

NPR 7120.5D ***High Level Overview***

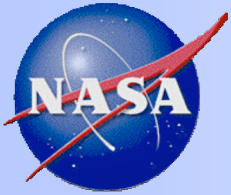
Governance

Program/Project Management

Technical Authority

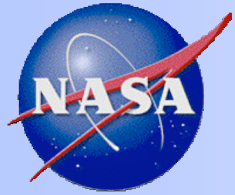
Waiver Principles

Dissenting Opinions



Big Picture

- NASA's mission is to **pioneer the future** in space exploration, scientific discovery, and aeronautics research.
- NASA employs a strategic management approach requiring all organizations to manage requirements, schedule, and budget according to a **program/project management method** built on NASA's **Governance Model** and NASA's **Core Values and Guiding Principles**.
- For **Space Flight Systems** this involves adherence to **NPR 7120.5D** (Program and Project Management) which invokes **NPR 7123** (Systems Engineering).

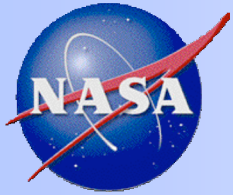


NASA Programs/Projects **Foundation**

The **NASA Governance Model** defined by (NASA Policy Directive **NPD 1000.0**, *NASA Strategic Management and Governance Handbook*)

- Separates Programmatic and Institutional Authorities
- Describes Governing Councils
- Articulates Strategic Management Principles
- Establishes Technical Authority





