

Lockheed Martin Aeronautics Appraisal Project Management Strategy

**CMMI® 9th Technology Conference and User Group
November 16-19, 2009**



Clay Watson
Systems Engineer, Sr Staff

Lockheed Martin Aeronautics Overview



29,000 employees across the company and around the world



2010 SCAMPISM Project Team



- **Leadership**
 - Sponsor – LM Aero Executive Vice President, Operations
 - Champion – Director, Enterprise Process Improvement (EPI)
 - Implementation – Sr. Manager, EPI Enterprise Common
- **Process Management Organization**
 - SCAMPISM Project Manager
 - Appraisal Planning Coordinator
 - PIID Population Lead
 - Project Integrators
- **Project representatives**
 - Project POC's
 - Subject Matter Experts
- **Functional SME's**
 - Engineering
 - Quality
 - Program Management
 - Supply Chain Management
 - Organizational Training
 - Measurement and Analysis
 - Global Sustainment

What is a CMMI[®] appraisal like at Lockheed Martin Aeronautics?



SCAMPISM Appraisal planning is problematic

- **Our CMMI[®] projects can be HUGE – much larger than many organizations that are appraised**
- **Evidence collection requires coordinating activities with 200-300 people or more**
- **Projects are spread across large geographic regions**
- **Access to project artifacts is a challenging and complex task**
 - **Security/Classification issues**
 - **Proprietary information of national and international partners**
 - **Computer network access issues**

2007 SCAMPISM Was a Significant Effort



- **Document review**
 - Over 3900 items examined
 - Included classified data
 - Only 9 Information Needs
 - No major findings
- **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 SCAMPISM Lead Appraisers
 - Consistent mini-team assignments





Mission Accomplished!



Maturity Level 3

Appraisal Methodology

(through the eyes of Generic Goal 2)

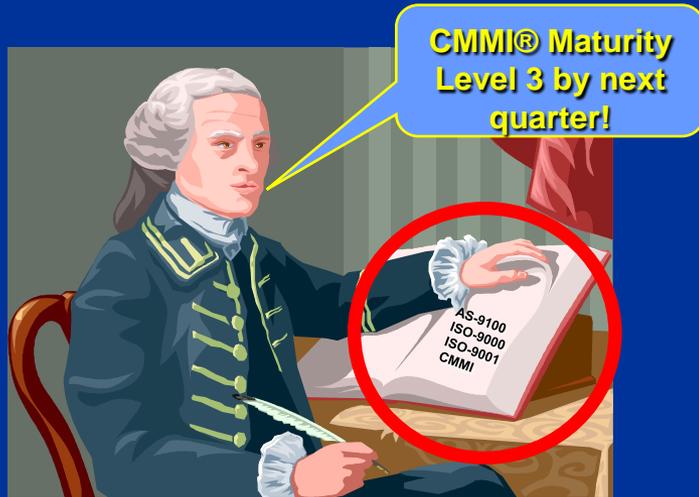


Institutionalize a Managed Process

- GP 2.1 and 2.2 – Establish a Policy and Plan the Process
- GP 2.3 and 2.4 – Provide Resources and Assign Responsibility
- GP 2.5 – Train People
- GP 2.6 – Manage Configurations
- GP 2.7 – Identify and Involve Relevant Stakeholders
- GP 2.8 – Monitor and Control the Process
- GP 2.9 – Objectively Evaluate Adherence
- GP 2.10 – Review Status With Higher Level Management

