1 - Proposal for New Workload Phase - 1.2 Perform Preliminary Planning

**Purpose:** To determine the organization's ability to accomplish the technical requirements and make estimates necessary to develop work products.

**Controls:** LYS Guidance, Customer Guidance, Legal Issues



**Measures:** Time, Effort, Defects, Rework

**Participants:** Software Engineering Group, (SEG), Customer/User, Business Office, Management, Affected Groups

**Tailoring:** (T) Domain/Project will define format for proposal if not specified by the customer



# OSSP Architecture Example (2)

## SW-CMM<sup>R</sup> to CMMI<sup>SM</sup>



### 1 - Proposal for New Workload Phase - 1.2 Perform Preliminary Planning

**Purpose:** To determine the organization's ability to accomplish the technical requirements and make estimates necessary to develop work products.

**Controls:** LYS Guidance, Customer Guidance, Legal Issues

- Customer Requests Needs
- Technical Project Documentation
- Historical Data
- Initial Requirements

**Inputs**

Entry Criteria	Tasks	Exit Criteria
<ul style="list-style-type: none"> <li>• Management Decision to Pursue the Project</li> <li>• Initial Requirements are Documented and Agreed to</li> <li>• Initial Requirements are Managed and Controlled</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate Technical Requirements (RM SP 1.1) (RD SP 1.1, 1.2, 3.3) (PP SP 1.2)</li> <li>• Determine Risk Sources and Categories (RskM SP 1.1)</li> <li>• Review Historical Data (PP SP 1.2, SP 1.4, SP 2.1) (IPM SP 1.2)</li> <li>• Identify:               <ul style="list-style-type: none"> <li>- Staffing Requirements (PP SP 1.4, 2.1, 2.4, 2.5, 3.2)</li> <li>- Facility Requirements (PP SP 1.4, 2.1, 2.4)</li> <li>- Training Requirements (PP SP 1.4, 2.1, 2.4, 2.5)</li> <li>- Software Tools (PP SP 1.2, 1.4, 2.1, 2.3, 2.4)</li> <li>- Hardware Requirements (PP SP 1.4, 2.1, 2.4)</li> </ul> </li> <li>• Define Responsibility (PP SP 2.4, 2.6) [GP 2.4]</li> <li>• Document Top Level Estimates (PP SP 1.2, 1.4, 2.1, 2.4, 3.2)</li> <li>• Conduct Feasibility Study &amp; Generate Provide Report to Management (RskM SP 1.1) (RD SP 3.4) (PP SP 1.2, SP 1.4, SP 2.1, SP 2.2, SP 3.2)</li> <li>• Document Assumptions (Apr 01 Assessment Findings PPI, PP2, ISM1, ISM2) (PP SP 1.2, SP 1.4, SP 2.1)</li> <li>• Develop Proposal (T)</li> <li>• Peer Review Proposal (See PR.0) (RM SP1.2) (PP SP 3.3)</li> <li>• Manage and control proposal and estimates (see SCM.2)</li> </ul>	<ul style="list-style-type: none"> <li>• Proposal has been Peer Reviewed (See PR.0)</li> <li>• Proposal Approved by Management</li> <li>• Proposal and Top Level Estimates are Managed and Controlled</li> </ul>

- Proposal
- Feasibility Report
- Top Level Estimates
- Assumptions

**Outputs**

**Measures:** Time, Effort, Defects, Rework

**Participants:** Software Engineering Group, (SEG), Customer/User, Business Office, Management, Affected Groups, Stakeholders

