U.S. AIR FORCE

Transitioning to CMMI[SM]: Another Fork in the Road on our Unending Journey

13 November 2002

CMMI is a service mark of Carnegie Mellon University.

Topics of Discussion

Who We Are

Process Improvement Background

WR-ALC CMMI[SM] Involvement

Pilot Appraisals

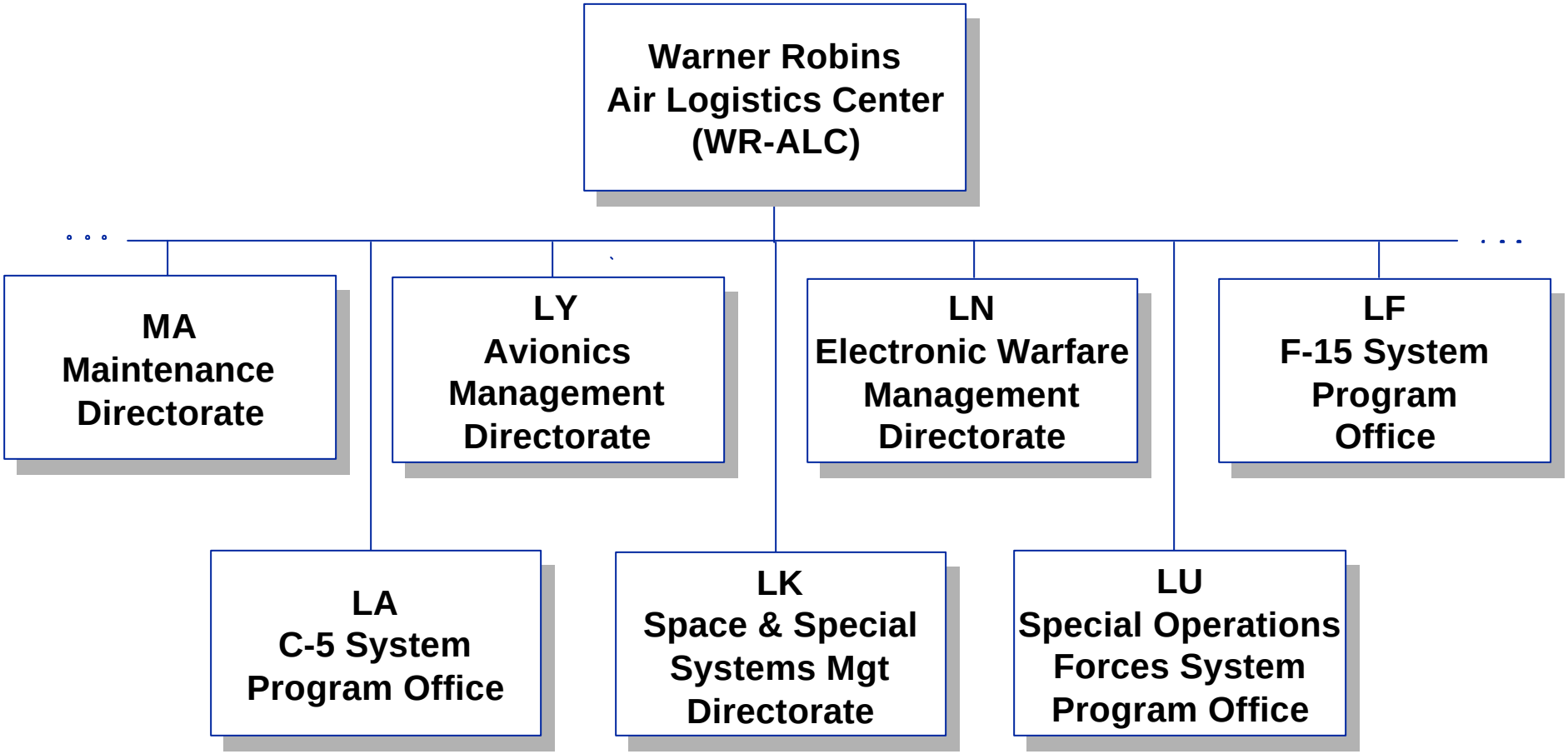
CMMI[SM] Implementation at WR-ALC

Transition Approach

Lessons Learned

Summary

Who We Are


Warner Robins
Air Logistics Center
(WR-ALC)
MA
Maintenance
Directorate
LY
Avionics
Management
Directorate
LN
Electronic Warfare
Management
Directorate
LF
F-15 System
Program
Office
LA
C-5 System
Program Office
LK
Space & Special
Systems Mgt
Directorate
LU
Special Operations
Forces System
Program Office

Process Improvement Background (1)

Software Engineering

Individual software organizations assessed at various levels of the Software Capability Maturity Model (CMM®)

- 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 in April 1997

Infrastructure established to support process improvement

Software Engineering Division was assessed at SW-CMM® Level 3 in April 2000

Process Improvement Background (2)

Acquisition

Special Operations Forces (SOF) System Program Office assessed in June 1997 using Software Acquisition CMM®

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℠ Involvement

Air Force Representative to draft CMMI℠ Reviewer Team

Air Force Member on CMMI℠ Configuration Control Board

Participated in Alpha Testing of CMMI℠ Training at OO-ALC

Participated in OO-ALC pilot appraisal

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

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

Authorized CMMI℠ Instructor by SEI

CMMI℠ 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[SM] Product Development Team on:

- appropriateness of CMMI[SM] model
- appropriateness of SCAMPI[SM] method

Provide findings to understand strengths & improvement opportunities relative to CMMI[SM]

Provide data to make business decision to support new CMMI[SM] model

Lessons Learned from Pilot Appraisals

Appropriately scope the appraisals

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

Business objectives play a bigger role in CMMI℠ than in SW-CMM®

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℠ needs to be tailored for maintenance organizations

