

Lockheed Martin Aeronautics – Planning the Conduct of a Successful SCAMPI

***8th Annual CMMI Technology Conference
and User Group***

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- **Lockheed Martin Aeronautics Overview**
- Appraisal Evidence Strategy
- Appraisal Readiness Strategy
- Early Appraisal Planning
- Detailed Appraisal Planning
- Critical Resource Planning

Lockheed Martin Aeronautics Overview



29,000 employees across the company and around the world



Lockheed Martin Aeronautics: A History of Improvement And Recognition



- 1958 Robert J. Collier Trophy – F-104 Starfighter
- 1963 Robert J. Collier Trophy – SR-71 Blackbird
- 1975 Robert J. Collier Trophy – F-16 Fighting Falcon
- 1996 SW-CMM® Maturity Level 3
- 1999 SW-CMM® Maturity Level 4
- 2000 Shingo Prize – Fort Worth, TX
- 2001 Robert J. Collier Trophy – F-35 STOVL lift fan
- 2003 ISO 9001/AS 9100
- 2003 Shingo Prize – Palmdale, CA
- 2006 Robert J. Collier Trophy – F-22 Raptor
- 2007 CMMI® Maturity Level 3



Robert J. Collier Trophy is a national award honoring those who had made significant achievements in the advancement of aviation.

The Shingo Prize was established in 1988 to recognize companies that achieve world-class manufacturing status.

SCAMPI Appraisal Projects Strategically Selected



- **Organizational strategy**
 - *Reflect anticipated business base*
 - *Include all major development sites*
 - *Touch full span of our products*
 - From JSF, largest aircraft program in history
 - To smaller projects of 30-35 heads
 - *Reflect range of program types*
 - Major A/C development
 - R&D projects
- **Result: Chose 3 appraisal projects**
 - *F-35 – Fort Worth, Texas*
 - *F-22 – Marietta, Georgia*
 - *Advance Development Programs (ADP)*
 - *RATTLRS – Palmdale, California*



F-35



F-22



RATTLRS-
Revolutionary
Approach To Time-
critical Long Range
Strike

SCAMPI A Was Significant Effort



- **Document review**
 - *Over 3900 items examined*
 - *Included classified data*
 - *Only 9 Information Needs*
- **Interviews**
 - *Over 100 participants at 3 sites*
 - *Conducted 9 group interviews*
 - *Included major engineering disciplines*
 - Hardware
 - Software
 - System
- **Appraisal Team**
 - *Team consisted of 11 members*
 - 5 internal, 6 external
 - 4 SCAMPI Lead AppraisersSM
 - *Consistent mini-team assignments*



The Systems and Software Consortium completed a CMMI® - Based Appraisal on August 30, 2007 in accordance with the Standard CMMI® Appraisal Method for Process Improvement (SCAMPISM), V1.1 and determined that

Lockheed Martin Aeronautics

achieved

Process Maturity Level 3

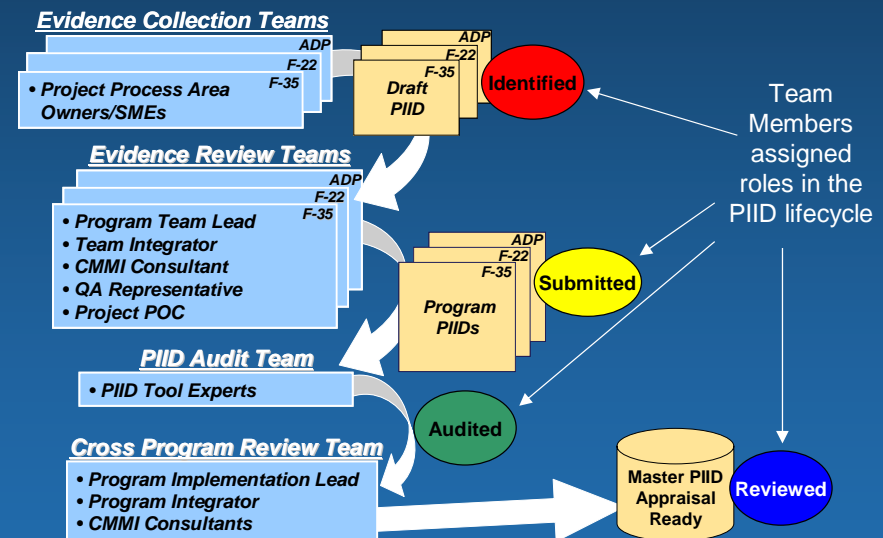
as defined by the SEI CMMI® Version 1.1 SE/SW Continuous Representation.