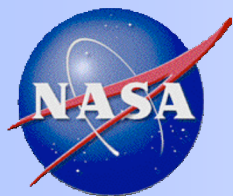
Governance Model ***Core Values***

Safety

Teamwork

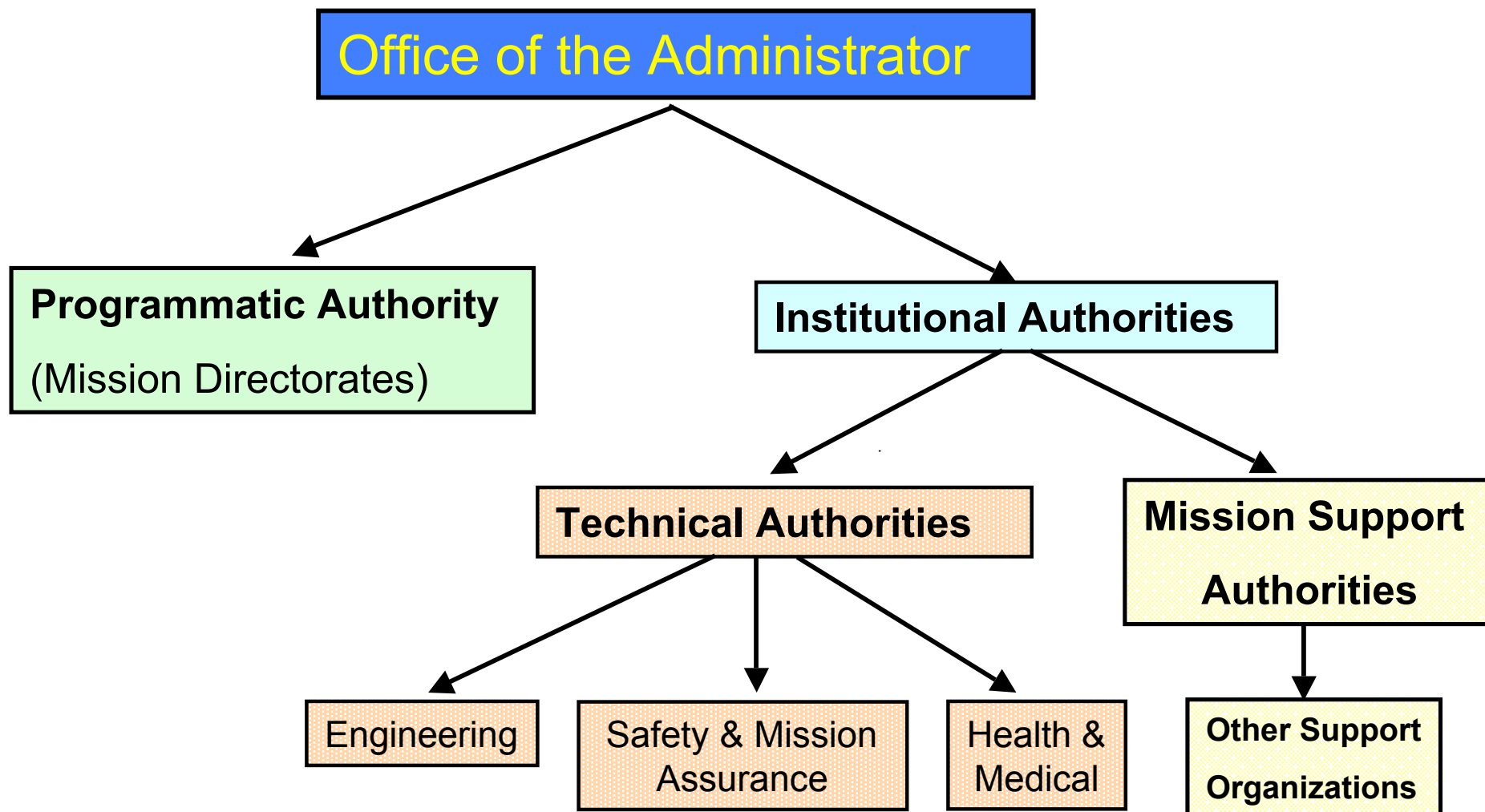
Integrity

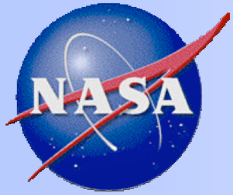
Mission Success



Governance Model

Separation of Authorities





Governance Model

Strategic Management Principles

Lean Governance

Responsibility and Decision-Making

Sensible Competition

Balance of Power

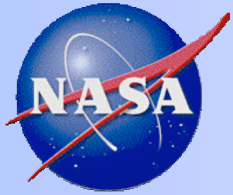
Checks and Balances

Integrated Financial Management

Strategic Management of Capital Assets

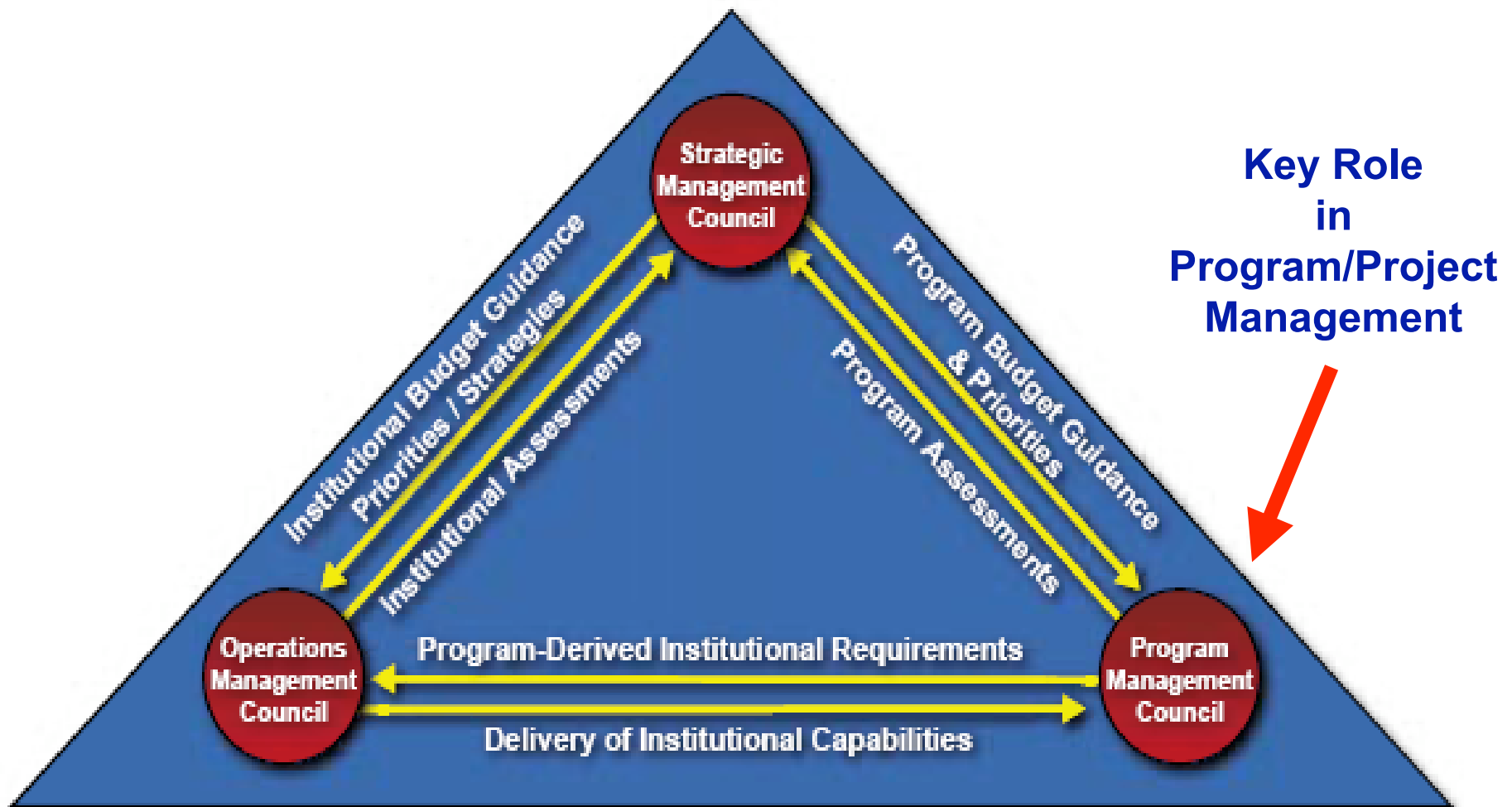
Strategic Management of Human Capital

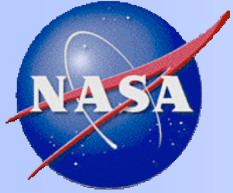
Principles in **red** are particularly important to program project management.



Governance Model Councils

Three governing councils - Lean Governance

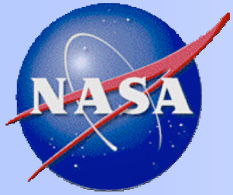




Governance Model

Key Checks and Balances

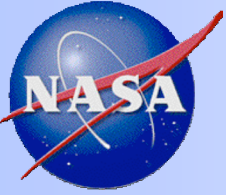
- **Technical Authority**
- **Dissenting Opinions**
- **Requirements Changes and Waiver Principles**
- **Independent Life Cycle Review Process**



