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in Aeronautics – The Journey to CMMI® Level 3

*7th Annual CMMI Technology Conference
and User Group*

November 13-15, 2007



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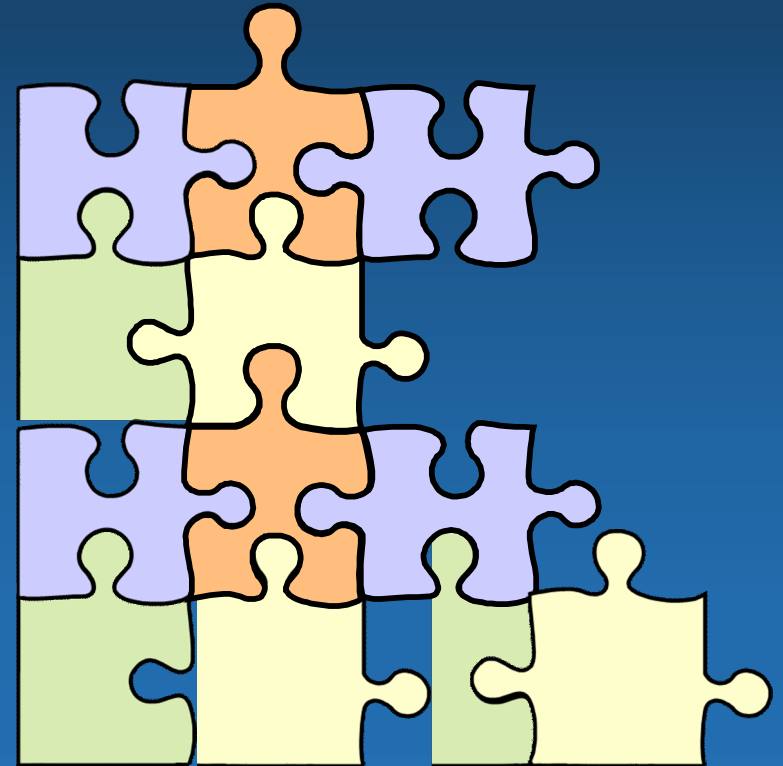
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Lockheed Martin Aeronautics Company

Rev. 3



- Lockheed Martin Aeronautics Improvement Legacy
- Achieving Maturity Level 3
- Lessons Learned And Insights
- Vision For The Future



Aeronautics Overview



29,000 employees across the company and around the world



Aeronautics: Improvement And Recognition



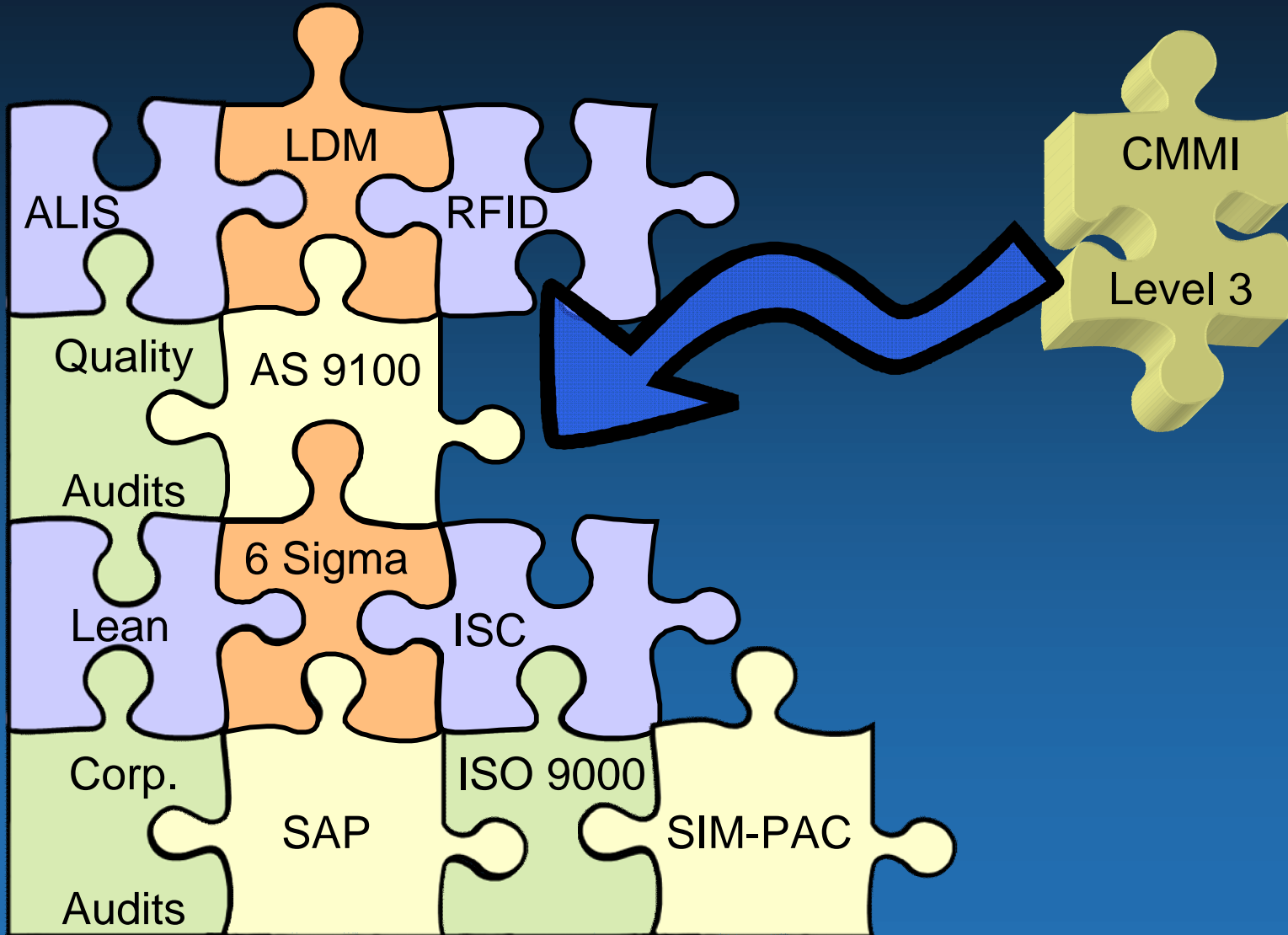
- 1958 Robert J. Collier Trophy – F-104 Starfighter
- 1963 Robert J. Collier Trophy – SR-71 Blackbird
- 1975 Robert J. Collier Trophy – F-16 Fighting Falcon
- 1996 SW-CMM® Maturity Level 3
- 1999 SW-CMM® Maturity Level 4
- 2000 Shingo Prize – Fort Worth, TX
- 2001 Robert J. Collier Trophy – F-35 STOVL 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.