Gene Jorgensen, SSCI
SEI Authorized Lead Appraiser

Drew Allison, SSCI
Appraisal Team Member



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- **Develop Lockheed Martin Aeronautics Standard Approach (LMASA) (to CMMI Requirements)**
 - *Provided unambiguous guidance to the appraisal projects in how LM Aero has decided to present our evidence to the SCAMPI team during our appraisal*
- **Develop PIID evidence storage approach**
 - *Program evidence folders with consistent folder architecture*
 - *Hyperlinks to evidence*
 - *Screen shots of tools*
- **Develop PIID population approach**
 - *CMMI project team members and program personnel worked together to select the best evidence*
 - *Document the rationale to ‘tell the story’*
- **Develop PIID Management approach**
 - *PIID Lifecycle*
 - *PIID Metrics*



- Documented strategies and provided guidance to identify the evidence for GPs and selected PAs
- Communicated to program, functional stakeholders and Appraisal Team Members
- Example - GP 2.2 Plan
 - *Organizational Directive*
 - One record that points to where in Your Process a plan is required (All PAs)
 - One record that points to Section 1.B of AC-5604 for the list of all plans, one of which is yours (even if it is not visible due to being part of another plan, such as the SEMP) (Project PAs only)
 - *Program Directive = Organizational Directive*
 - If you obtained a tailoring regarding your plan, create a record that shows that tailoring
 - *Direct Evidence*
 - A finalized, approved plan

Screen Shot from PIID Tool



Practice Implementation Indicator Descriptions

Practice: OEI SP 1.1-1

Classification: Implementation Direct

Project: Aero Enterprise - CAM 2006 Organization Project

Organizational Environment for Integration (IPPD)

Establish the Organization's Shared Vision - Establish and maintain a shared vision for the organization.

[More Info](#)

Document No.: *Adequacy: Fully Satisfied *Owner Org: IO

*Document Title: LM Aero Value & Vision Statements

*Section: Vision and Values

Location:

*Link: <http://home.lmaero.lmco.com/default.asp>

The LM Aero Homepage primarily communicates both the corporate and company Value and Vision Statements.

*Rationale:

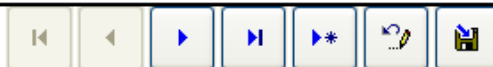
None

Comments:

PIID Record State: Audited ID: 495 * - Required fields.

Show pending records only

Show retired records



Record 1 of 3.

PIID Population Approach



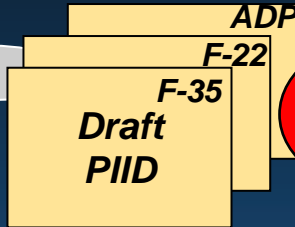
Evidence Collection Teams

- Project Process Area Owners/SMEs

ADP

F-22

F-35



Identified

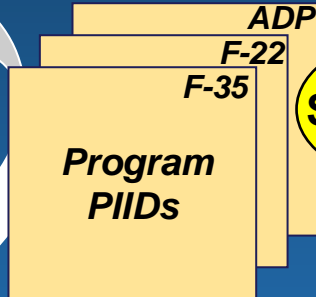
Evidence Review Teams

- Program Team Lead
- Team Integrator
- CMMI Consultant
- QA Representative
- Project POC

