



JT Open TRB
Seattle, Washington
June 7th-9th, 2011



JPL PLM Visualization Overview

Bill Allen

**Jet Propulsion Laboratory
California Institute of Technology**



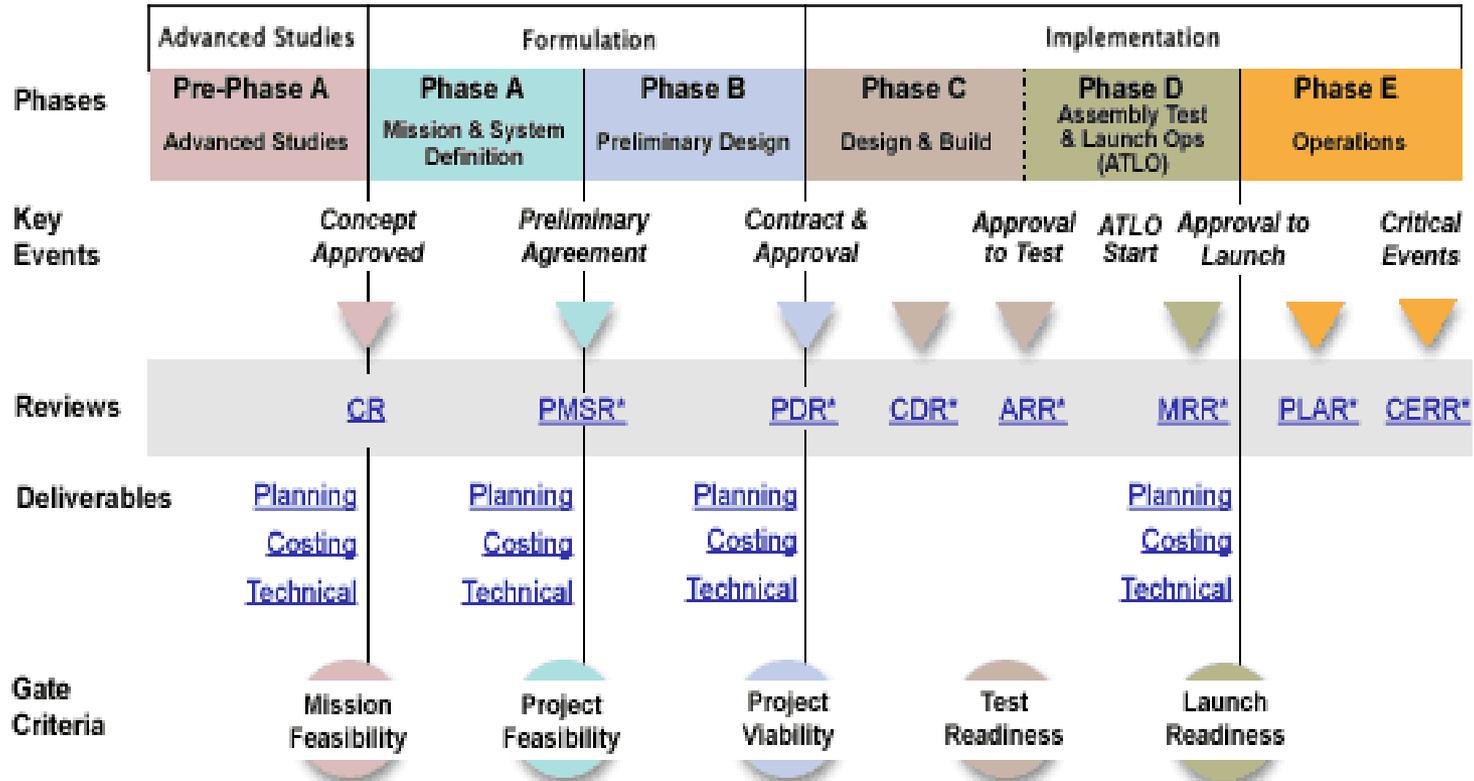
- Overview of JPL spacecraft development process
- Initial adoption of JT
- Early PLM JT adoption
- Current PLM JT adoption
- Future directions
- Conclusion