The Element of Our Improvement Landscape



1 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

Resources From Our Corporate Family



- **Used our corporate expertise**
 - *Understood model and addressed challenges*
 - *On-site participation for SCAMPI*
- **Adopted best practices**
 - *LM Continuous Appraisal Methodology (CAM)*
 - *Lockheed Martin Integrated Enterprise Process (LM-IEP) Architecture*
 - *Best practices from sister companies*

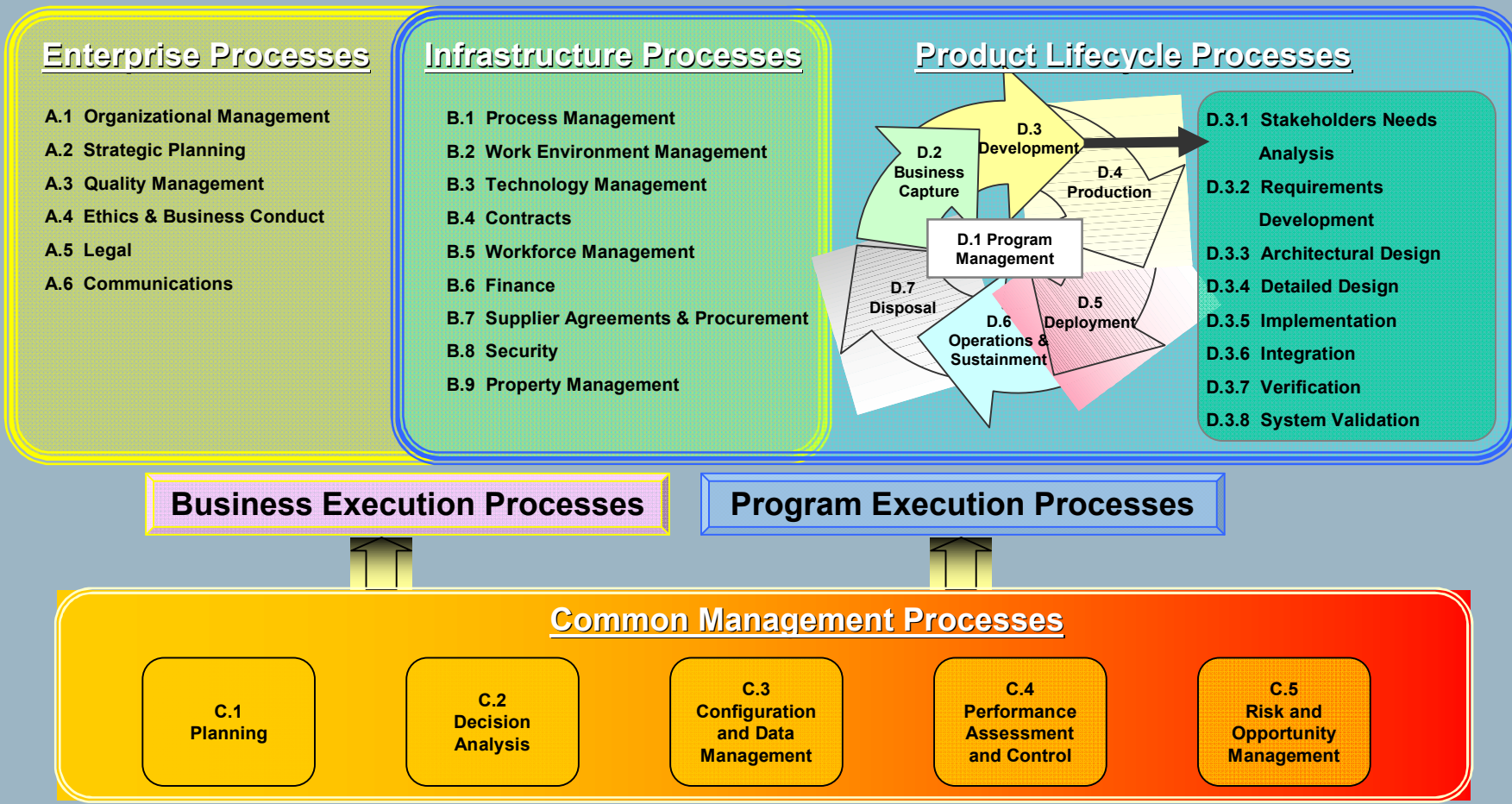


Built our approach using the best!

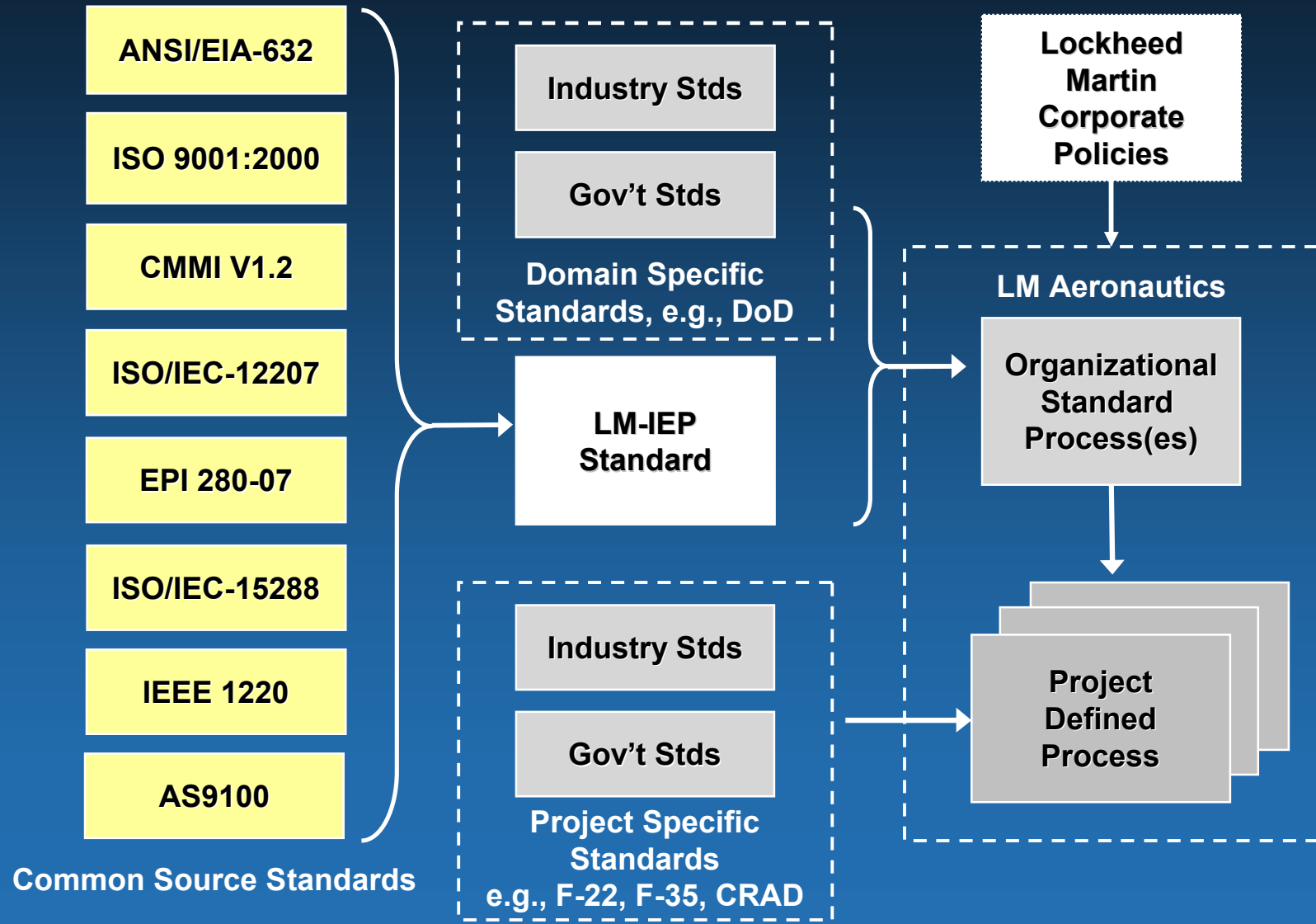
Enterprise Process (LM-IEP) Architecture