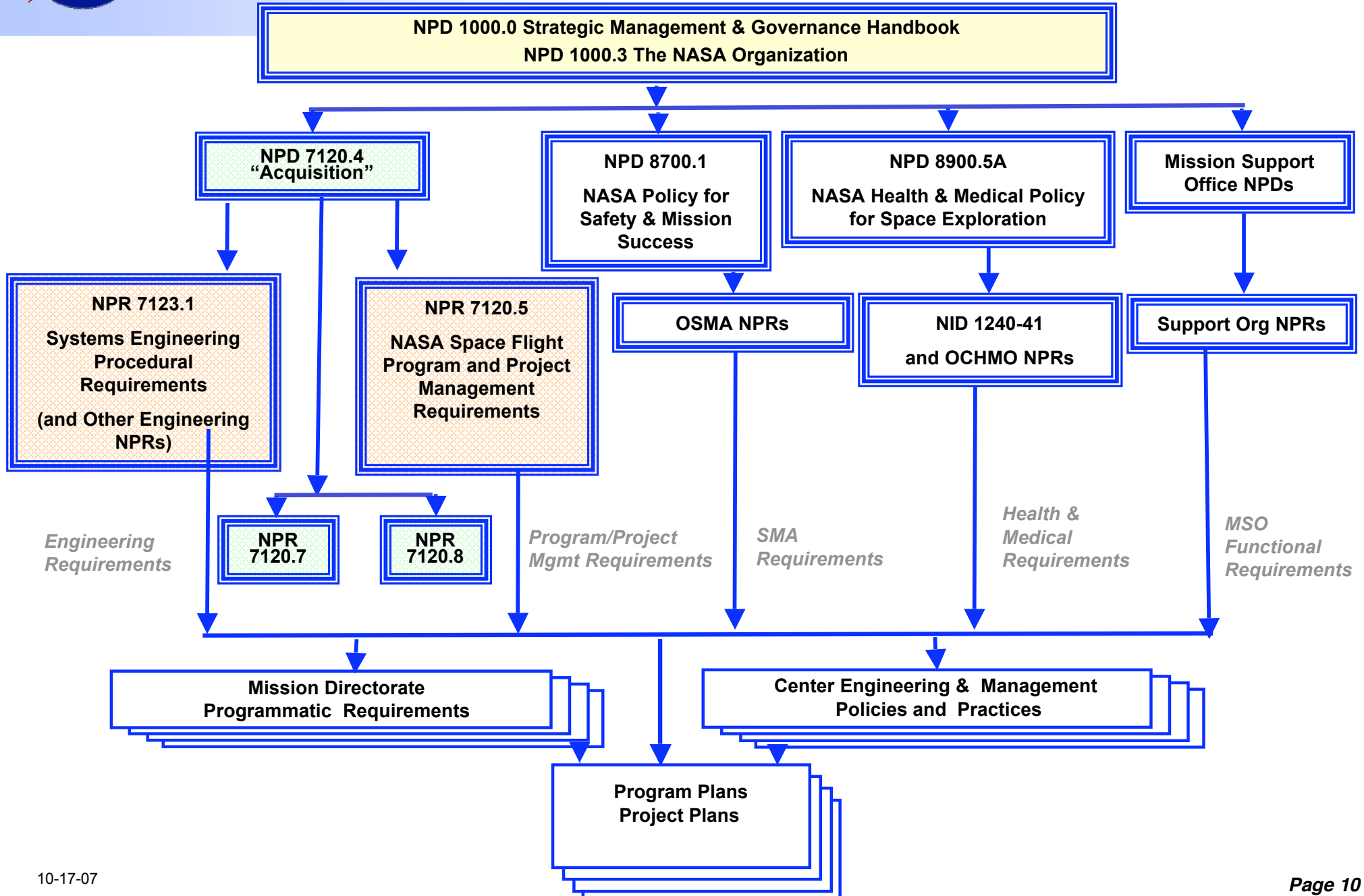
Governance Model ***Punch Line***

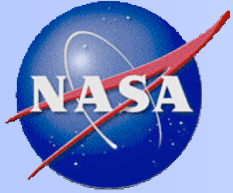
**A comprehensive, self-consistent
management system**

It all fits together.



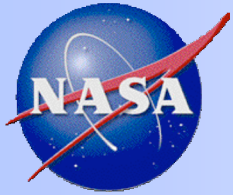
Realignment of Governing Documents





NPR 7120.5D

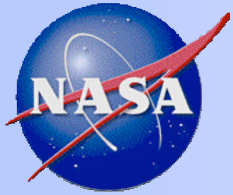
- **Purpose of rewrite**
- **Participants**
- **Applicability**
- **Key themes and requirements**
- **Benefits and challenges**



Purpose of Rewrite

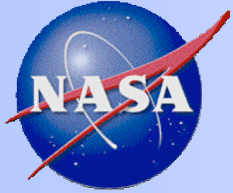
- Focus on **space flight** programs and projects
- Incorporate the **Governance Model**
- **Clarify life cycles** and key decision points
- **Clarify responsibilities**
- **Formalize** Technical Authority, Dissenting Opinion Resolution, and Waiver **processes**
- **Streamline** the document

NPR 7120.5D retains the fundamental best practices for Program and Project Management.



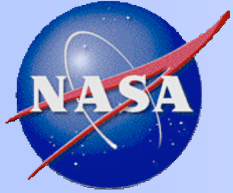
Participants

- NPR 7120.5D was **produced by an Agency-wide team:**
 - All Mission Directorates
 - All Centers
 - Mission Support Offices (e.g., Chief Engineer, PA&E, OSMA, Procurement)
 - Experienced space flight program and project practitioners
- **Focused on concepts first, document second**
 - Team agreed on the life cycle, products, reviews, and decision points prior to writing text
- Team **“operated in the sunshine”** and received key support across NASA
 - Dispositioned 1400 comments from Agency-wide team
 - Dispositioned additional comments (370) received NASA-wide from formal NODIS review process



Document Structure

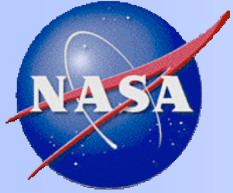
- Chapter 1: **Background** and overview of NASA Management Structure
- Chapter 2: **Life cycles** for space flight programs and projects
- Chapter 3: **Roles and responsibilities** of program/project team members and their interrelationships
- Chapter 4: **Management requirements** on programs and projects by life cycle phase
 - Specifies the gate products required to transition between phases
- **Appendices:**
 - A & B: Definitions and Acronyms
 - C – G: Templates for Management Documents
 - H & I: References and Index



Document Compliance

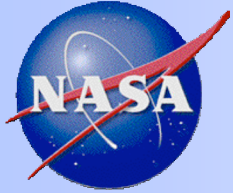
- Chapters 2 and 3 are **written as NASA policy** describing how NASA does program/project work.
- Chapter 4 is **written using verifiable “shall” statements** that define the requirements that the program/project must meet.

Chapters 2, 3, 4, and the content of the templates located in the Appendices must be met to be in compliance with NPR 7120.5D

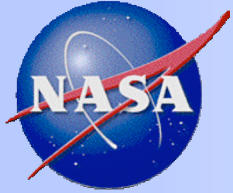


Applicability

- **All current and future NASA space flight programs and projects, including reimbursable space flight programs/projects performed for non-NASA sponsors**
- **NASA Headquarters and NASA Centers, including Component Facilities and the Jet Propulsion Laboratory, and contractors/service providers to the extent specified in their contracts with**
- **NASA Critical technical facilities specifically developed or significantly modified for space flight systems and ground systems that are in direct support of space flight operations**
- **An existing program/project's present phase as of the effective date of this NPR and to phases yet to be completed**



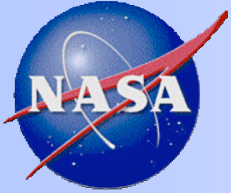
Key Themes and Requirements



4 Part Management Process

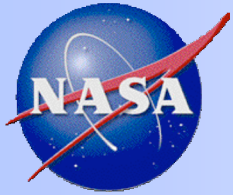
- **NPR 7120.5D builds on NASA's extensive experience in human and robotic space flight implementation.**
- **It retains the proven 4-part process for managing programs and projects.**
 - **Formulation**
 - **Approval (for Implementation)**
 - **Implementation**
 - **Evaluation**

NPR 7120.5D retains the fundamental best practices for Program and Project Management.



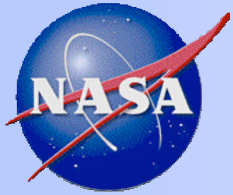
Strengthened Acquisition Process

- **Added early involvement by senior management**
 - **Acquisition Strategy Planning (ASP) meeting**
 - Ensures consistency with Vision, Strategic Plan, and Agency budget request
 - Assigns program/project to a Center
 - Directs major partnerships
 - **Acquisition Strategy Meeting (ASM), early in Formulation**
 - Reviews make-or-buy decisions
 - Approves acquisition strategy
- **Retained Procurement Strategy Meetings** prior to release of major RFPs/contracts
 - Complies with all FAR and NASA FAR requirements



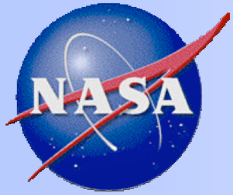
Program and Project Life Cycle

- Provides a **uniform life cycle** for human and robotic missions
 - Common process flow, uniform phases, and KDPs
 - Disciplined review structure for technical requirements and implementation plans
- **5 key elements** in execution of the life cycle:
 - Key Decision Points
 - Required independent reviews
 - Required life cycle gate products
 - CMC and GPMC role in life cycle process
 - Decision Authority role as gatekeeper