Project Lifecycle



04/02/03

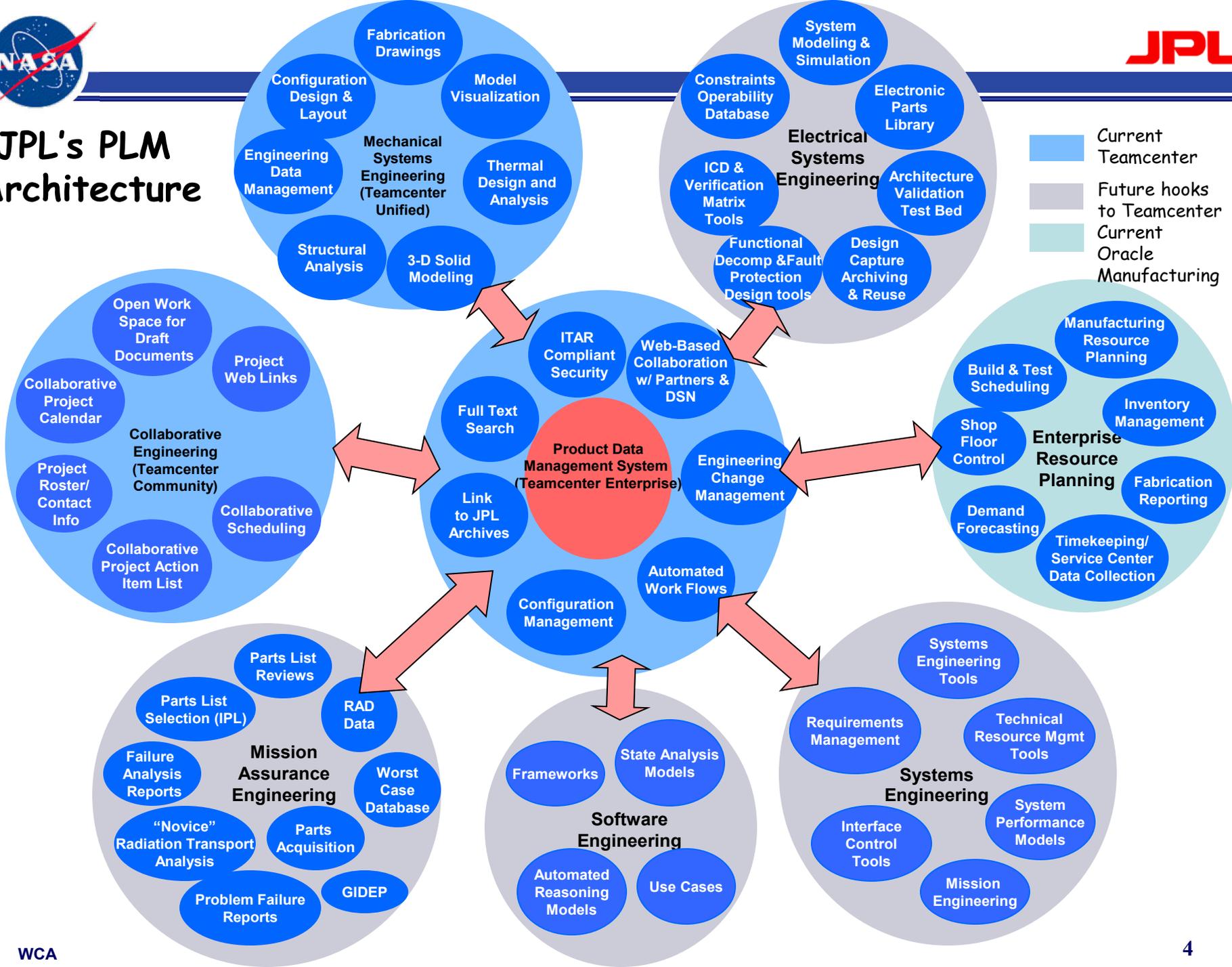


Abbreviations

- 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