A comprehensive enterprise architecture serves as the foundation for continuous process improvement



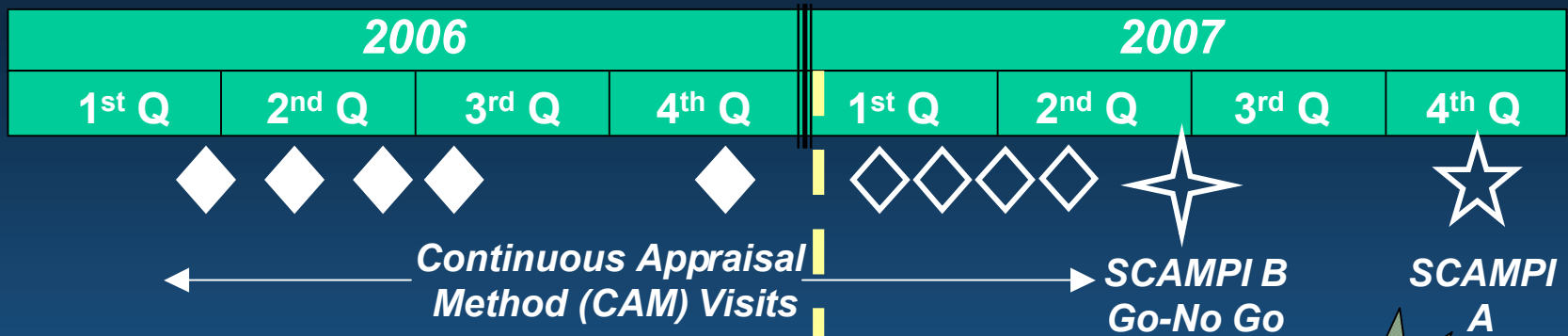
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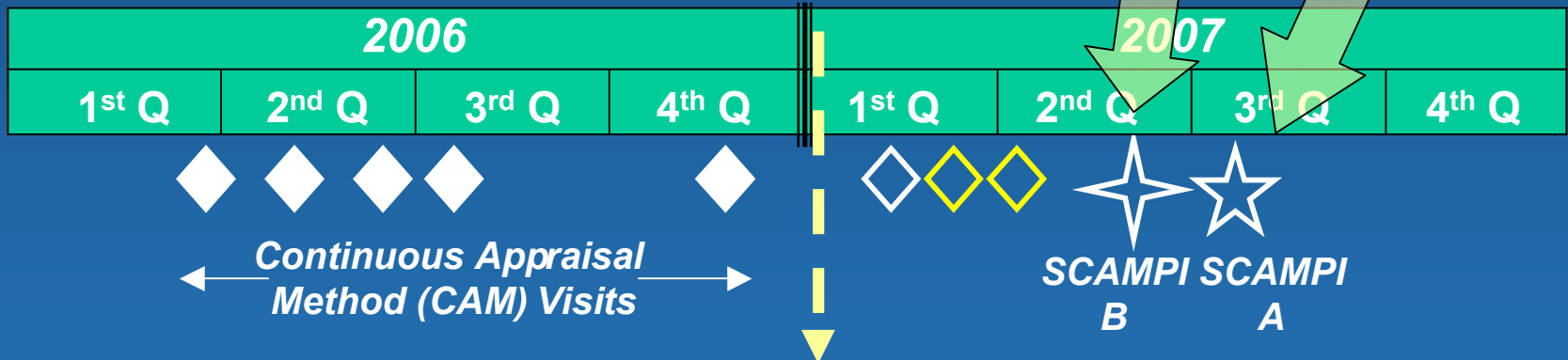
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Original 2005 Plan