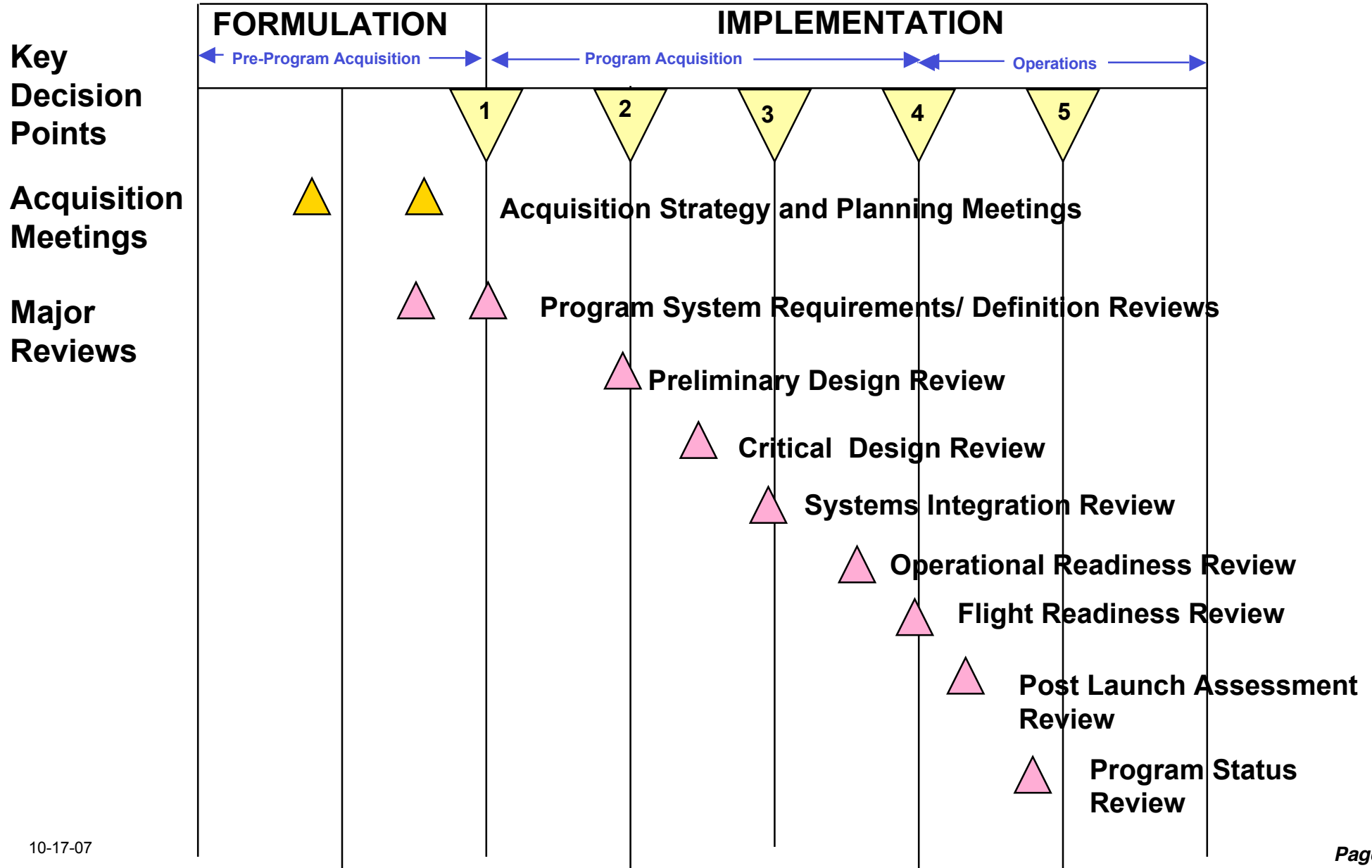


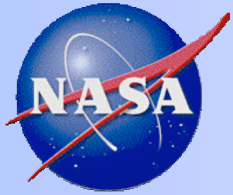
4 Types of Programs

- **Single-project programs (e.g., JWST)**
 - Long development and/or operational lifetimes, large investment of Agency resources in one program/project, and contributions to that program/project from multiple organizations/agencies.
- **Uncoupled programs (e.g., Discovery)**
 - Implemented under a broad scientific theme and/or a common program implementation concept.
- **Loosely coupled programs (e.g., Mars Exploration)**
 - Address specific scientific or exploration objectives through multiple space flight projects of varied scope.
- **Tightly coupled programs (e.g., Constellation)**
 - Multiple projects that execute portions of a mission or missions. No single project is capable of implementing a complete mission. Typically, multiple NASA Centers contribute to the program.