ADP

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Submitted

PIID Audit Team

- PIID Tool Experts

Audited

Cross Program Review Team

- Program Implementation Lead
- Program Integrator
- CMMI Consultants



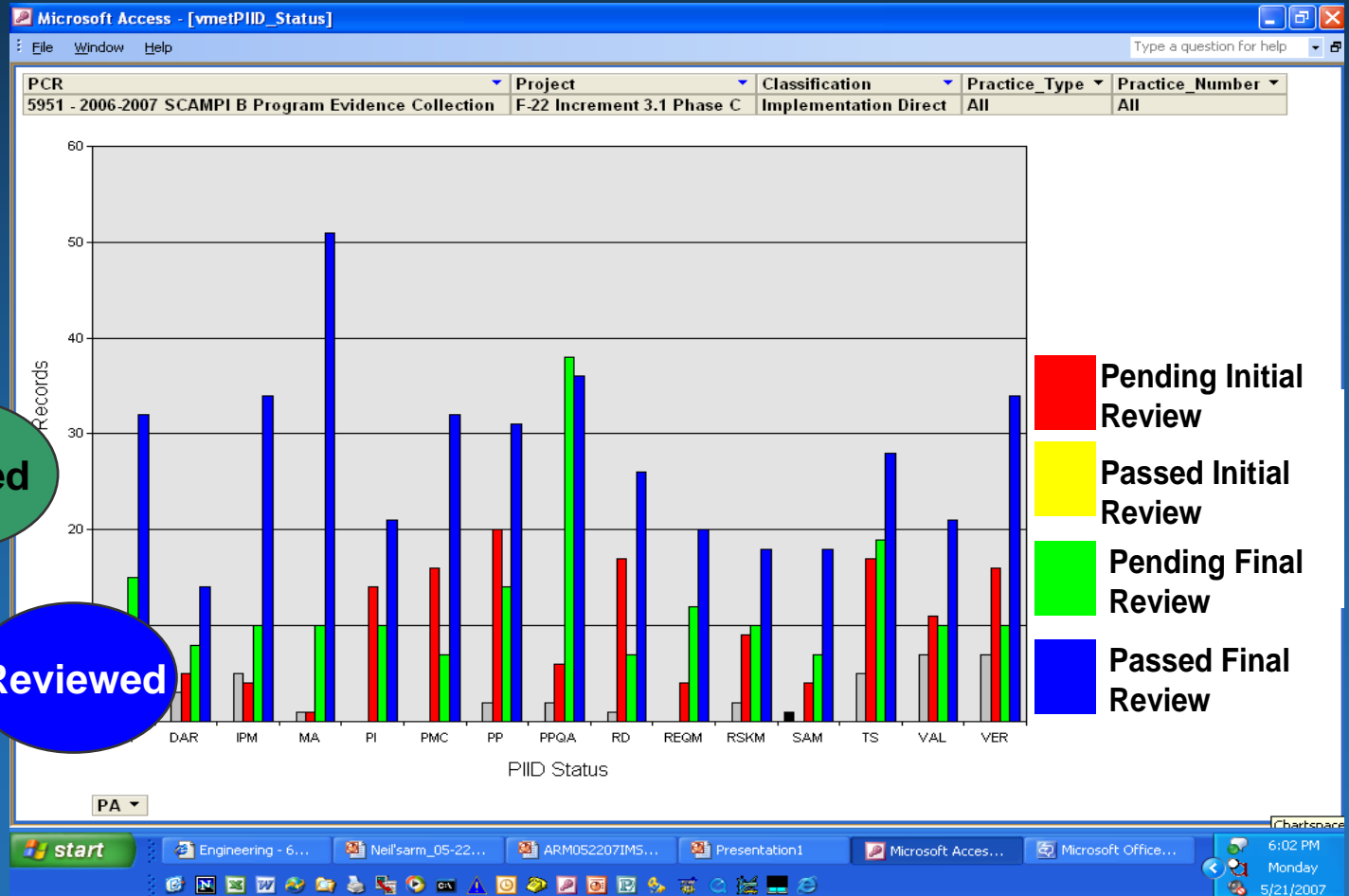
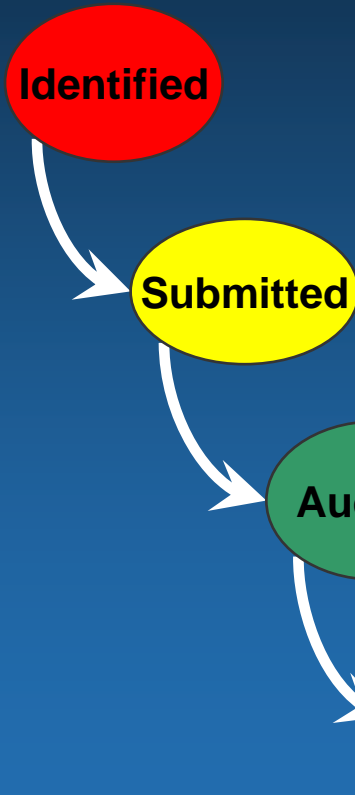
Reviewed