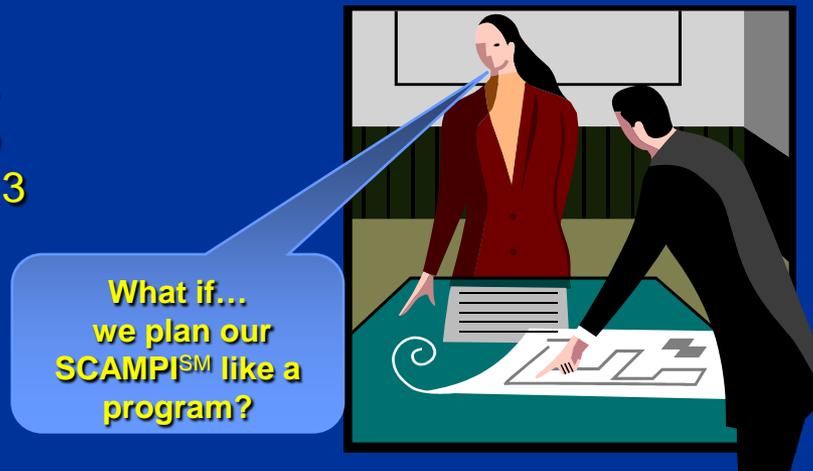
GP 2.1 and 2.2

Establish a Policy and Plan the Process



- Policies are defined at corporate level and company level tell us to align our business objectives with our process improvement activities
 - CMMI® Maturity Level 3 allows us to bid on certain government contracts
 - Process institutionalization reduces our total cost of doing business
 - Standards compliance is required by our customer

- Our response to the policy was to create and execute a plan to achieve CMMI® Maturity Level 3



Planning the SCAMPISM

Key Elements



- **Appraisal Team Selection**
- **Project Selection**
- **Assessment of Project Readiness**
- **Evidence Collection / PIID Population**
- **Evidence Verification and Validation**
- **Integrated Master Schedule**

Appraisal Team Selection

Lead Appraiser



It is important to select the right lead appraiser for the organization!



- **Must understand the product and the organization**
- **Must have an approach which melds with the organization**
- **Must have participation throughout entire process**
- **No rookies allowed!**

Appraisal Team Selection

Appraisers



Lockheed requires every mini-team have a team member from outside of the company (can be from a sister company within the corporation)



Every mini-team has a member from within the company that has access to the artifacts

Every mini-team member has a member with substantial SCAMPISM appraisal experience



Providing artifact access to mini-team members can be problematic – plan ahead!

Project Selection



- **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 Aircraft development
 - Legacy Upgrade Projects
 - R&D projects



F-35



F-22



RATTLRS-
Revolutionary
Approach To Time-
critical Long Range
Strike

Assessment of Project Readiness



We conducted gap analysis events* early in the schedule with each program to determine:

- Compliance with organizational processes**
- Identify gaps and prioritize corrective actions**
- Develop plans to fix process problems**