Program Life Cycle Simplified

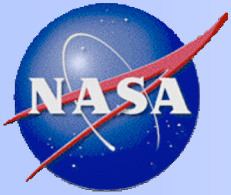




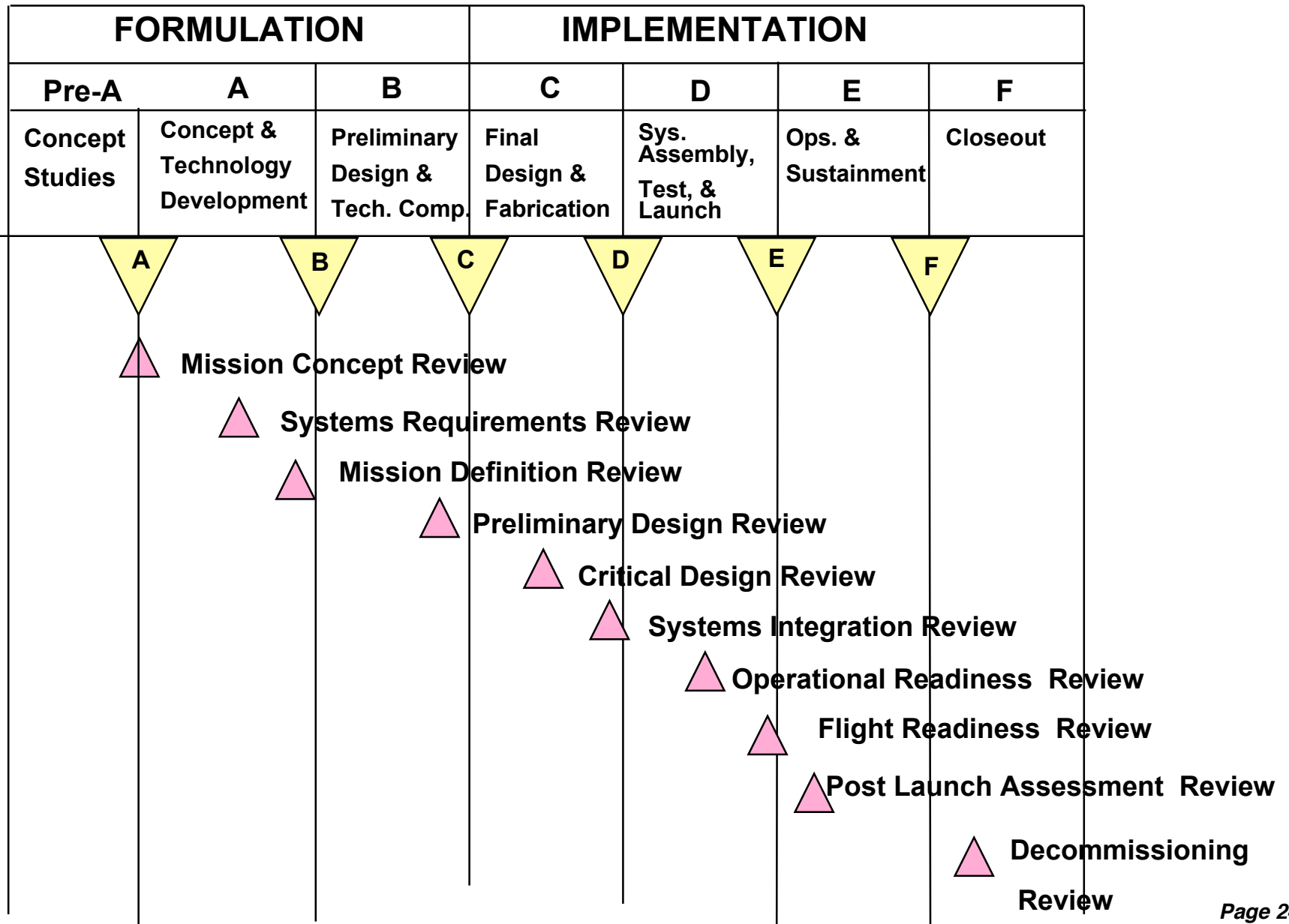
Project Categorization

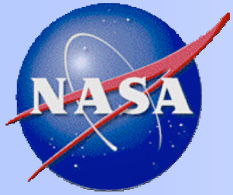
- **Category 1**
 - Nuclear power sources
 - Human space flight
 - Project life cycle cost (LCC) estimate greater than \$1B
- **Category 2**
 - LCC between \$250 M and \$1B
 - High priority projects with LCC < \$250M
- **Category 3**
 - Remaining projects
- **Note:**
 - MDAA may recommend other categorizations
 - AA approves all categorization

Projects vary in scope and complexity and thus require varying levels of requirements and oversight.



Project Life Cycle Simplified

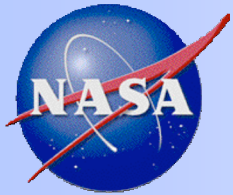




Independent Life Cycle Review Process

The review of programs and projects at each life cycle milestone by competent individuals who are not dependent on or affiliated with the program/project to objectively assess:

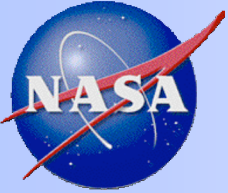
- The adequacy and credibility of the **technical approach** (including but not limited to: requirements, architecture, and design),
- **Schedule,**
- **Resources,**
- **Cost,**
- **Risk, and**
- **Management approach;**
- **Progress** against the Program/Project Plan;
- **Readiness** to proceed to the next phase; and
- **Compliance** with NPR 7120.5 and 7123.1 requirements.



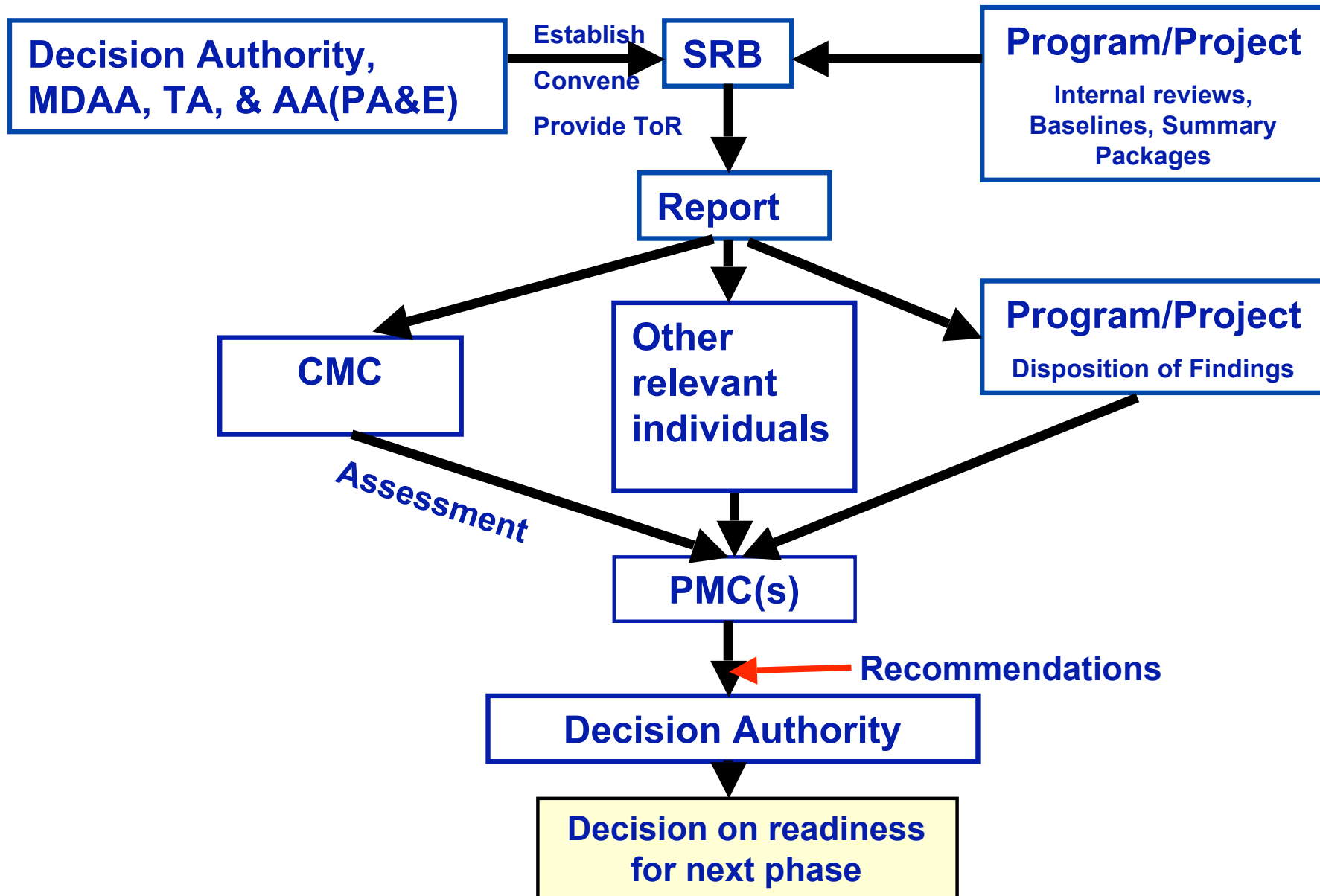
Why Have A Life Cycle Independent Review Process? (Cont.)