CMMI℠ Implementation at WR-ALC

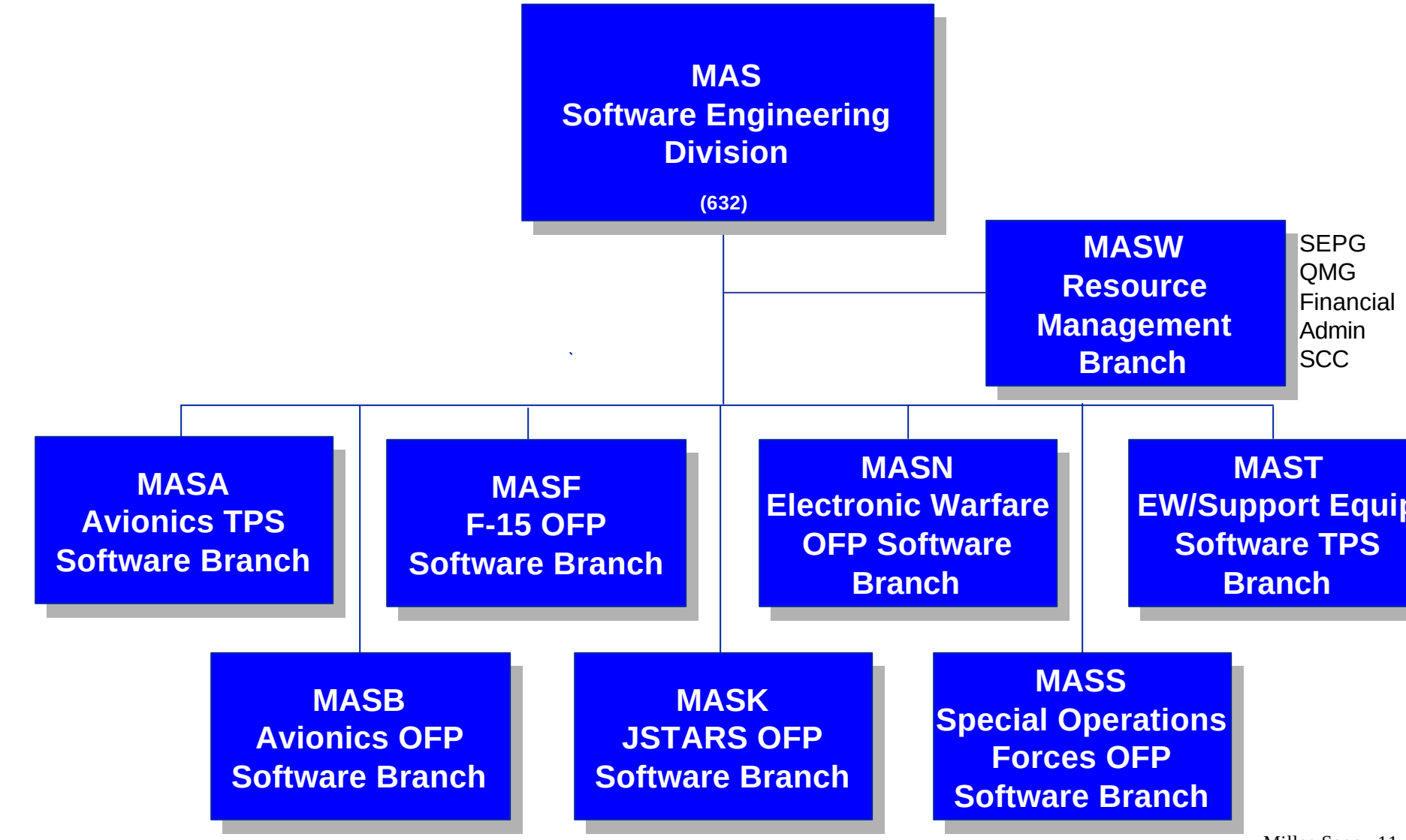
Weapon system programs are evaluating CMMI℠

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

Software providers are transitioning to CMMI℠

- Apply staged representation
- Obtain maturity level rating

Software Engineering Division



CMMI℠ Transition Approach (1)
MAS

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

CMMI℠ Transition Approach (2)
MAS

Restructure documentation

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

Begin with process architecture used for SW-CMM® Level 3

- Streamline processes
- Map practices to CMMI℠
- Identify holes
- Fill gaps
- Determine tailoring requirements

OSSP Architecture Example (1)

SW-CMM®

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: MAS Guidance, Customer Guidance, Legal Issues

Inputs

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

Entry Criteria	Tasks	Exit Criteria
• Management Decision to Pursue the Project • Initial Requirements are Documented and Agreed to • Initial Requirements are Managed and Controlled	• Investigate Technical Requirements • Review Historical Data • Identify: - Staffing Requirements - Facility Requirements - Training Requirements - Software Tools - Hardware Requirements • Define Responsibility • Document Top Level Estimates • Conduct Feasibility Study & Generate Report • Document Assumptions • Develop Proposal (T)	• Proposal has been Peer Reviewed (See PR.0) • Proposal Approved by Management • Proposal and Top Level Estimates are Managed and Controlled

Outputs

- Proposal
- Feasibility Report
- Top Level Estimates

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® to CMMI℠

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: MAS Guidance, Customer Guidance, Legal Issues