*** Note – gap analysis events are not audits (although they can be closely related)!**

Audits are against the company processes

Gap analysis events are against the CMMI® model

Evidence Verification and Validation

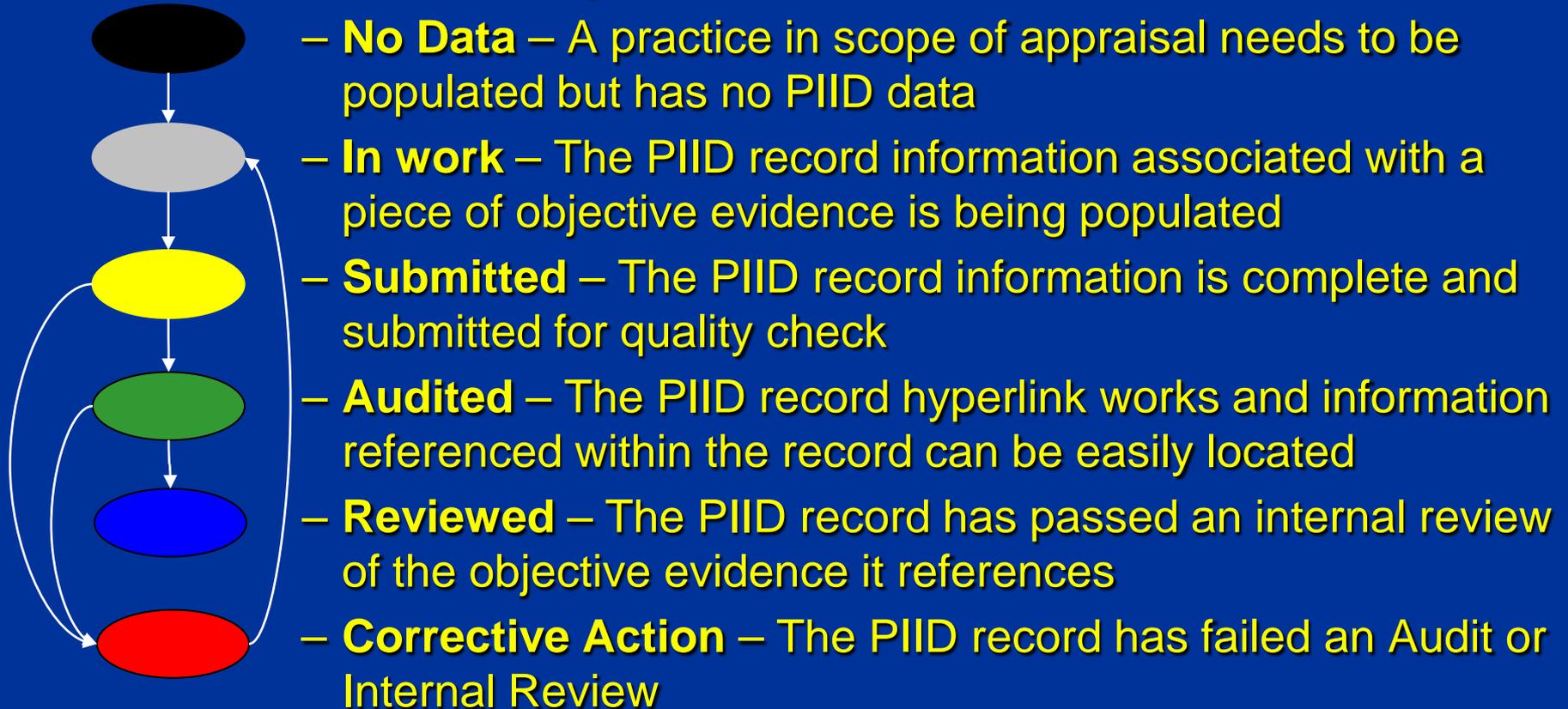


- **Class C Appraisal**
 - Validated the organizational processes
 - Validated company standards for PIID artifacts
- **PIID Reviews**
 - Four distinct reviews using external reviewers
 - Validated proposed artifacts for objective evidence
 - Identified long-lead action items (OT, PPQA, GP 2.5, GP 2.9, ...)
 - No interviews conducted
- **Class B (SCAMPISM) Appraisal**
 - Dry run for Class A appraisal, including interviews
 - Identify and close out all major and minor issues
- **Class A (SCAMPISM) Appraisal**
 - Everything is “perfect”
 - Coffee cups are distributed