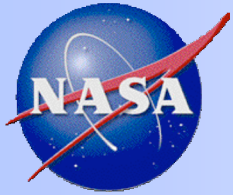
To provide:

- The **program/project** with a credible, objective assessment of how they are doing.
- **NASA senior management** with an understanding of whether
 - The program/project is on the right track,
 - Is performing according to plan, and
 - Externally-imposed impediments to the program/project's success are being removed.
- A **credible basis for a decision** to proceed into the next phase.
 - The independent review also provides additional assurance to external stakeholders that NASA's basis for proceeding is sound.



Independent Life Cycle Review Process



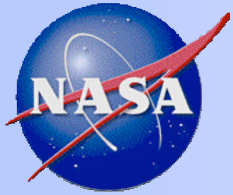


Independent Life Cycle Reviews (Cont.)

Standing Review Board (SRB)

- **Same core members** serve for the life of the program/project.
- Board members must be **independent** of the program/project, and the some members must be independent of the participating Centers.
- **Separate Center review board and IPAO IRT board are eliminated.**
- IPAO provides Review Manager and ICE resources to the SRB.

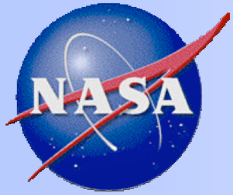
Efficient, disciplined approach to providing independent evaluations



Key Decision Points & Decision Authority

- **Key Decision Point (KDP) - Decision Authority** decides on the readiness for next phase of the life cycle
- **Decision Authority**
 - **NASA Associate Administrator** for Programs and Category 1 projects
 - **Mission Directorate Associate Administrator** for Category 2 and 3 projects

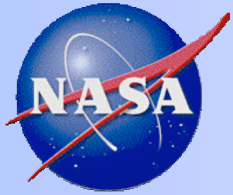
KDPs and the Decision Authority are defined throughout the life cycle.



Governing PMCs

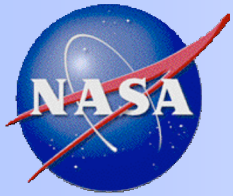
- **Agency PMC**
 - **Governs all programs and Category 1 projects**
- **Mission Directorate PMC**
 - **Evaluates all programs/projects executed within the Mission Directorate**
 - **Governs Category 2 and 3 projects**
 - **Provides recommendations to the Agency PMC for programs and Category 1 projects**

Ensures appropriate level of management oversight



Center Management Councils Technical Oversight

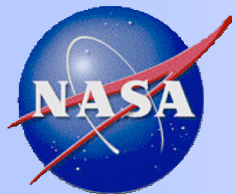
- Evaluate **All program and project work executed at that Center**
- Focus on whether Center's technical and management **policies and practices are being followed** and whether the Center's **resources support** program/project requirements
- Assess program and project **risk**
- Evaluate performance and provide findings and **recommendations to Program/Project Managers** and to the appropriate **PMCs**



What is Technical Authority?

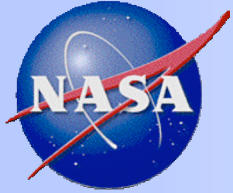
- **The technical authority process** provides a means of independent oversight of programs and projects through the selection of individuals at delegated levels of authority. These individuals are the **Technical Authorities.**

Three Technical Authorities: Engineering, Safety and Mission Assurance, and Health and Medical



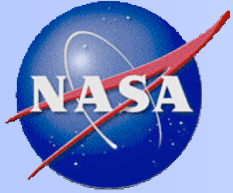
Technical Authority Fundamental Aspects

- **Delegated Technical Authority is formal and originates from the Administrator.**
- **Technical Authorities are funded independently of the program/project.**
- **The Program/Project Manager remains responsible for program/project the safe conduct and successful outcome in conformance with governing requirements.**



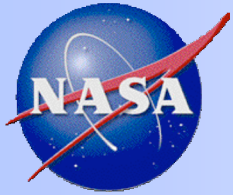
Technical Authority Responsibilities include:

- **Being the single point of contact at the program, project, or element level for Technical Authority matters at the level of delegated Technical Authority**
- **Approving changes to and waivers to all Technical Authority requirements**
- **Serving as members of program/project boards**
 - **Control boards, change boards, and internal review boards**



Waiver Fundamentals

- The **organizations** and the organizational levels that agreed to the establishment of a requirement must agree to the change or waiver of that requirement, unless this has been formally delegated elsewhere.
- The **next higher level** of programmatic authority and Technical Authority are **informed** in a timely manner of change requests or waivers that could affect that level.



Waiver Fundamentals

Requirements Types

- **Programmatic Requirements**

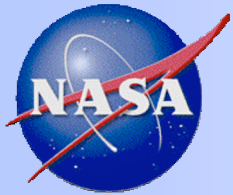
Focus on space flight products to be developed and delivered and specifically relate to the goals and objectives of a particular program or project. These requirements flow down from the Agency's strategic planning process. **(Responsibility of Programmatic Authority)**

- **Technical Authority Responsible Requirements**

Contained in Center and Agency Level documents

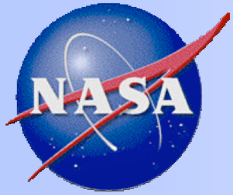
- **Derived Requirement**

Arise from constraints, consideration of issues implied but not explicitly stated in high-level direction provided by Center and Agency level requirements. **(Responsibility of Programmatic Authority)**



What is a Dissenting Opinion?

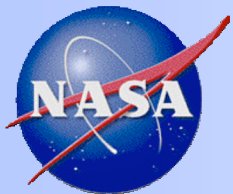
- A “Dissenting Opinion” **is** a **disagreement** with a decision or action that an individual judges is of **sufficient importance** that it warrants a specific review and decision by higher level management and the individual **specifically requests** that the dissent be recorded and resolved by the dissenting opinion process. (See NPR 7120.5D paragraph 3.3.)
- A “Dissenting Opinion” **is not** a difference of opinion that might be expressed in a manner such as “I would not do it that way if it were my decision”, or “I disagree with the proposed action, but I can live with it.”



