PLM World 2011

JPL PLM Overview

Bill Allen
Jet Propulsion Laboratory
California Institute of Technology
Overview

- Project Lifecycle at JPL
- Product Lifecycle Management (PLM) at JPL
- Top-Down Design Approach for One-Off Prototype
- Typical challenges for business base (MSL Pilot Example)
- Future directions
- Conclusion
Project Lifecycle

**Abbreviations**
- CR - Concept Review
- PMSR - Preliminary Mission & System Review
- PDR - Project/System Preliminary Design Review
- CDR - Project/System Critical Design Review
- ARR - ATLO Readiness Review
- MRR - Mission Readiness Review
- PLAR - Post Launch Assessment Review
- CERR - Critical Events Readiness Review
Mechanical Systems at JPL

- Products developed require integration of multiple disciplines
  - Design
  - Engineering
  - System Engineering
  - Analysis (Thermal, Structural, Dynamics)
  - Fabrication
  - Propulsion
  - Cabling
  - Ground support, handling fixtures
  - Assembly
  - Testing
  - Planetary protection
  - Quality assurance
  - Data management
Top-Down Design Approach for One-Off Prototype

- Configuration Development
- Capture High level Requirements
- Capture Resources (Mass, Volume, etc.)
  - High level trade studies
  - Low design fidelity
  - Little design re-use

- Establish Interfaces
- Establish lower level Requirements
- Mature design models
- Detailed design trades
- Build component level test hardware
  - Validate component level assumptions

- Detailed designs finalized
- Flight components fabricated
- Assembly of flight components
- Build system level test hardware
  - Validate system level assumptions
Mars Science Laboratory (MSL) PLM Pilot Project overview
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• Challenges
  • Need concurrent engineering approach to meet more aggressive schedule and leaner budgets
  • Multiple disciplines
  • Multiple tools
  • Processes in flux due to new tools
  • No history to base standard practices
  • No history to enforce universal usage
  • Complex design involving integration of dynamic subsystems in a multi-event environment
Mars Science Laboratory (MSL) PLM Pilot Project overview

• Results
  • Able to address complicated problems with new approaches and creative solutions
  • Developed custom applications in partnership
    • Obscuration Analysis Program

• Open architecture of platform facilitated greater integration with partnering organizations
• Have learned enough from pilot to establish and enforce appropriate practices and processes for an effective and efficient Mechanical Systems design for future missions
JPL PLM Vision

• Future vision
  • Collaboration environment to facilitate overlay of multi-discipline information
  • Re-use becoming more prominent (improving competitive edge)
  • Global partnering/collaboration expanded
  • Visualization of information becoming key
    • JT-centric environment
    • HD3D
    • Product Template Studio (PTS)

• Have developed a Mechanical Design Center (MDC) facility to accommodate above technology
Conclusion

• Resources becoming more challenging
  • Funding harder to acquire
  • Schedules reducing
  • Missions/Task more complicated
• Innovation mandatory in order to compete
  • Must have innovative tools and processes