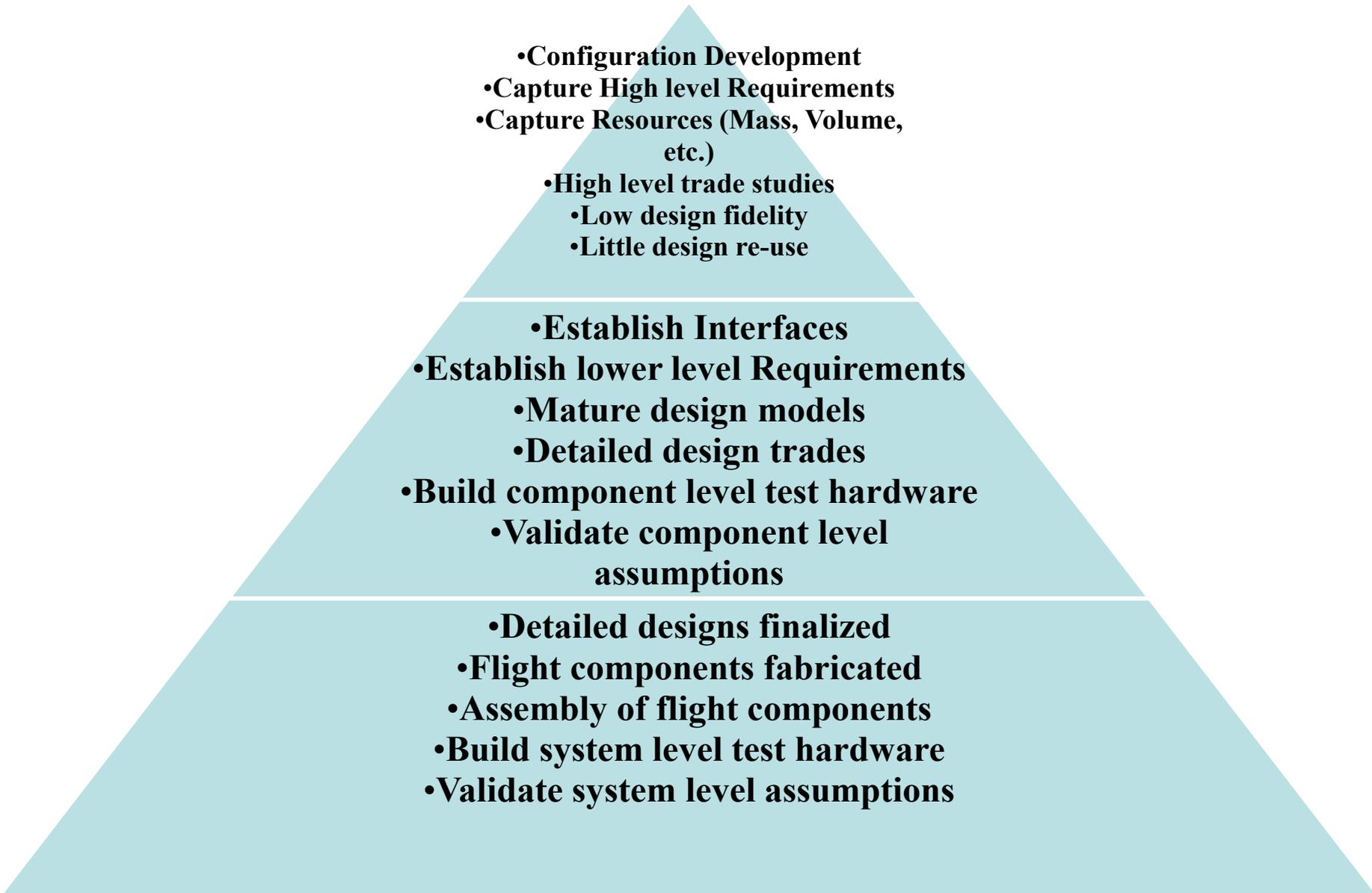


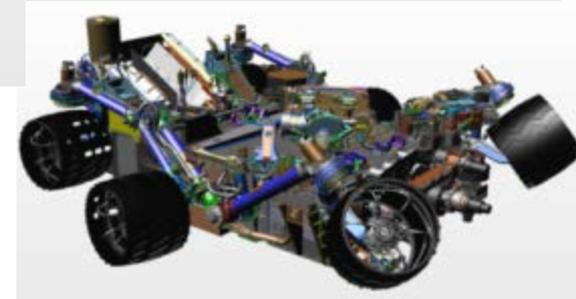
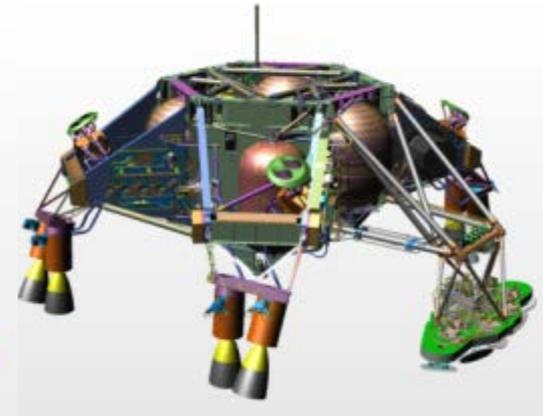