Evidence Verification and Validation

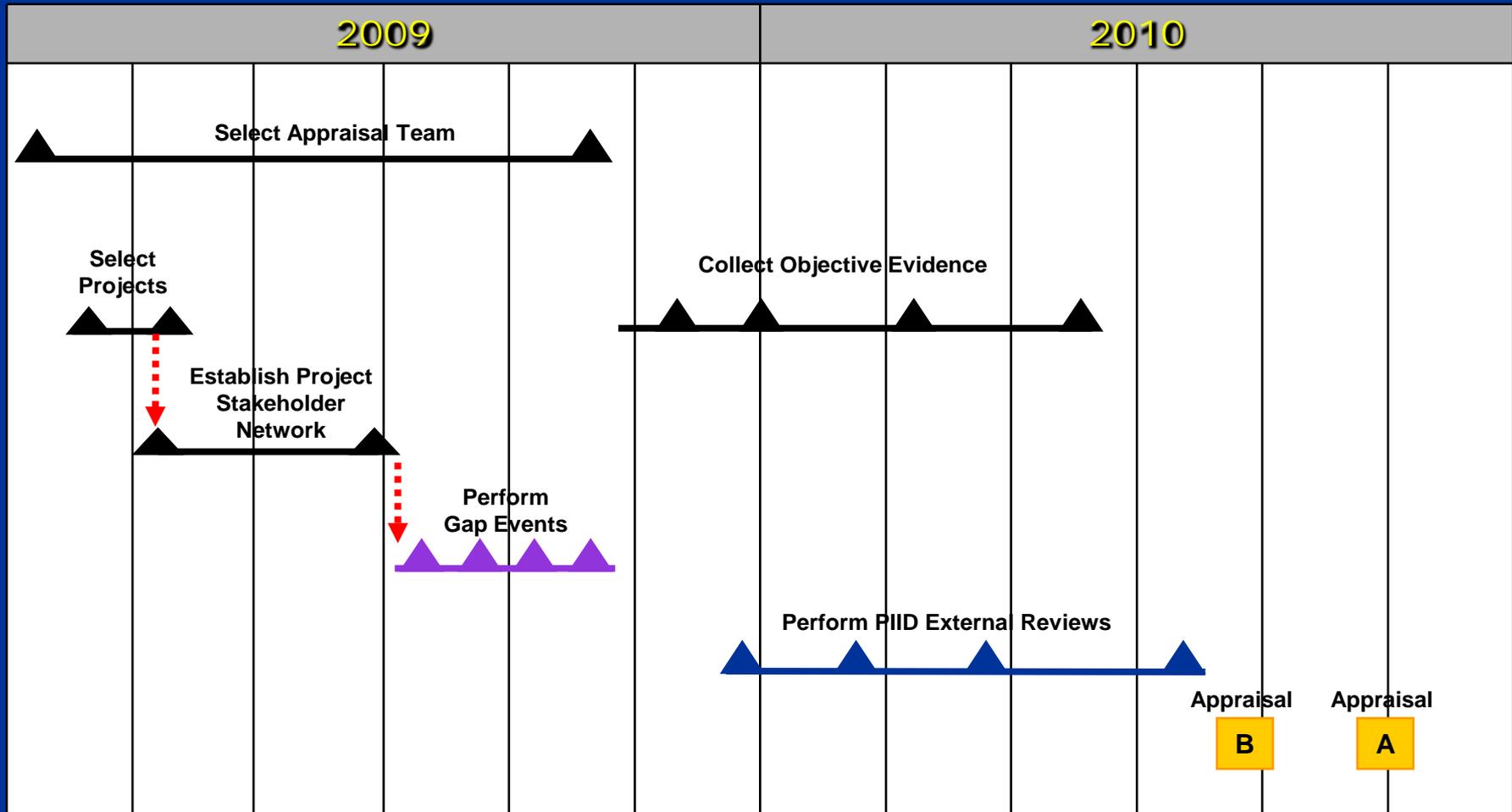


• PIID Record Life Cycle States



Planning the SCAMPISM

The Integrated Master Schedule



GP 2.3 and 2.4

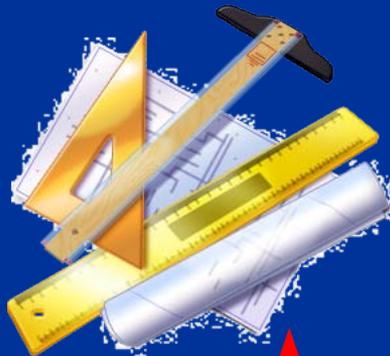
Provide Resources and Assign Responsibility



Budgeting



People



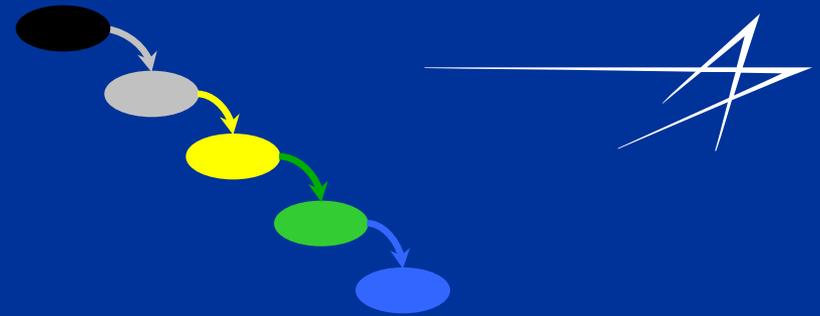
Tools



Facilities

Tools

PIID* Database



- Partitioning data by appraisal, schedule, project, PA, etc. is a very powerful and useful thing
 - Filtering data
 - Measuring data
 - Controlling Access
- Multi-user environment is critical
- Locks down data after submittal
- Tracks to closure corrective actions resulting from audits and reviews
- Enforces PIID life cycle