Team Members assigned roles in the PIID lifecycle

PIID Management Approach



Real-time status of the PIID population was critical to managing the progress of appraisal readiness



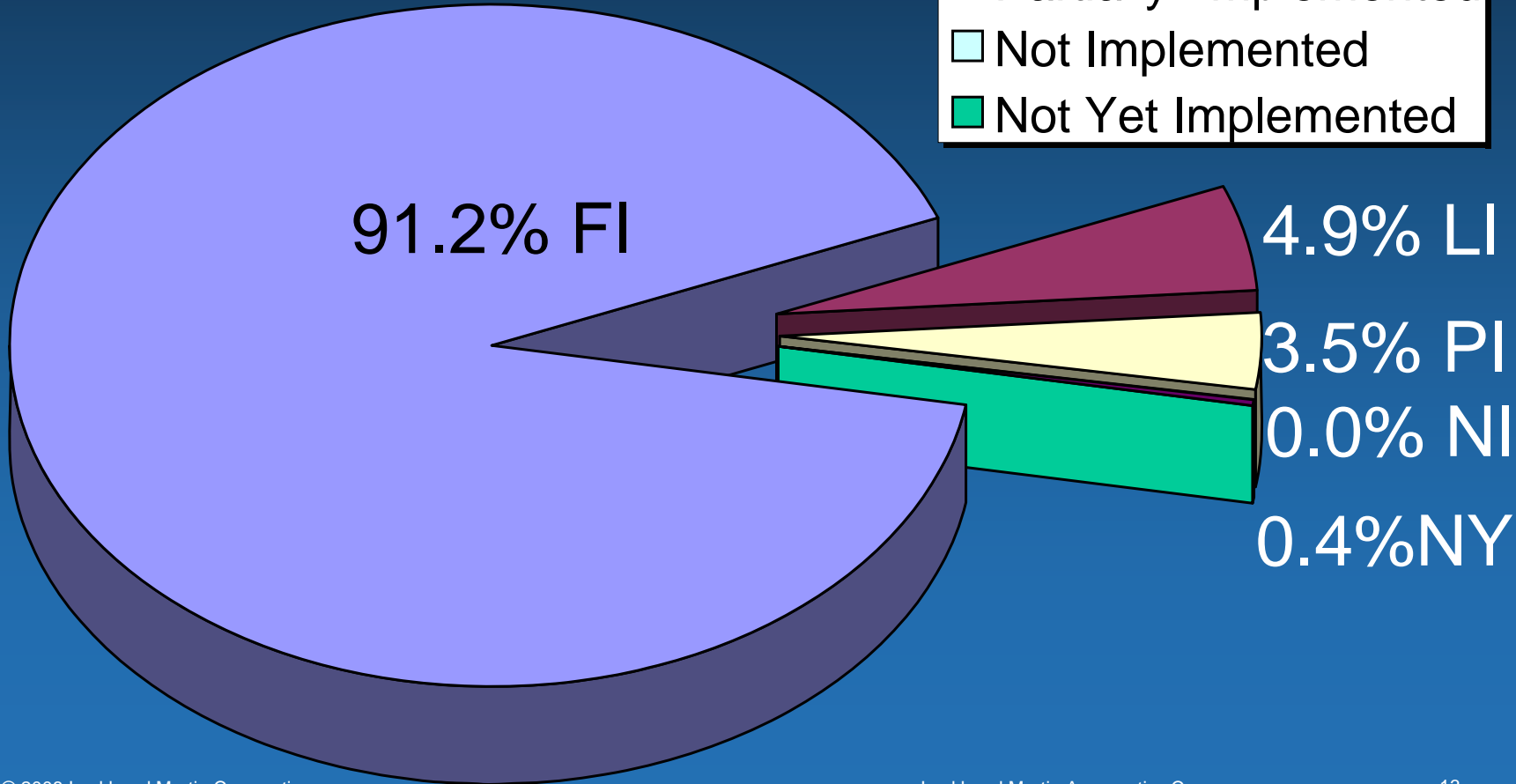
SCAMPI B Success Validated PIID Review Strategy