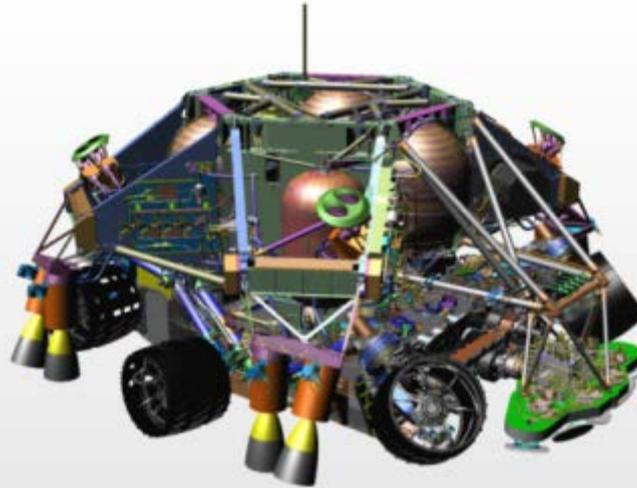
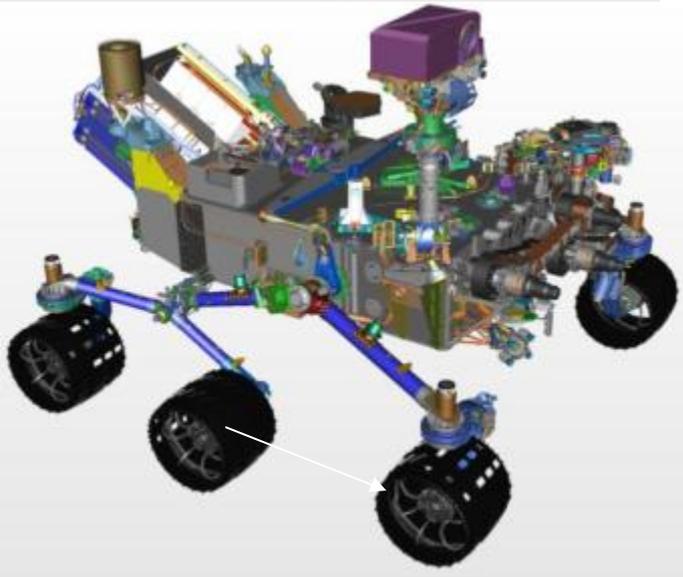
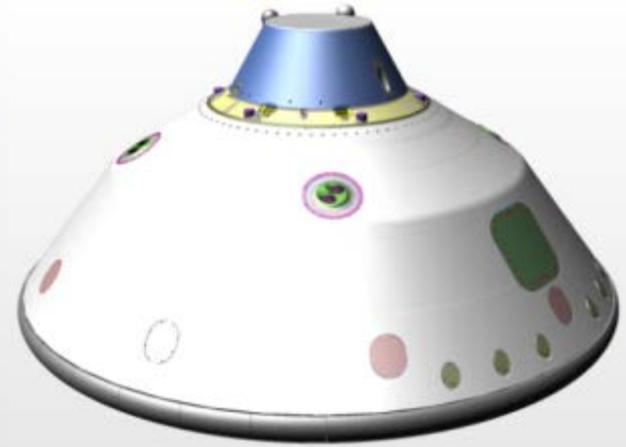
