8TH BRIEFING FOR INDUSTRY

Threads of Mission Success

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Explore *the* Possibilities

A JPL Project Manager Has Many Threads to Work With

- NASA/JPL Interaction & Communications
- NASA/JPL Institutional Requirements
- Planning
- Mission/System Reqts/Design/Implement
- Science Interaction
- Technical Division/Section Interaction
- Financial
- Assessment, Review and Control
- US and Foreign Partner Interaction
- Verification & Validation
- Safety and Mission Assurance
- Independent Assessment, Review & Reporting

NASA/JPL Institutional Requirements

Prime Contract

Flight Project Practices

Rev. 5

Effective Date: 02/27/03

Design, Verification/Validation, and Operations Principles for Flight Systems (D-17868)

Revision 2

fective Date: 3/3/03

NASA Procedural Requirements

NPR: 7120.5C

Effective Date: March 21, 2005

Expiration Date: March 21, 2009

NASA Program and Project Management Processes Requirements

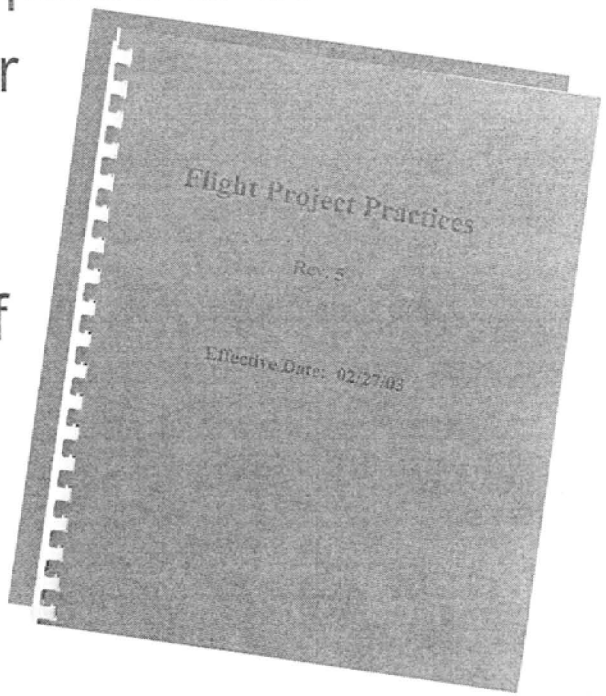
Responsible Office: Office of the Chief Engineer

Other NPR's and Handbooks

Explore *the* Possibilities

Flight Project Practices

- Applies to all projects, regardless of implementation mode
- Establishes standards of uniformity
- Specifies what projects are required to do
- Projects meet requirements, or get approval for deviation/exception
- Communicates the JPL way of doing business, both internally and to sponsors
- Provides for projects the JPL implementation of 7120.5



Explore the Possibilities

Flight Project Practices, Rev. 5 Content

Note: Sections 1-4 are Applicability, Purpose, Implementation and Approval/ Change Authority

Section 5 Management Practices

5.1 Life Cycle
5.2 Planning
5.3 Science
5.4 Project Organization
5.5 Work Breakdown Structure
5.6 NEPA Compliance & Launch Application
5.7 Spares, Testbeds, and Models
5.8 Make-or-Buy Decisions
5.9 Scheduling, Cost Estimating, etc.
5.10 Information, Data Mgmt and Archiving
5.11 Level 1 Descope Planning
5.12 Project Staffing & Destaffing
5.13 Acquisition
5.14 Project/Institutional Reporting
5.15 Reviews
5.16 Risk Management
5.17 Waivers
5.18 Crisis Response
5.19 Science Data Management
5.20 Ext Comm & Public Engmnt
5.21 Lessons Learned
5.22 Margins & Margin Mgt
5.24 ITAR