Inputs

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

Entry Criteria	Tasks	Exit Criteria
• Management Decision to Pursue the Project • Initial Requirements are Documented and Agreed to • Initial Requirements are Managed and Controlled	• Investigate Technical Requirements **(RM SP 1.1) (RD SP 1.1, 1.2, 3.3) (PP SP 1.2)** • Determine Risk Sources and Categories **(RskM SP 1.1)** • Review Historical Data **(PP SP 1.2, SP 1.4, SP 2.1) (IPM SP 1.2)** • Identify: - Staffing Requirements **(PP SP 1.4, 2.1, 2.4, 2.5, 3.2)** - Facility Requirements **(PP SP 1.4, 2.1, 2.4)** - Training Requirements **(PP SP 1.4, 2.1, 2.4, 2.5)** - Software Tools **(PP SP 1.2,1.4, 2.1, 2.3, 2.4)** - Hardware Requirements **(PP SP 1.4, 2.1, 2.4)** • Define Responsibility **(PP SP 2.4, 2.6) [GP 2.4]** • Document Top Level Estimates **(PP SP 1.2, 1.4, 2.1, 2.4, 3.2)** • Conduct Feasibility Study & 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)** • Document Assumptions (Apr 01 Assessment Findings PP1, PP2, ISM1, ISM2) **(PP SP 1.2, SP 1.4, SP 2.1)** • Develop Proposal (T) • Peer Review Proposal (See PR.0) (RM SP1.2) (PP SP 3.3) • Manage and control proposal and estimates (see SCM.2)	• Proposal has been Peer Reviewed (See PR.0) • Proposal Approved by Management • Proposal and Top Level Estimates are Managed and Controlled

Outputs

- Proposal
- Feasibility Report
- Top Level Estimates
- Assumptions

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[SM]

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

Inputs

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

Entry Criteria

- Management has decided to pursue the project
- Initial requirements have been documented and agreed to stakeholders
- Initial requirements have been placed under configuration control

Tasks

- Investigate technical requirements (RM SP 1.1) (RD SP 1.1, 1.2, 3.3) (PP SP 1.2)
- Review historical data (PP SP 1.2, 1.4, 2.1) (IPM SP 1.2)
- Identify and document:
  - Staffing requirements (PP SP 1.4, 2.1, 2.4, 2.5, 3.2)
  - Facility requirements (PP SP 1.4, 2.1, 2.4)
  - Training requirements (PP SP 1.4, 2.1, 2.5)
  - Software tools (PP SP 1.2,1.4, 2.1, 2.3, 2.4)
  - Hardware requirements (PP SP 1.4, 2.1, 2.4)
  - Risk sources and categories (RskM SP 1.1)
  - Assumptions for estimates (Apr 01 Assessment Findings PP1, PP2, ISM1, ISM2) (PP SP 1.2, 1.4, 2.1)
- Define responsibility (PP SP 2.4, 2.6)[GP 2.4)
- Document top level estimates (PP SP 1.2, 1.4, 2.1)
- Conduct feasibility study & 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)
- Develop and review proposal (T) (RM SP1.2)
- Submit proposal to management for approval (RM SP1.2) (PP SP 3.3)
- Manage and control proposal and estimates (See SCM.2)

Exit Criteria

- Feasibility report has been reviewed
- Proposal has been approved by management and submitted to the customer
- Proposal and top level estimates are managed and controlled

Outputs

- Proposal
- Feasibility Report
- Top Level Estimates
- Assumptions

Measures: None

Participants: SEG, Management, Stakeholders

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

CMMI℠ Cross Reference Example

Level 2		CMMI PA: Project Planning			
MAS OSSP 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.			

CMMI℠ Transition Approach (3)
MAS

Identify projects to begin transition

Provide CMMI℠ training to projects

Have projects complete the CMMI℠ cross reference matrix

Perform internal assessments and audits

- Verify implementation
- Identify areas of improvement

Lessons Learned During Transition Period

Maintenance organizations need to appropriately tailor the CMMI℠

Workforce involvement is critical

Quantifiable business goals are a necessity

Robust measurement program needs to be in place early
- Clearly define measures
- Establish automated methods for collecting data

Practical (not theoretical) approach to Level 4 is essential

Process improvement takes time

Summary

WR-ALC has been involved with CMMI℠ since 1999

Pilot initiatives have been beneficial

Software Engineering Division is transitioning to CMMI℠

Other WR-ALC organizations are currently evaluating CMMI℠