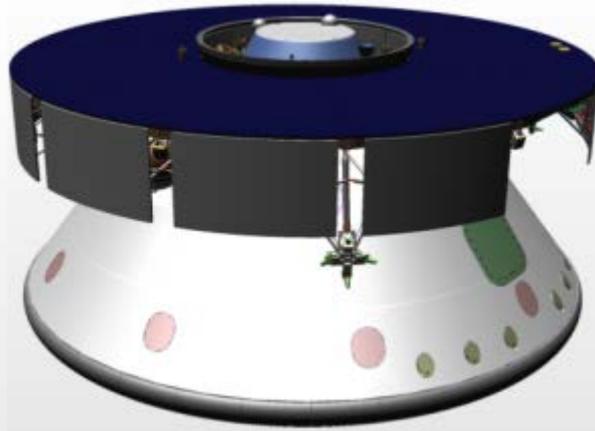
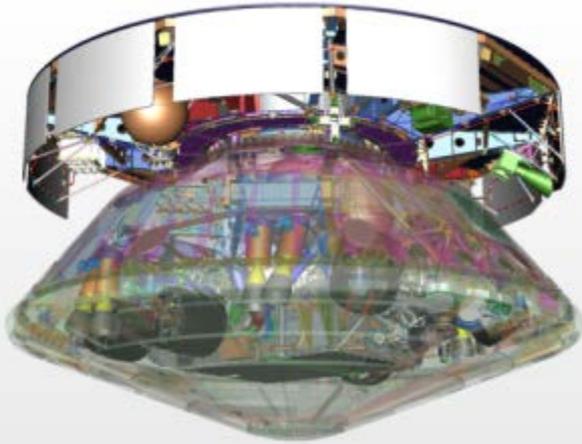
JPL's PLM Architecture