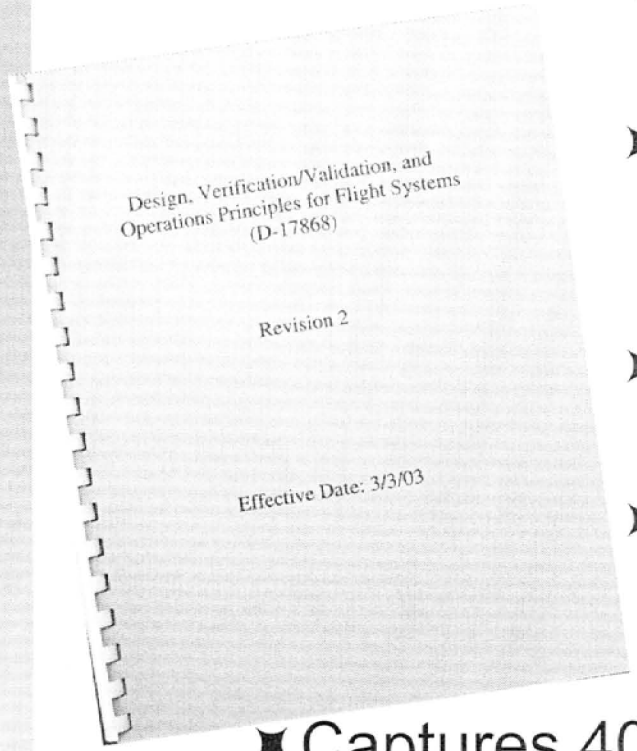
Section 6 Engineering Practices

6.1 Mission Design
6.2 Telecommunications Design
6.3 Mission Operations
6.4 System Engineering
6.5 L/V and Launch Operations
6.6 Inheritance
6.7 Planetary Protection
6.8 Flt Sys Fault Tolerance/ Redundancy
6.9 Flight Hardware Logistics
6.10 Materials, Processes, and Contamination Control
6.11 Software Development
6.12 Design & Verification for Environmental Compatibility
6.13 System Level Functional V&V
6.14 Configuration Management
6.15 Orbital Debris
6.16 Hardware Development
6.17 Mission Ops System Development

Section 7 Safety & Mission Assurance Practices

7.1 Mission Assurance Management
7.2 Reliability Engineering
7.3 Quality Assurance
7.4 Software IV&V
7.5 Electronic Parts Reliability, Application and Acquisition
7.6 Problem Reporting
7.7 Mission Operations Assurance

Design Principles

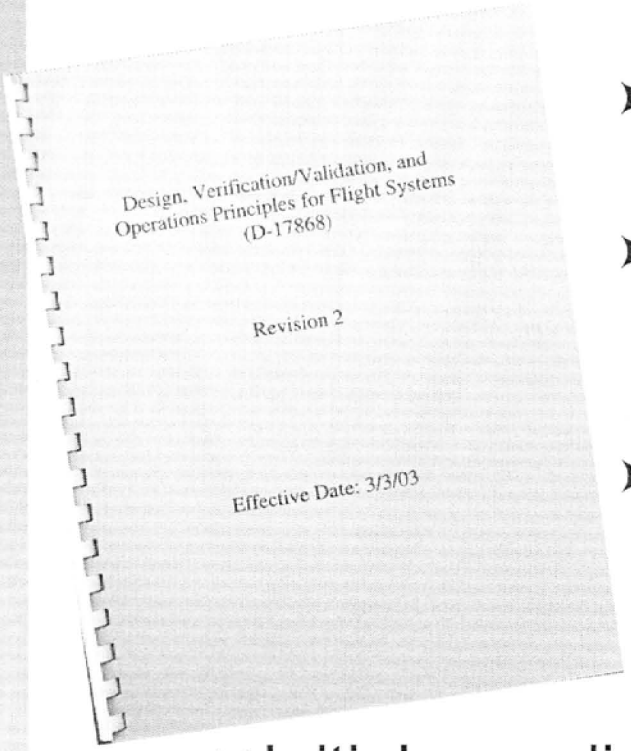

Design, Verification/Validation, and Operations Principles for Flight Systems (D-17868)

Revision 2

Effective Date: 3/3/03

- Applies to all flight designs, whether implemented in-house or at a subcontractor
- Specifies essential attributes of JPL flight designs
- Projects meet requirements, or get approval for deviation/ exception
- Captures 40+ years of lessons learned
- Establishes robust design margins for high reliability
- Defines ample margins for management of development risk