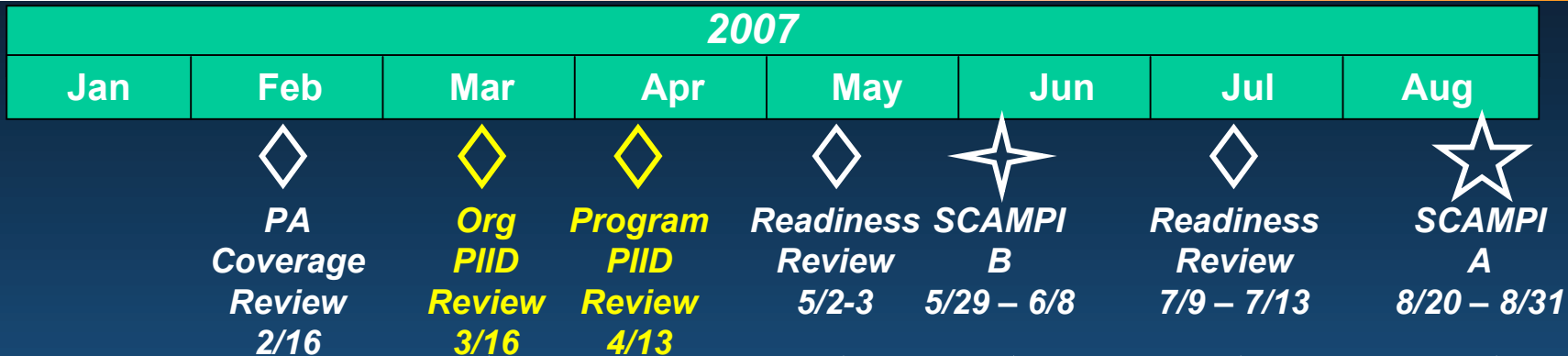


Revised 1/2007 Plan



Earlier v1.1 sunset schedule required accelerated SCAMPISM preparation to protect our v1.1 OSP investment

Revised Project Plan Milestones



Finalize and Release Processes

Finalize and Release Program Plans & Procedure

Conduct & Attend Process Training

Implement Plans/Procedures & Collect Evidence

Conduct and Support Internal Evidence Evaluations

Improve Processes / Update OSP, PDPs, and Other Products

Address Findings

Address Information Needs

Used our project management strengths

- “ Clear lines of authority
- “ Risk/schedule management
- “ Accountability reviews

Features of the LM Continuous Appraisal Method (CAM) incorporated into CMMI review teams and independent PIID reviews

Review Teams Established to Solve Issues Real-Time



Evidence Collection Teams

ADP
F-22
F-35
" Project Process Area Owners/SMEs

ADP
F-22
F-35
Draft PIID

Identified

Evidence Review Teams

ADP
F-22
F-35
" Program Team Lead
" Team Integrator
" CMMI Consultant
" QA Representative
" Project POC