3760 Documents reviewed
270 Information Needs closed
1 Global finding identified

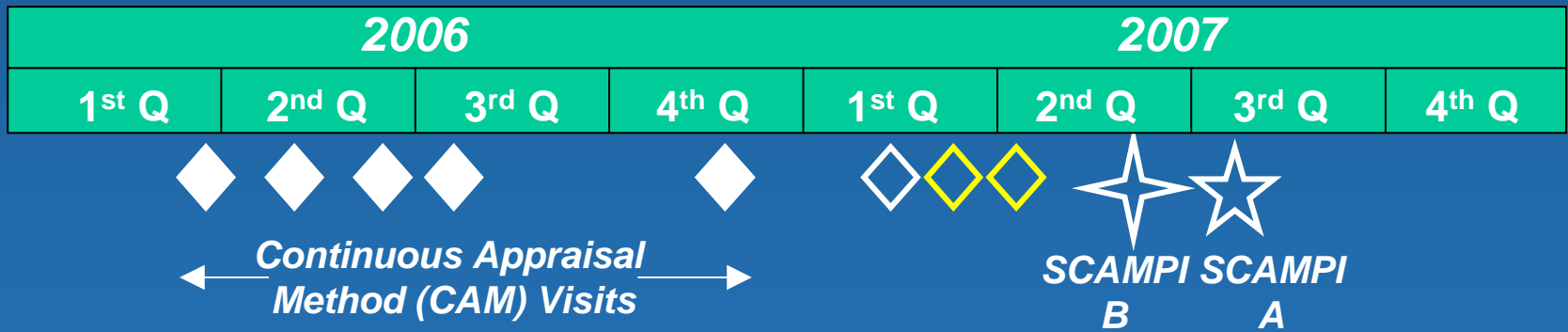
Percent of practices that were:

- Fully Implemented
- Largely Implemented
- Partially Implemented
- Not Implemented
- Not Yet Implemented





- Lockheed Martin Aeronautics Overview
- Appraisal Evidence Strategy
- **Appraisal Readiness Strategy**
- Early Appraisal Planning
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Appraisal Readiness Strategy



- **Continuous Appraisal Method (CAM)s**
 - *Some members of appraisal team participated*
 - *Validated the Organization's set of Standard Processes*
- **Functional PIID Review**
 - *Some members of appraisal team participated*
 - *Focused on organizational evidence*
- **Program PIID Review**
 - *Some members of appraisal team participated*
 - *Provided dry run of the review of classified data*
 - *Demonstrated network and security accessibility for non-Aero and non-LM members*
- **SCAMPI B**
 - *Full SCAMPI A appraisal team participated*
 - *Provided a comprehensive dry run of the appraisal tool*
 - *Included complete document review*
 - *Complete set of Interviews were conducted (some remotely)*



- Lockheed Martin Aeronautics Overview
- Appraisal Evidence Strategy
- Appraisal Readiness Strategy
- **Early Appraisal Planning**
- Appraisal Planning
- Physical Resource Needs
- Computing Resource Needs

Laid the Foundation

- Began 36 months prior



- **Appraisal preparation was managed as a project**
 - ***Established dedicated team***
 - CMMI Program Integrators were co-located
 - Program Lead role who could speak for the program
 - ***Developed project plans for the appraisal***
 - Integrated Master Plan
 - Integrated Master Schedule
 - Communication Plan
 - Risk Plan
 - Team website
- **Provided CMMI and SCAMPI training for stakeholders**
 - ***2 hour CMMI Executive Overview – 11 classes, 268 attendees***
 - ***8 hour Introduction to CMMI – 17 classes, 180 attendees***
 - ***3 day CMMI Overview – 14 classes, 241 attendees***