- 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







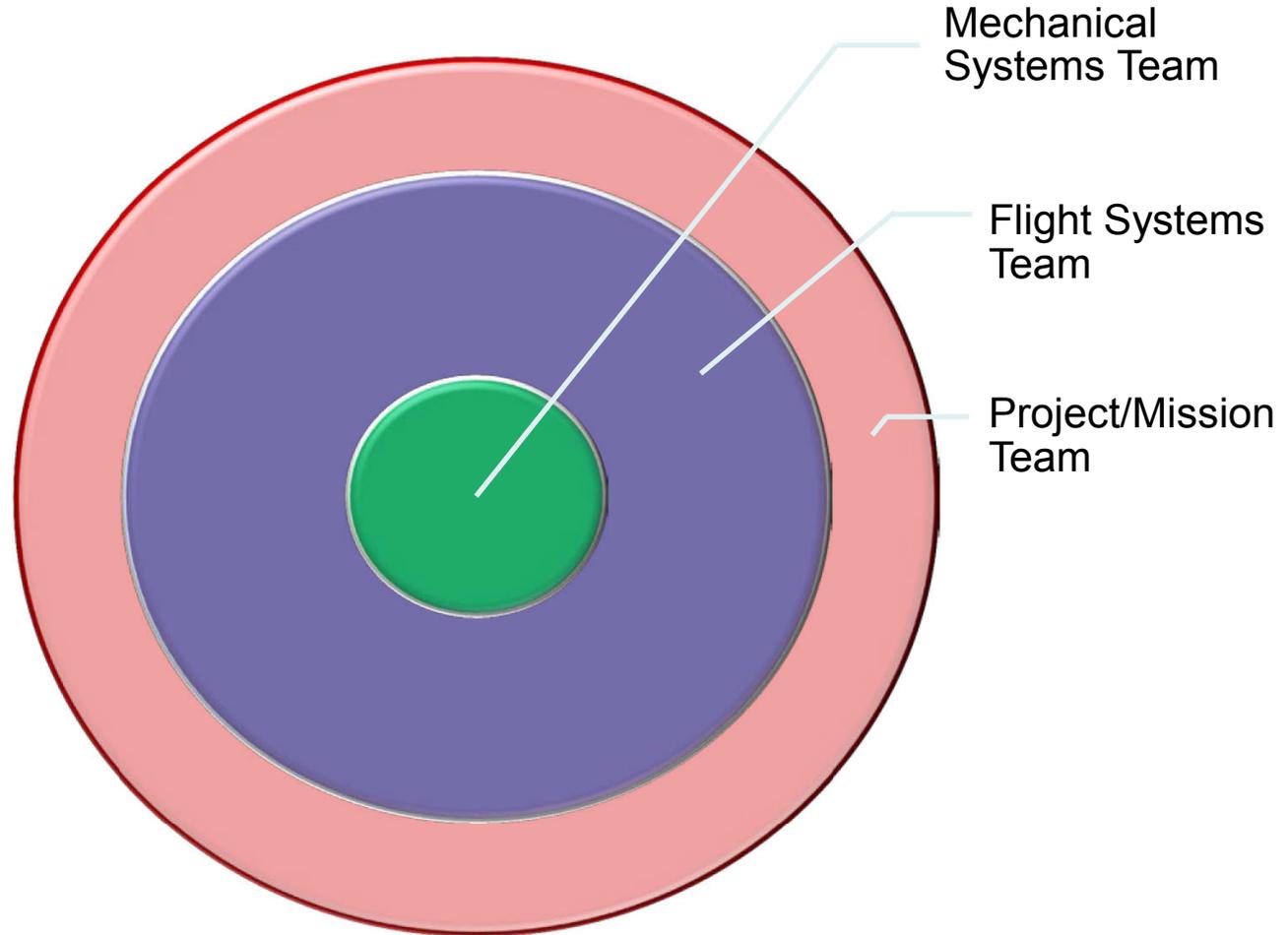
•Challenges

- Need concurrent engineering approach to meet more aggressive schedule and leaner budgets
- Multiple disciplines needing concurrent information
- Multiple tools generating information
- Processes in flux/development 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

- Mechanical Systems creates/authors & uses, the spacecraft mechanical PLM data and JT files. JT files contain BOM and geometry.

- Flight Systems consumes Mechanical Systems PLM data and JT files.

- Project/Mission also consumes Mechanical Systems PLM data and JT files. Includes external partners.