ADP
F-22
F-35
Program PIIDs

Submitted

PIID Audit Team

" PIID Tool Experts

Audited

Cross Program Review Team

" Program Implementation Lead
" Program Integrator
" CMMI Consultants

Master PIID Appraisal Ready

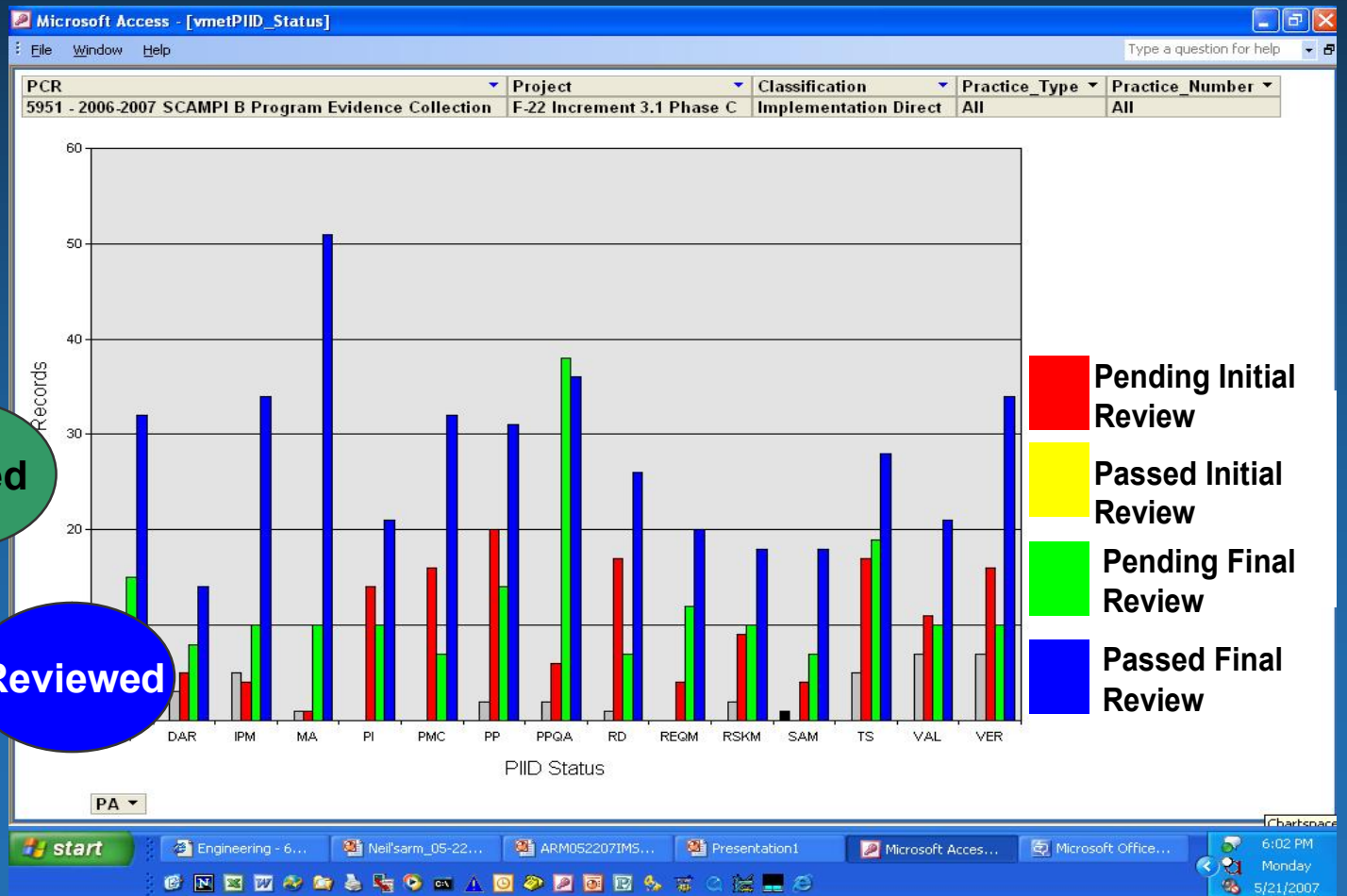
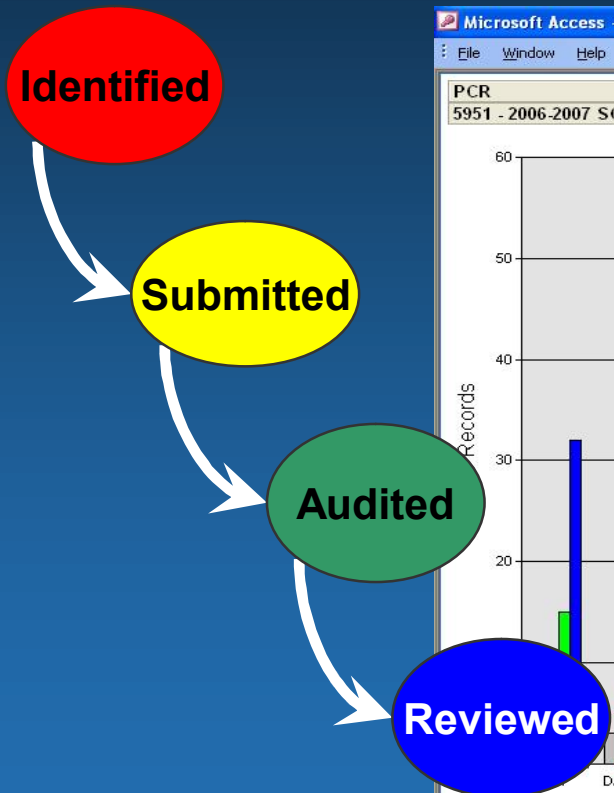
Reviewed