**Tailoring:** (T) Domain/Project will define format for proposal if not specified by the customer



# OSSP Architecture Example (3)

## CMMI<sup>SM</sup>

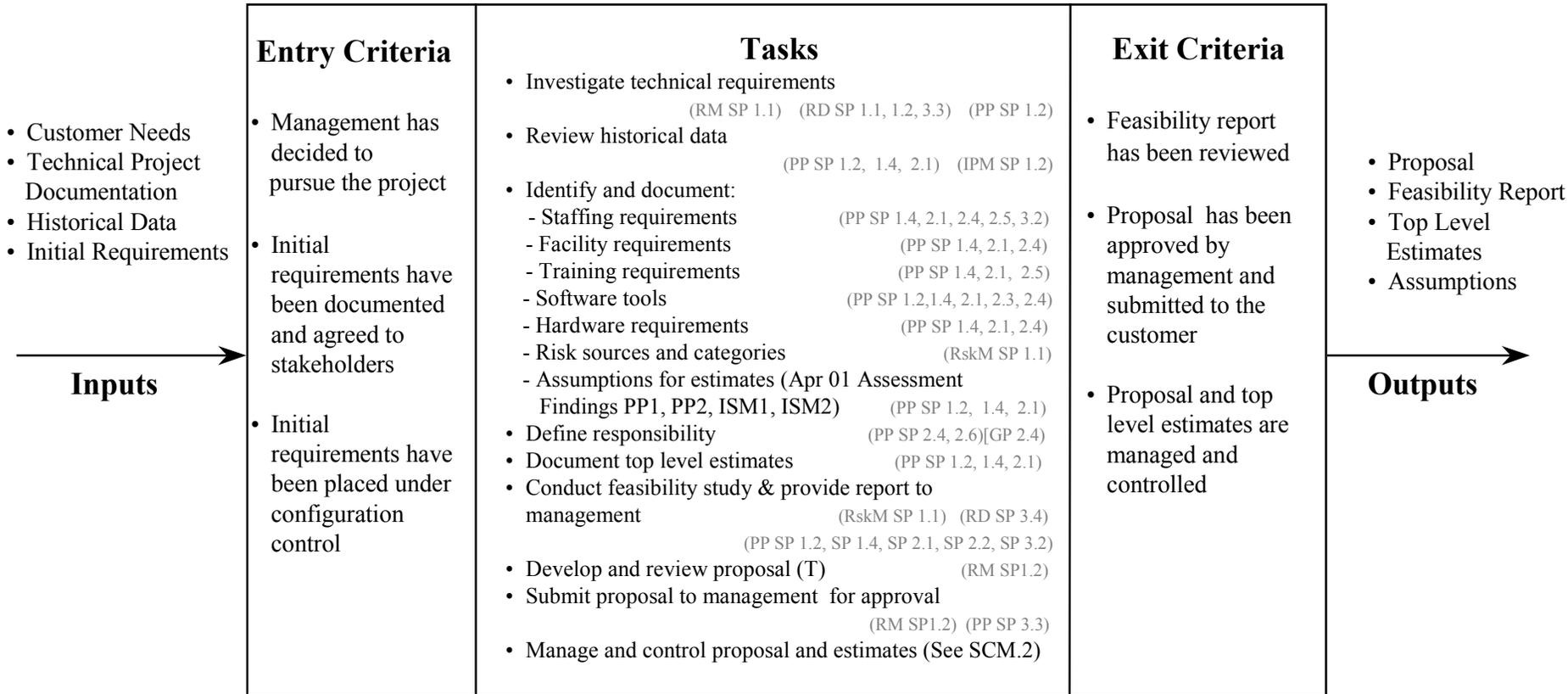


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### 1 - Proposal for New Workload Phase - 1.2 Perform Preliminary Planning

**Purpose:** To determine the organization's ability to accomplish the technical requirements and make estimates necessary to develop work products.

**Controls:** SPI-1002 Organizational Software Policy, Project Guidance, Customer Guidance, Legal Issues



**Measures:** None

**Participants:** SEG, Management, Stakeholders

**Tailoring:** (T) Domain/Project will define format for proposal if not specified by the customer.



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# CMMI<sup>SM</sup> Cross Reference Example



Level 2		CMMI PA: Project Planning			
LYS ETVX Reqmt	CMMI Feature	Description	Feasible?	Performed?	Documented? (If so, identify location)
	PP SG 1	Estimates of project planning parameters are established and maintained.			
1.1, 2.2, 2.3, IC.1	PP SP 1.1	Establish a top-level work breakdown structure (WBS) to estimate the scope of the project.			
1.2, 2.2, 2.3, 3.1, IC.1	PP SP 1.2	Establish and maintain estimates of the attributes of the work products and tasks.			
2.2	PP SP 1.3	Define the project life-cycle phases upon which to scope the planning effort.			
1.2, 2.2, 2.3, IC.1	PP SP 1.4	Estimate the project effort and cost for the work products and tasks based on estimation rationale.			
	PP SG 2	A project plan is established and maintained as the basis for managing the project.			
1.2, 2.2, 2.3, PC.1, IC.1	PP SP 2.1	Establish and maintain the project's budget and schedule.			
1.2, 2.2, 2.3, IC.1	PP SP 2.2	Identify and analyze project risks.			



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# CMMI<sup>SM</sup> Transition Approach (3) LYS



Identify projects to begin transition

Provide CMMI<sup>SM</sup> training to projects

Have projects complete the CMMI<sup>SM</sup> Cross Reference

Perform internal assessments and audits

- Verify implementation
- Identify areas of improvement



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# Summary



WR-ALC has been involved with CMMI<sup>SM</sup> since 1999

Pilot initiatives have been beneficial

Software Engineering Division is transitioning to CMMI<sup>SM</sup>

Other WR-ALC organizations are currently evaluating CMMI<sup>SM</sup>