*PIID -> Process Implementation Indicator Description

Tools

LMASA – Lockheed Martin Aeronautics Standard Approach



- Defines the Lockheed Martin Aeronautics standards for SCAMPISM artifacts
- Accessible through PIIID database tools
- Validated via Class C appraisal

CMMI[®]
Practice
Info

CMMI Practice Report for CM GP 2.4

Process Area: Configuration Management

Category: Support

The purpose of Configuration Management (CM) is to establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits.

Goal: GG 2 Institutionalize a Managed Process
The process is institutionalized as a managed process.

Practice: GP 2.4 Assign Responsibility
Assign responsibility and authority for performing the process, developing the work products, and providing the services of the configuration management process.

Example Direct Artifacts
LMASA: Program Management Plan establishing responsibility for CM by roles; Program Org Chart showing people assigned to CM roles (same as in GP 2.3)
CMMI: • Documentation assigning responsibility for process activities, work products, or services; e.g., job descriptions, or plans for performing the process (see GP 2.4)
• Task descriptions and activities for defined roles.

Example Indirect Artifacts
LMASA: Affirmations from Program In-Brief.
CMMI: • Assignment is often in the project plan or configuration management plan.

Typical Work Products

Other contextual help

Appraiser Considerations
LMASA Organizational Guidance: AC-5604, Plan and Baseline the Program, 3.D.5.e AC-5605, Organize the Program, 3.C, 3.D.5.e AC-5607, Monitor and Control Program Performance
LMASA Considerations: For Aero, AC-5604 establishes responsibility for various elements of the program plan. AC-5605 specifically addresses the assignment of personnel for programs. Section 3.C describes the assignment of management personnel to the lowest tier. Section 3.D.5.e describes the assignment of personnel to roles within each IPT to the various team members. Responsibilities, roles, and personnel assignments are covered in the Program Management Plan and the Program Organization Charts, as well as in IPT Charters.
CMMI Considerations: • These activities may be distributed across different groups within the organization (e.g. systems, software, CM group).
• Responsibility may change as development progresses across the life cycle.

Tools



- **SharePoint Site**
 - **Primary means for project communication**
 - **Project files**
 - **Metrics and Measures**
 - **Archives**
- **Artifact repositories**
 - **Simple networked file shares**
 - **Each project controls its own**

Assigning Responsibilities



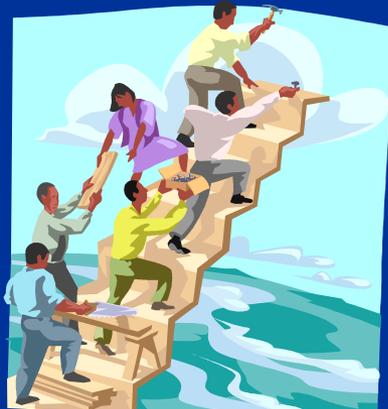
SCAMPISM Team

- SCAMPI Project Lead
- PIID Population Lead
- Project Integrators
- Admin Support



SCAMPISM Appraisal Team

- Planning Coordinator
- Lead Appraiser
- Mini Team Members



Project Teams

- Point of Contact / Team Lead
- Subject Matter Experts
- Admin Support



Functional Core Teams

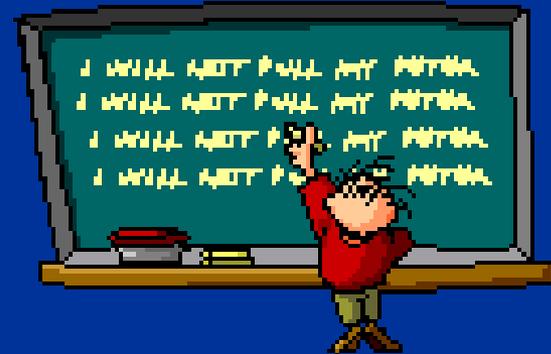
- Functional Representative
- PIID Population Coordinators for:
 - PPQA
 - SAM
 - OPD
 - OPF
 - OT