Framed the House

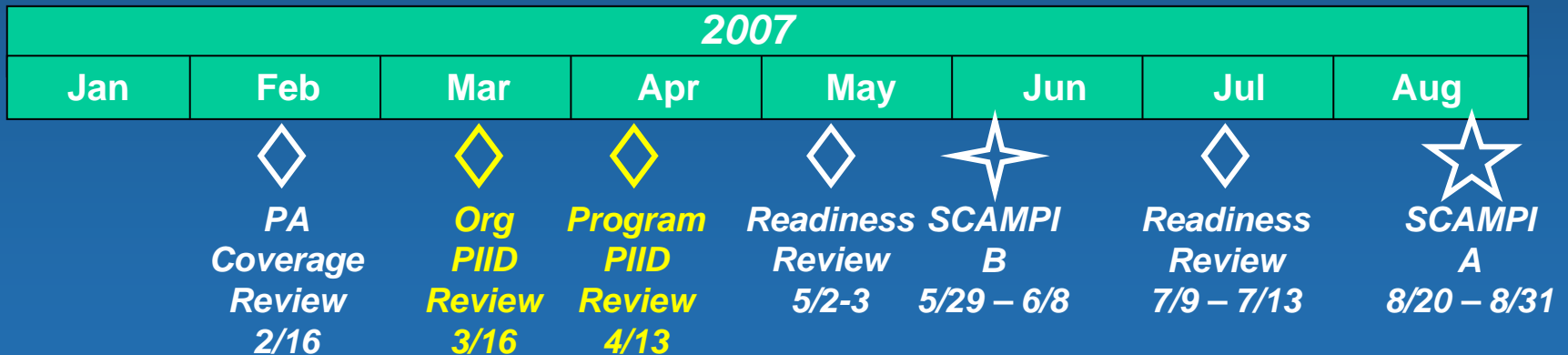
- Began 24 months prior



- **Evaluated candidate appraisal projects**
 - ***Business base coverage***
 - ***Lifecycle of the projects***
 - ***Site coverage***
- **Coordinated with Lead Appraiser**
 - ***Selected Lead Appraiser 2 years prior to the SCAMPI A***
 - ***Conducted Lead Appraiser Summits with members of the CMMI team***
 - ***Addressed special concerns***
 - Pre-existing evidence
 - Classified evidence
 - Scoping 'project' in the LM Aero context
- **Selected Appraisal Team Members**
 - ***Internal and external, including back-ups***
 - ***Four qualified lead appraisers were on the appraisal team***



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- **Detailed Appraisal Planning**
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Hung the Drywall Began 6-8 months prior



- **Identified Site Coordinator eight months prior to the SCAMPI A**
 - *Lead appraiser provided checklist to Site Coordinator (quantify)*
 - *Executive Management available to resolve issues*
- **Selected 100 interviewees and backups**
 - *Evaluated roles that best reflect the 9 interview session tracks*
 - CMMI PAs are do not align exactly with personnel roles and responsibilities
 - *Identified the selection criteria for interviewees*
 - Knowledge in the discipline
 - No reporting relationships within the interview group
 - *Collected contact information for the interviewees and their manager*
 - Critical as every interview provided unique affirmation coverage

Installed the Trim

- Began 4 months prior



- **Prepared the interviewees and backups**
 - ***Briefed on SCAMPI conduct expectations***
 - ***Required familiarization with the evidence***
 - ***Described the significance of their participation***
- **Developed detailed appraisal schedules and audiences**
 - ***Opening briefings***
 - ***Mini-teams and process areas***
 - ***Parallel interview sessions***
 - ***Preliminary findings briefings***
 - ***Final findings briefing***
- **Communicated the appraisal schedule**
 - ***Posted on the team website***
 - ***Sent meeting notices for all sessions of the schedule well in advance of the SCAMPI date***
 - ***Had a designated meeting place in advance of the interview time***