MSL PLM Teamcenter Community (TCC) Overview

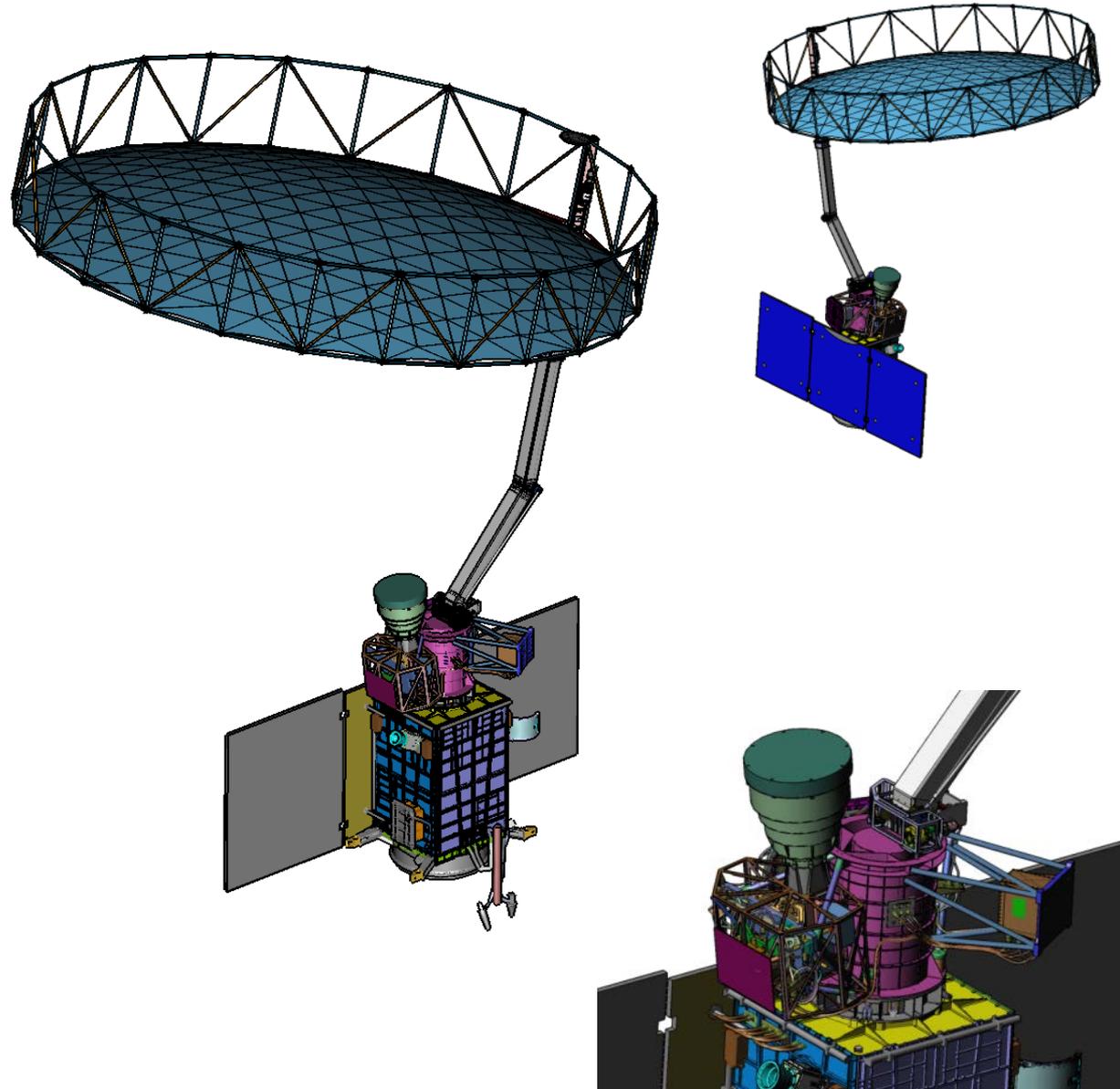


- TCC is a great source for collaboration of Work-In-Progress (WIP) data
- TCC was used to serve WIP JT files
- Early on (up to ~phase B), the I-Series JT viewer was used to view JT files directly from TCC
- JT assembly files became too large to use I-Series, so Teamcenter Vis Profession was chosen to run locally and JT files were downloaded from TCC as needed
- JT's Created a permanent design baseline and history
- JT's Controlled proper distribution and disclosure of same design to multiple organizations (internal and external)

The screenshot displays the MSL Mechanical Systems Collaborative Web site. The page includes a navigation menu on the left with categories like Documents and Links, Home, Site Software, and Contact. The main content area features a central image of satellite components and a 'Home' section with a welcome message. Below this is a 'Drawing Practices Example List' table.