GP 2.5

Train People



- **CMMI® Training Courses**
 - SEI training
 - Management Overview
 - Introduction (1-day)
- **PIID Tool Training Courses**
 - Data entry role
 - Auditor and Reviewer roles
- **Other Training**
 - LMASA
 - Organizational Standard Processes
 - Role-based training From Functional Cores



GP 2.6

Manage Configurations



- Artifact Repositories
- File shares



- Archives from past appraisals
- Program archives
- CD's
- DVD's



- Tools
- SharePoint & File shares
 - PIID Database Software
 - PIID Documentation
 - LMASA



- Project files and documents
- SharePoint
 - Plans
 - Presentations
 - Status Reports
 - ...

GP 2.7



Identify and Involve Relevant Stakeholders

Project Integrators meet regularly with their project POC's to coordinate activities



Coordination meetings with all project integrators and project points of contact occur weekly

Coordination meetings with functional representatives occur every two weeks



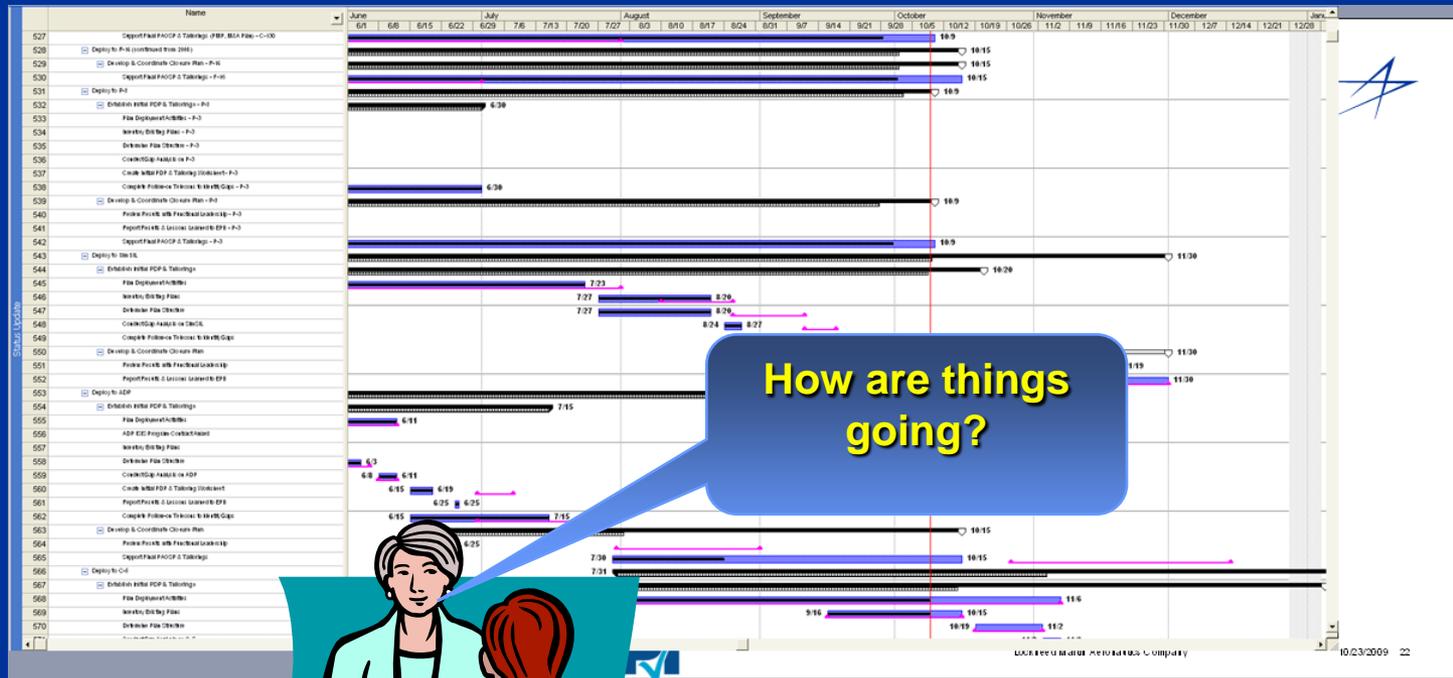
Accountability review meetings with higher level management occur monthly