Design Principles, continued


Design, Verification/Validation, and Operations Principles for Flight Systems (D-17868)

Revision 2

Effective Date: 3/3/03

- Defines a level of risk acceptable to management
- Engages management in dialog, when deviations are taken, of the risks being accepted
- Prevents management from being surprised by unacceptable risk at a time when it is too late to change the outcome
- Initial compliance assessment is via the DP Compliance Matrix
- Compliance verification process
- Deviations/Exceptions process
- Design principles

Explore the Possibilities

Design Principles, Rev. 2 Content

Section 3 Mission Design

Section 4 Flight System Design

4.1 General
4.2 Mechanical Configuration/Systems
4.3 Power/Pyrotechnics
4.4 Information System
4.5 Telecommunications System
4.6 Guidance, Navigation & Control
4.7 Propulsion System
4.8 System Thermal
4.9 System Fault Protection
4.10 System EMC/EMI
4.11 Flight Software System
4.12 Flight Hardware System

Section 5 Software

Section 6 Managed Margins

6.1 Project Programmatic Resource Margins
6.1.1 Budget Reserve
6.1.2 Schedule Margin
6.2 Mission Design Resource Margins
6.2.1 Propellant
6.3 Flight System Development Resource Margins
6.3.1 General
6.3.2 System Mass
6.3.3 System Power
6.3.4 System Energy
6.3.5 Flight Software Margins
6.3.6 Power/Pyro System Margins
6.3.7 Telecom System Margins
6.3.8 Flight Hardware Margins

Section 7 Flight Sequence Design

Section 8 Flight System V&V Design

8.1 General
8.1.1 Min Op Times for Electronics
8.1.2 Handling & Test Constraints
8.2 Pre-delivery Verification
8.2.1 Subsystem and Assembly Level
8.2.2 Early Interface Testing
8.2.3 System Level
8.3 System Assembly, Integration & Test
8.3.1 System Assembly
8.3.2 System Integration
8.3.3 System Functional Verification
8.3.4 Flight Sequence Verification
8.3.5 System Fault Protection Verification
8.3.6 System Stress Testing
8.3.7 System Environmental Verification
8.3.8 Inter-system Verification
8.4 Launch Operations
8.4.1 Pre-mate Verification
8.4.2 Post-mate Verification