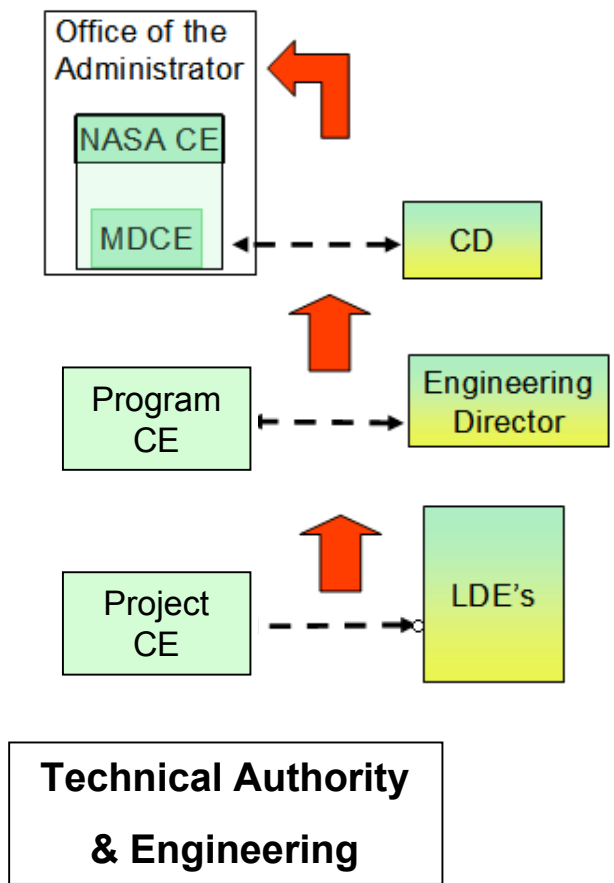
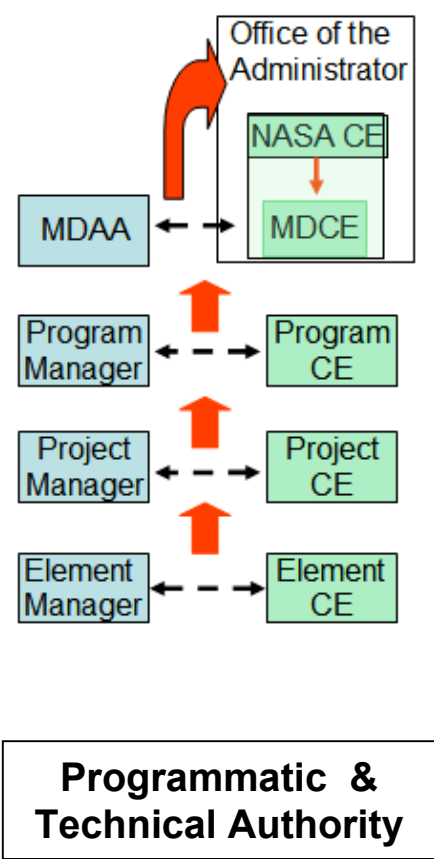
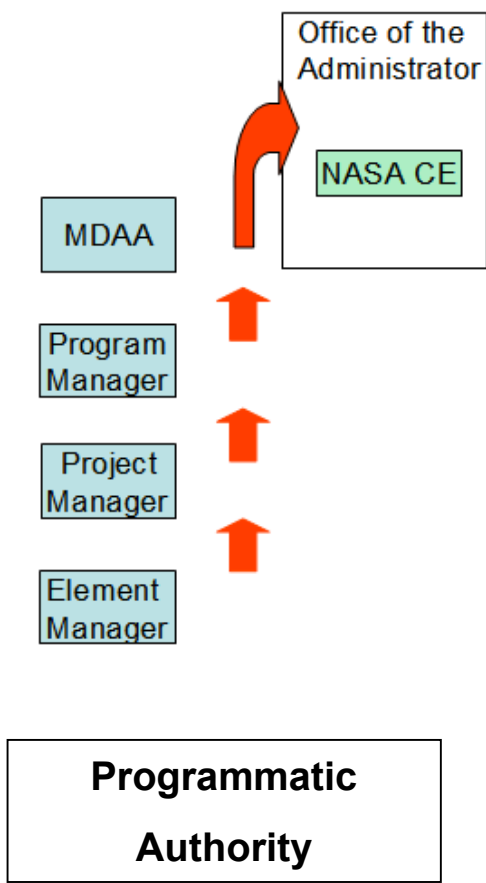
Dissenting Opinions Resolution Process

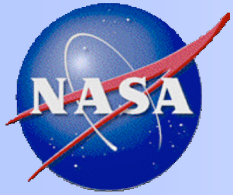
- Dissenting parties attempt resolution at their level.
- If no resolution, **jointly** attempt resolution at next level of management.
- If no resolution, continue the process at the next higher level of management, even to the NASA Administrator if necessary.

**A formal, recognized process for resolving
dissenting opinions**



High Level View Of Dissent Resolution Paths

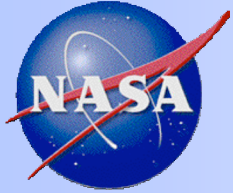




Program and Project Planning Templates

- **Formulation Authorization Document (FAD)**
- **Program Commitment Agreement (PCA)**
- **Program and Project Plans**, including sub-plans
 - *SAFETY AND MISSION ASSURANCE,*
 - *RISK MANAGEMENT,*
 - *ACQUISITION,*
 - *REVIEWS,*
 - *SCIENCE DATA MANAGEMENT,*
 - *EXPORT CONTROL,*
 - *EDUCATION AND PUBLIC OUTREACH, etc.*

Templates ensure uniformity across the Agency.

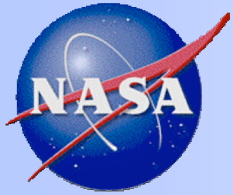


Further Information and Feedback

A web-based version of the requirements and processes in NPR 7120.5D will be available in early June 2007:

<https://polaris.nasa.gov/>

- **POLARIS will contain:**
 - **Searchable, sortable database of requirements**
 - **Interactive life cycle charts w/links to review descriptions, KDP gate products, templates and examples**
 - **Process information for Technical Authority, Reviews, Categorization, Management councils, Dissenting opinions, etc.**
 - **FAQs, related ASK articles, training materials**
 - **Source for feedback**
 - **and much more.....**



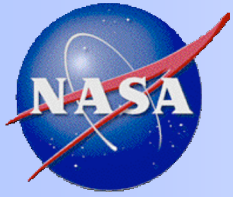
Conclusions

Benefits

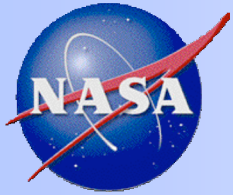
- Unifies management of programs and projects
- Clarifies the flow down of programmatic and management process requirements
- Clarifies accountability, roles and responsibilities of key personnel

• Challenges

- Providing training for institutional and project personnel
- Updating center-specific processes and practices to align with 7120.5D
- Developing a database to identify the lead Technical Authority and associated delegations of waiver approval authority