GP 2.8



Monitor and Control the Process

- Tracking against the Integrated Master Schedule is a regular topic at our meetings

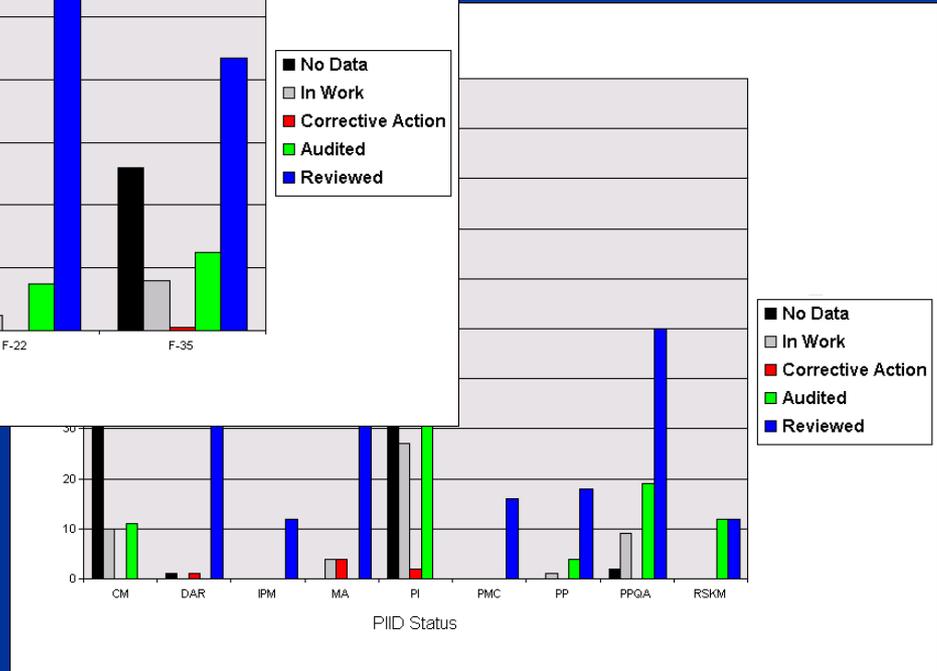
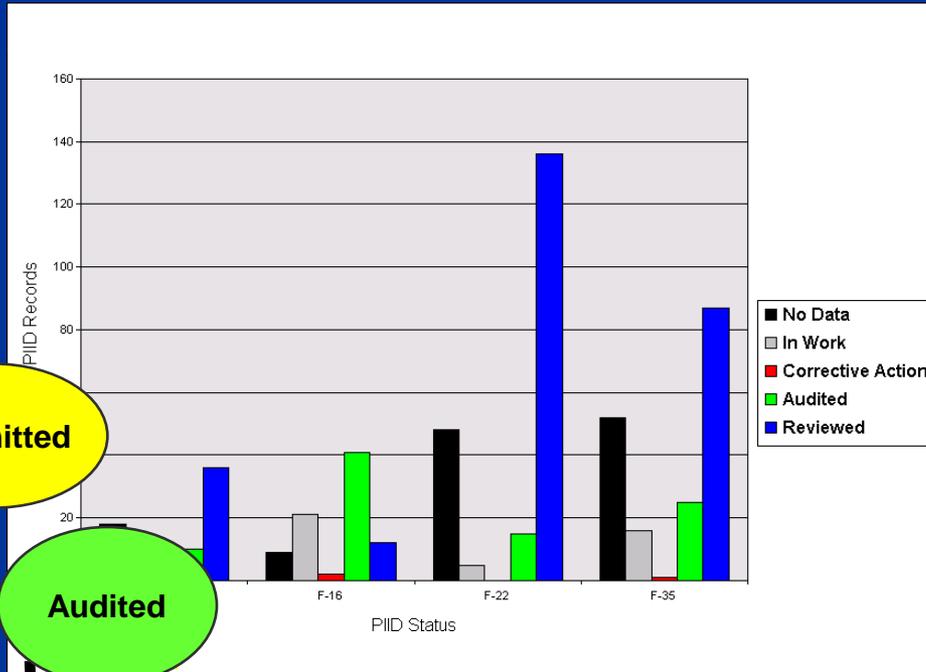
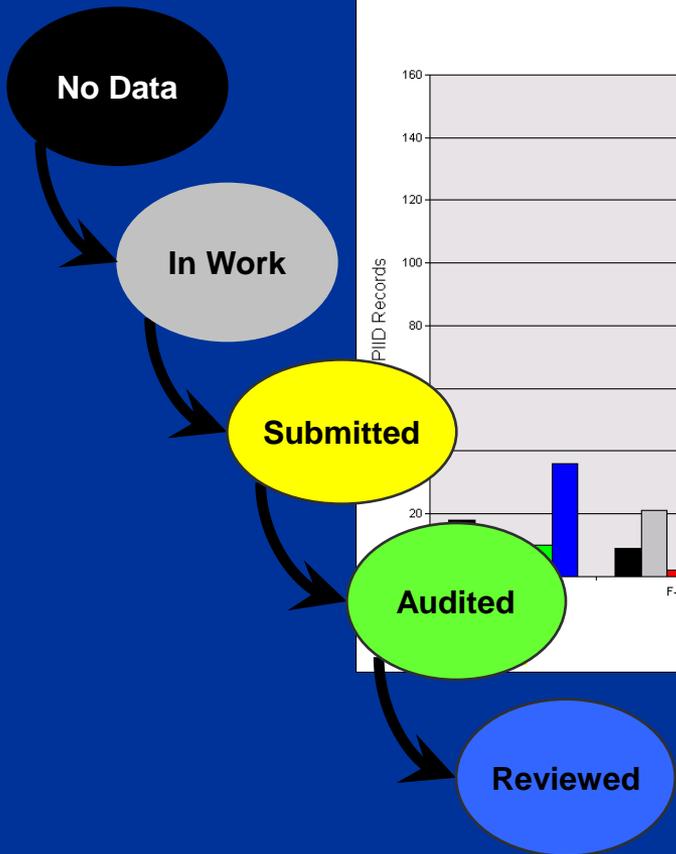