PIID Tool tracked status at lowest level item

ment Adjustments D Tool








**Custom MS Access-based tool
provided real-time status across entire CMMI project**

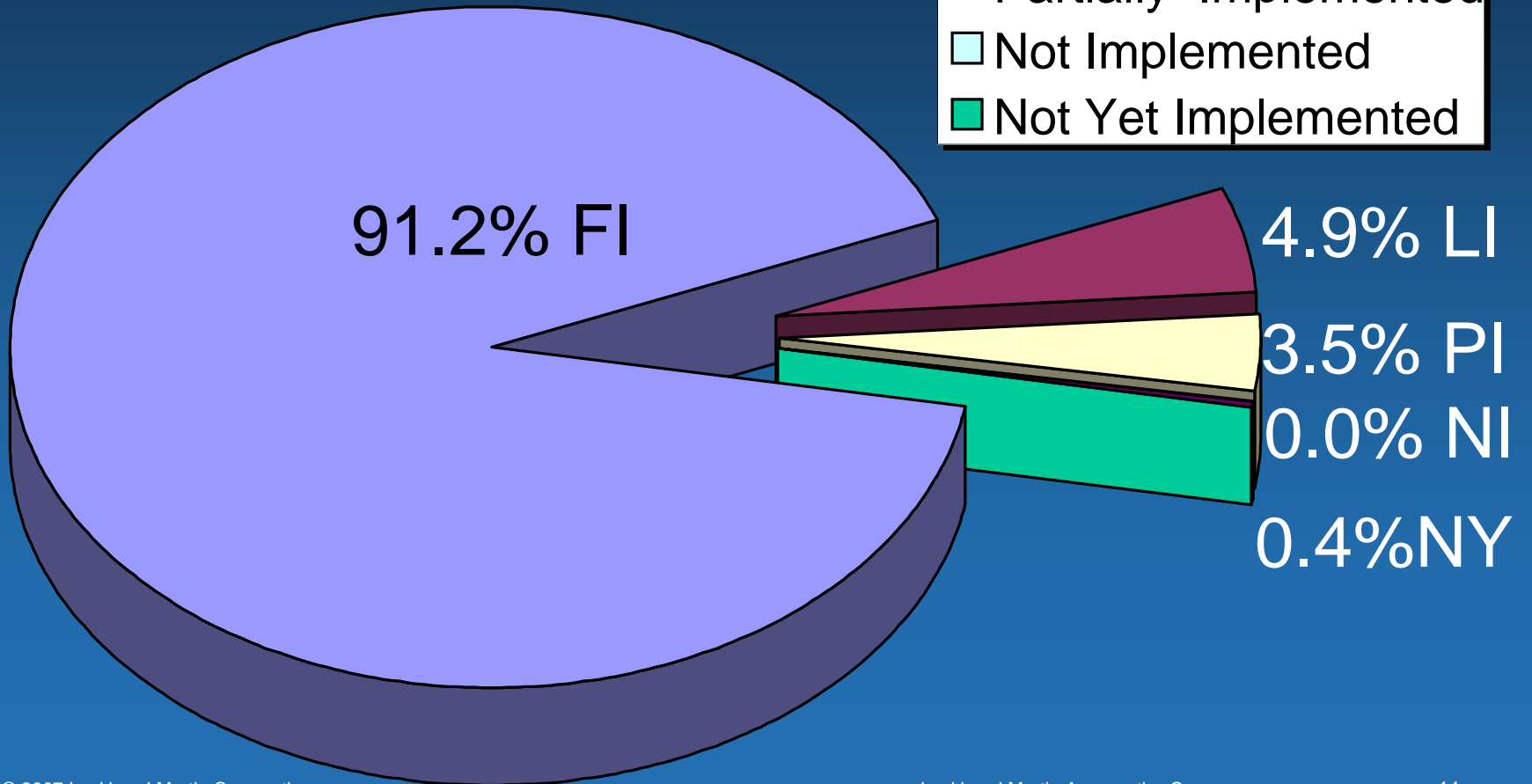




3760 Documents reviewed
270 Information Needs closed
1 Global finding identified

**Percent of practices
that were:**

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



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 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



Mission Accomplished!



Maturity Level 3

Improved Company Behaviors



- **Vice President assigned full time to sponsor the effort**
 - *Management commitment from the company president down*
 - *“Direct leadership from the sponsor provided solid foundation for process improvement”*
- **Feedback from programs and functions**
 - *Programs are more involved in process changes and deployment of processes*
 - Changes are pre-coordinated with programs
 - Programs incorporate changes prior to formal deployment
 - *Increased use of disciplined processes*
 - *Improvements identified on one program are shared across programs in a more timely manner*
 - *Improved communications across programs, sites and functions*
 - *Program integration – good communication and consistent expectations*