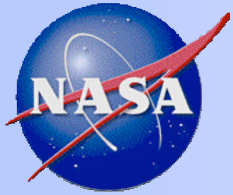
Backup



Programmatic Requirements Hierarchy

Direction	Content	Governing Document
Needs, Goals, Objectives (NGO's)	Agency strategic direction	Strategic Plan
Agency Requirements	Structure, relationships, principles governing design and evolution of cross-Agency NGO's	Architectural Control Documents (ACD)
MDAA Requirements	High-level requirements levied on a program including programmatic direction	Program Commitment Agreement (PCA)

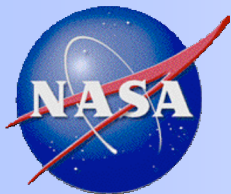
MDAA +Mission Directorate Associate Administrator



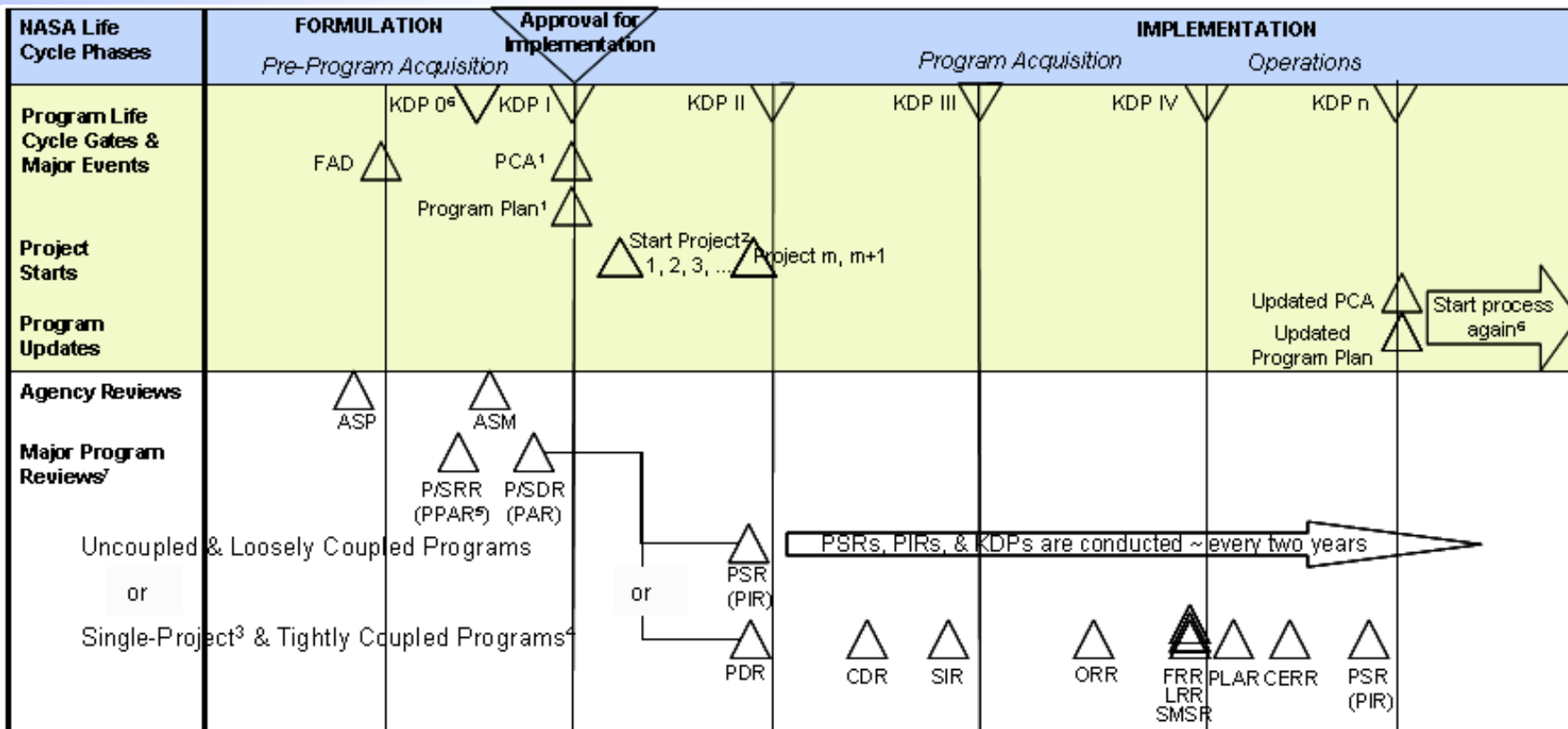
Programmatic Requirements Hierarchy (cont.)

Direction	Content	Governing Document
Program Requirements	Detailed requirements to implement the PCA and programmatic requirements levied from Program its projects	Program Plan
Project Requirements	Detailed requirements to implement the Program Plan and programmatic requirements levied from Program its projects	Project Plan
System Requirements	Detailed requirements allocated from project to lower levels of project	Systems Req. Doc.

Increased accountability and clarity in flowdown of programmatic requirements



Program Life Cycle



FOOTNOTES

1. PCA and Program Plans are baselined at KDP I and reviewed and updated, as required, to ensure program content, cost, and budget remain consistent.
2. Projects, in some instances, may be approved for formulation prior to KDP II. Initial project pre-formulation generally occurs during program formulation.
3. Single-project program reviews from PDR until operations are the same reviews as the project reviews (not duplicates). Single-project programs are approved at KDP II.
4. Tightly coupled program reviews generally differ from other program types because they are conducted to ensure the overall integration of all program elements (i.e., projects). Once in operations, PSRs/PIRs are conducted ~ every two years.
5. KDP 0 and the PPAR may be required by the Decision Authority to ensure major issues are understood and resolved prior to formal program approval at KDP I.
6. When programs require upgrades (e.g., new program capabilities), the life-cycle

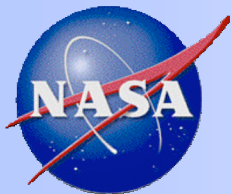
process will be restarted when directed by the AA, i.e., the program's upgrade will go through the same formulation and implementation steps as originally done.

7. These reviews are conducted by the program for the independent SRB (with the exception of the FRR and SMSR). See Section 2.5 and Table 2-5.

ACRONYMS

ASP—Acquisition Strategy Planning meeting
 ASM—Acquisition Strategy Meeting
 CDR—Critical Design Review
 CERR—Critical Events Readiness Review
 FAD—Formulation Authorization Document
 FRR—Flight Readiness Review
 KDP—Key Decision Point
 LRR—Launch Readiness Review
 ORR—Operational Readiness Review
 PAR—Program Approval Review

PCA—Program Commitment Agreement
 PDR—Preliminary Design Review
 PIR—Program Implementation Review
 PLAR—Post-Launch Assessment Review
 PPAR—Preliminary Program Approval Review
 P/SDR—Program/System Definition Review
 P/SRR—Program/System Requirements Review
 PSR—Program Status Review
 SIR—System Integration Review
 SRB—Standing Review Board
 SMSR—Safety and Mission Success Review



Project Life Cycle