GP 2.8

Monitor and Control the Process



PIID Life Cycle Metrics Are Used to Monitor PIID Population Process Activity



GP 2.9



Objectively Evaluate Adherence

We use SCAMPISM preparation and SCAMPISM appraisal results to identify adherence issues within the organization

- Project gap events
- PIID Corrective Actions
- Integration with organizational auditing functions through PPQA

Ensuring compliance with PIID standards is automatically built into the life cycle

- Auditing Standards
- LMASA Evidence Standards
- File Repository Standards
- Corrective Actions



GP 2.10



Review Status With Higher Level Management

Accountability Review Meetings (ARM) – everyone should have them!



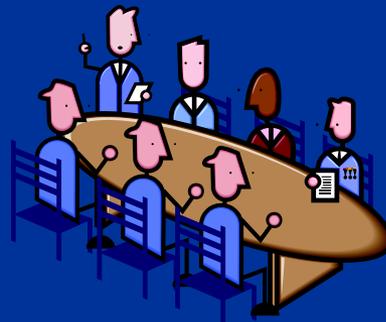
Financial Status



Schedule Status



Project Accomplishments



Process Decision Boards



Project Risks



Program Issues

Conclusions



- 1. SCAMPI events at Lockheed Martin Aeronautics are uncommonly large efforts**
- 2. Even if your effort is smaller, the underlying methodology can be similar**
- 3. Run your SCAMPI preparation like a major project (using CMMI® GG 2 as a guide)**
 - Establish a Policy and Plan the Process**
 - Provide Resources and Assign Responsibility**
 - Train People**
 - Manage Configurations**
 - Identify and Involve Relevant Stakeholders**
 - Monitor and Control the Process**
 - Objectively Evaluate Adherence**
 - Review Status With Higher Level Management**



Questions?