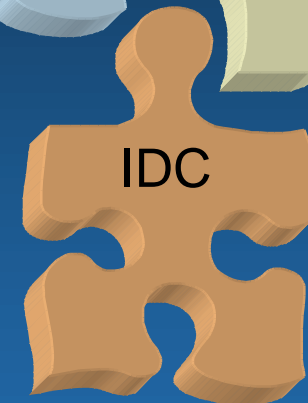
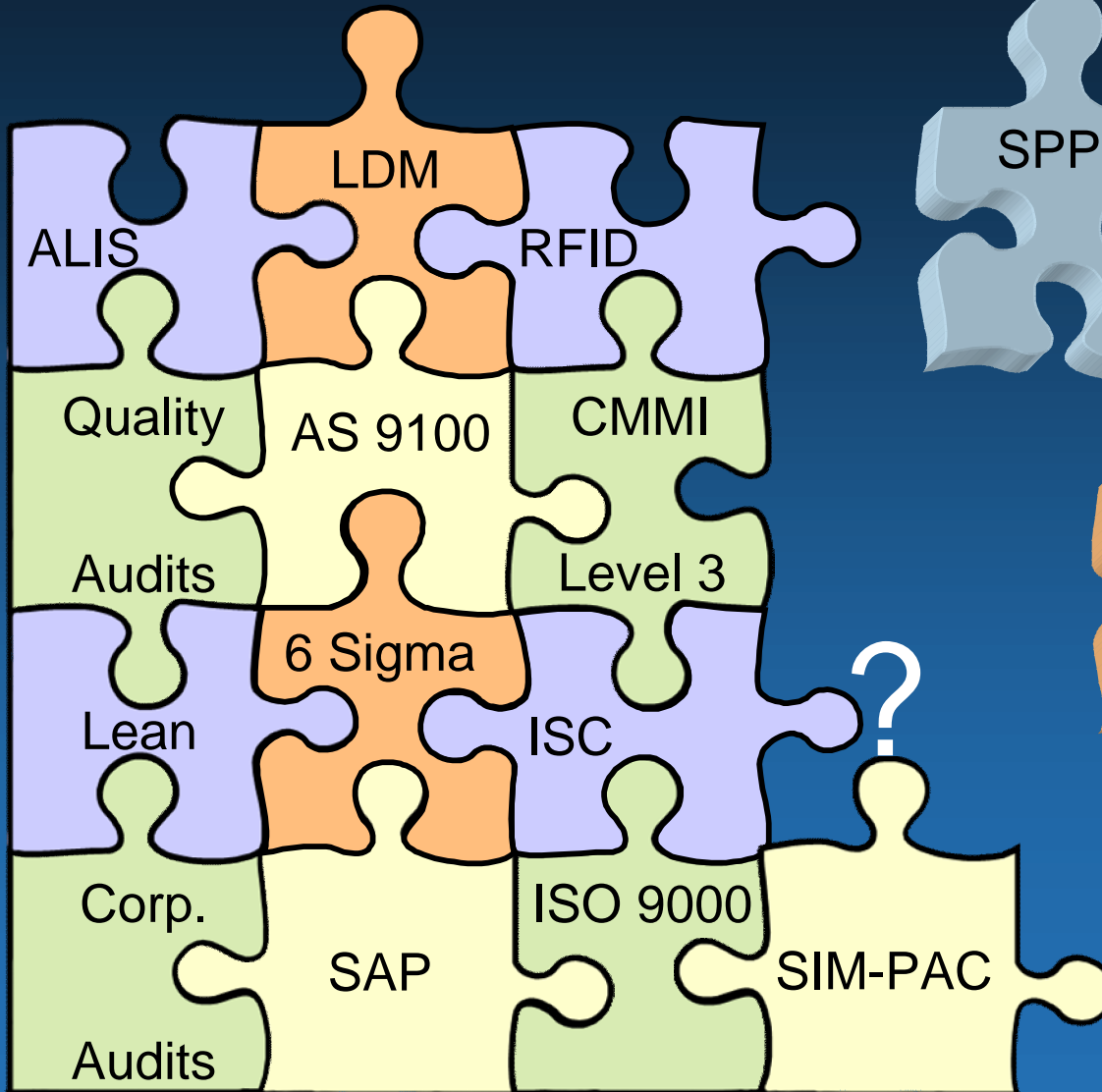


- **Longest effort: Development & release of the CMMI compliant OSP**
 - *OSP “what’s in vs. what’s out” was a big issue*
 - *Processes were written within each functional area*
 - *Process owners previously had no common vision / framework*
 - *Was difficult to obtain program engagement – too busy*
 - *Few subject matter experts were available*
- **It pays to keep it simple**
 - *Took advantage of common metrics already in use*
 - *Combined peer review methods into one common process*
 - *Aligned auditing groups under one process*
 - *Standardized training across multiple functions*



- **Major obstacles to overcome...**
 - *Long development life cycles (7-10 years)*
 - *Large functional organizations*
 - *Multiple work cultures within large company*
 - *Program size varies from extremely large to very small*
- **Key factors that helped us to be successful**
 - *Vice president leadership and executive sponsorship*
 - *Engagement of strong corporate expertise*
 - *Experienced appraisal team*
 - *Disciplined programs*
 - *Recognition of model flexibility*
 - *PIID reviews to accelerate evidence collection*
 - *Documented our standard approach for generic practices*
 - *Structured SCAMPI opening briefings to maximize GP coverage*

Aeronautics Is Continuous Improvement



What's next?
Must determine best strategy to maximize payoff





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