- **Lockheed Martin Aeronautics Overview**
- **Appraisal Evidence Strategy**
- **Appraisal Readiness Strategy**
- **Early Appraisal Planning**
- **Detailed Appraisal Planning**
- **Critical Resource Planning**

Installed the Fixtures

- Began 3 months prior



- **Developed 4 Opening Briefings to address GPs**
 - *Coordinated via cross-program dry runs*
 - *Targeted specific GPs to consistently address in each Program Opening Brief*
- **Defined Information Need Process**
- **Defined Physical Resource Needs**
- **Defined Computer Resource Needs**

Sample of Opening Brief Slide Covering GPs

GP 2.2 Plan the Process



Artifact	PP	PMC	IPM	RSKM	REQM	RD	TS	PI	VER	VAL	CM	PPQA	MA	SAM	DAR
Program Management Plan	X	X	X	X							X		X	X	X
Systems Engineering Management Plan							X	X		X	X			X	
Configuration Management Plan											X				
Software Development Plan for the Mission Systems		X					X	X			X				
Requirements Management Master Plan					X	X									
Requirements Work Package Concept of Operation						X									



- **Assigned dedicated Information Need (IN) Manager**
- **Defined IN process to provide a response within 4 hours**
- **IN Manager received IN and coordinated with the Program PIID Team to provide clarification or identify new evidence**
 - *Used pre-defined email template*
 - *Interfaced with the Site Coordinator if necessary to clarify the request with the appraisal team*
- **Briefed the appraisal team on the IN process and how to tag and track INs in the appraisal tool**
- **The identified clarification or new evidence was added to both the PIID tool and Appraisal Wizard prior to closing the IN**



- **Opening Presentation Room**
 - *Lead Appraiser presented to 200 SCAMPI participants*
 - *Teleconferencing enabled for remote locations*
- **Organizational and Program Presentations**
 - *Audience was limited to the Appraisal Team and presenters*
- **Appraisal Team War Room**
 - *Dedicated conference room for 13 people for 2 weeks*
 - *Tables, network connections, printers, projectors, outlet strips*
 - *Layout for 5 mini-teams to work independently, but also for the entire team to work together*
 - *Break-out room needed for meals*
 - *Close proximity to the interview rooms*



- **Interview Rooms**
 - *9 interview sessions, some conducted in parallel*
 - *Dedicated interview rooms via telecon at the remote locations*
 - *Tables and chairs, in specific arrangement to accommodate interviewees on one side and appraisal team on the other*
- **Preliminary Findings Briefings**
 - *Session 1: Project Management and Process Management*
 - *Session 2: Engineering and Support*
- **Final Findings Briefing**
 - *Aero conducted the largest briefing Lead Appraiser had done, 500 attended across three sites*
 - *Video-conferencing for remote locations*



- **Installed Appraisal Tool (Appraisal Wizard)**
 - *Procured 16 licenses (late to need)*
 - *Developed an interface to migrate our PIIID data to Appraisal Wizard*
- **Collected primary and backup contact info for IT and Security manager**
 - *Network support*
 - *Computer firewall support*
 - *Appraisal tool (Appraisal Wizard) support*
 - *Needed a database server administrator*



- **Each appraisal team member was assigned an Aero computing asset**
 - *Network Access - NT Logon id access controls*
 - *Program/Security access for each member*
 - *Web domain authorization*
 - *Computing applications and licenses—*
 - Office and Project, Appraisal Wizard, Adobe Acrobat ...
- **LM Aeronautics IT Policies**
 - *We had 5 unique user profiles*
 - *Conducted a security assessment*
 - *Compliance with access rules required significant effort*

Successful SCAMPI requires extensive planning



- **Managed the appraisal as a project**
- **Identified risks and developed mitigation plans**
- **Tracked PIID population via real-time view of status**
- **Selected early and coordinated closely with Lead Appraiser**
- **Assigned a dedicated Site Coordinator**
- **Identified a dedicated Information Need Manager**
- **Documented and coordinated physical and computing resource needs**



Questions?