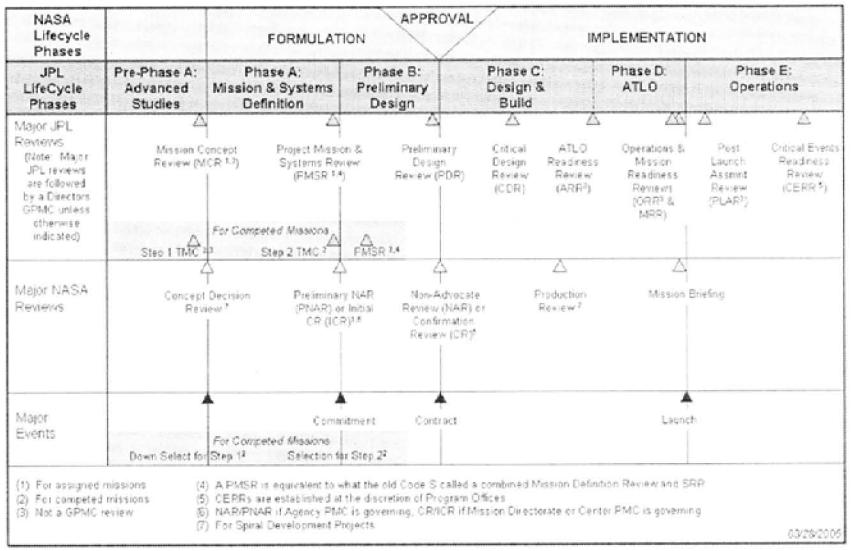
Section 9 Flt System Flight Ops Design

Note: Sections 1 and 2 are Applicability and Introduction

Explore the Possibilities

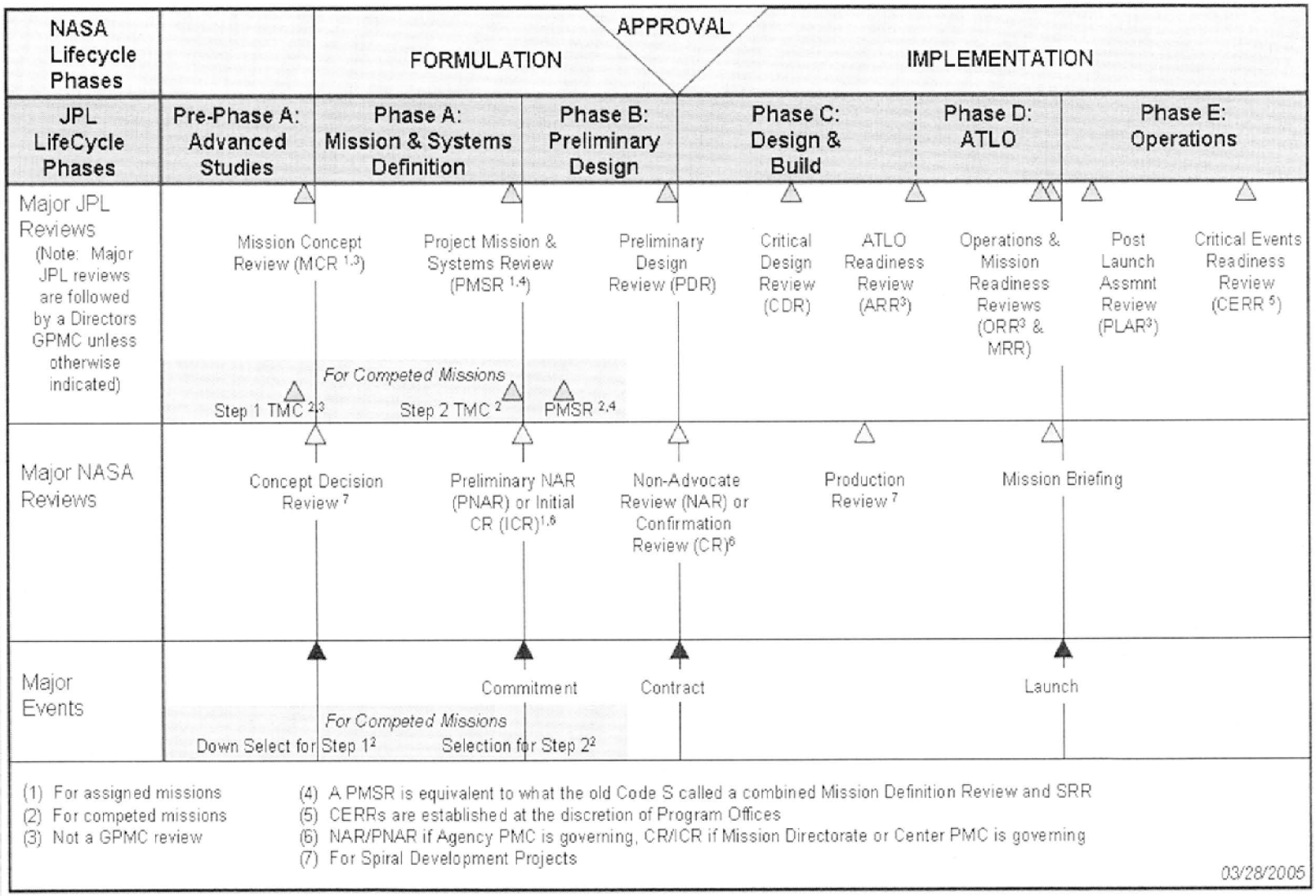
Planning

- JPL Project Lifecycle
  - Phase Transitions
- Gate Products
- Organization
- Standard WBS
- Integrated Scheduling
- Project Plan and PIP
- Acquisition Strategies
- Contingencies
  - Margins, Reserves, Options, Descopes
- JPL Institutional Support
  - Project Support Team, Templates,
  - PSO Website, Costing Office, Scheduling Section…..



Explore the Possibilities

JPL LifeCycle Phases
(Enlarged)



Questions?