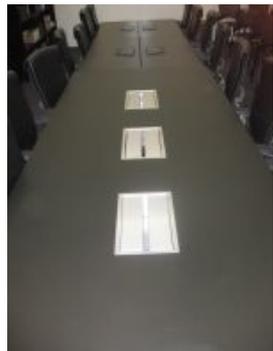
Created	Title	Doc Type of Entry	Doc Type of Entry	Created By	Created On
8/24/2008 10:40	MSL Level Map Drawing Template (Dr. Ed. Rev. 1)	Drawing Type	Assembly Drawing	8/24/2008 10:31	
8/11/2008 10:52	Inspection Drawing Example	Drawing Type	Inspection Drawing	8/11/2008 10:51	
2/8/2008 14:24	Dimension Drawing Notes and Specifications	Standard Note	Detail Drawing	2/6/2008 14:28	
1/11/2008 13:34	DRAGGING PARTS LIST	Standard Practice	AP Drawing	1/4/2008 15:42	
10/28/2007 10:02	Spacer Connector Drawing Example	Drawing Type	Spacer Connector Drawing	11/06/2007 10:04	
10/20/2007 11:05	Typical Fastener Item Drawing (Rev. 479)	Diagram	Drawing	11/20/2007 11:08	
10/12/2007 09:20	Particular Drawing Note Format	Standard Practice	AP Drawing	11/13/2007 11:11	
10/12/2007 11:12	Drawing Sheet Layout	Standard Practice	AP Drawing	10/13/2007 11:11	
10/10/2007 11:01	Tube Bending Drawings	Drawing Type	Tube Bending Drawing	10/10/2007 10:57	
10/10/2007 11:04	Warning a High Temperature Operation Note, Product Utilize Hardware	Standard Note	Detail Drawing	10/11/2007 10:11	
10/10/2007 11:07	Warning a High Temperature Operation Note, Item Hardware Utilize Hardware	Standard Note	Detail Drawing	10/10/2007 11:06	
10/10/2007 11:07	Operation Note, Dimension	Drawing Format	All Drawings	11/6/2007 10:11	
10/10/2007 10:28	Surface Finish Symbol Part Alignment	Drawing Format	Detail Drawing	10/10/2007 10:29	
8/24/2007 10:37	United Dimension Drawing Note 1, Tolerances	Standard Note	United Dimension	10/10/2007 11:12	
8/24/2007 10:37	United Dimension Drawing Note 1	Standard Note	United Dimension	10/10/2007 11:10	

- SMAP* project (medium scale) serves WIP JT files from an official project controlled vault of WIP data called Docushare



*The SMAP mission has not been formally approved by NASA. The decision to proceed with the mission will not occur until the completion of the National Environmental Policy Act (NEPA) process. Material in this document related to SMAP is for information purposes only

- 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 (visual navigation road map to all project data)
 - HD3D
 - Product Template Studio (PTS)
 - Active Workspace helping to navigate enterprise silos of data
- Have developed a Mechanical Design Center (MDC) facility to accommodate above technology



WCA





- Resources becoming more challenging
 - Funding harder to acquire
 - Schedules reducing
 - Missions/Task more complicated
- More organizations across the enterprise are needing access to PLM data
- Innovation mandatory in order to compete
 - Must have innovative tools, processes, and people
- JT is a good vehicle to serve as a central, visual, physical road map to an enterprises PLM and ERP data