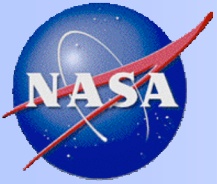


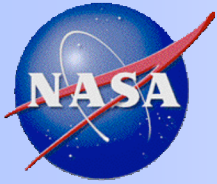


# ***High-Level Overview of NPR 7123.1A***

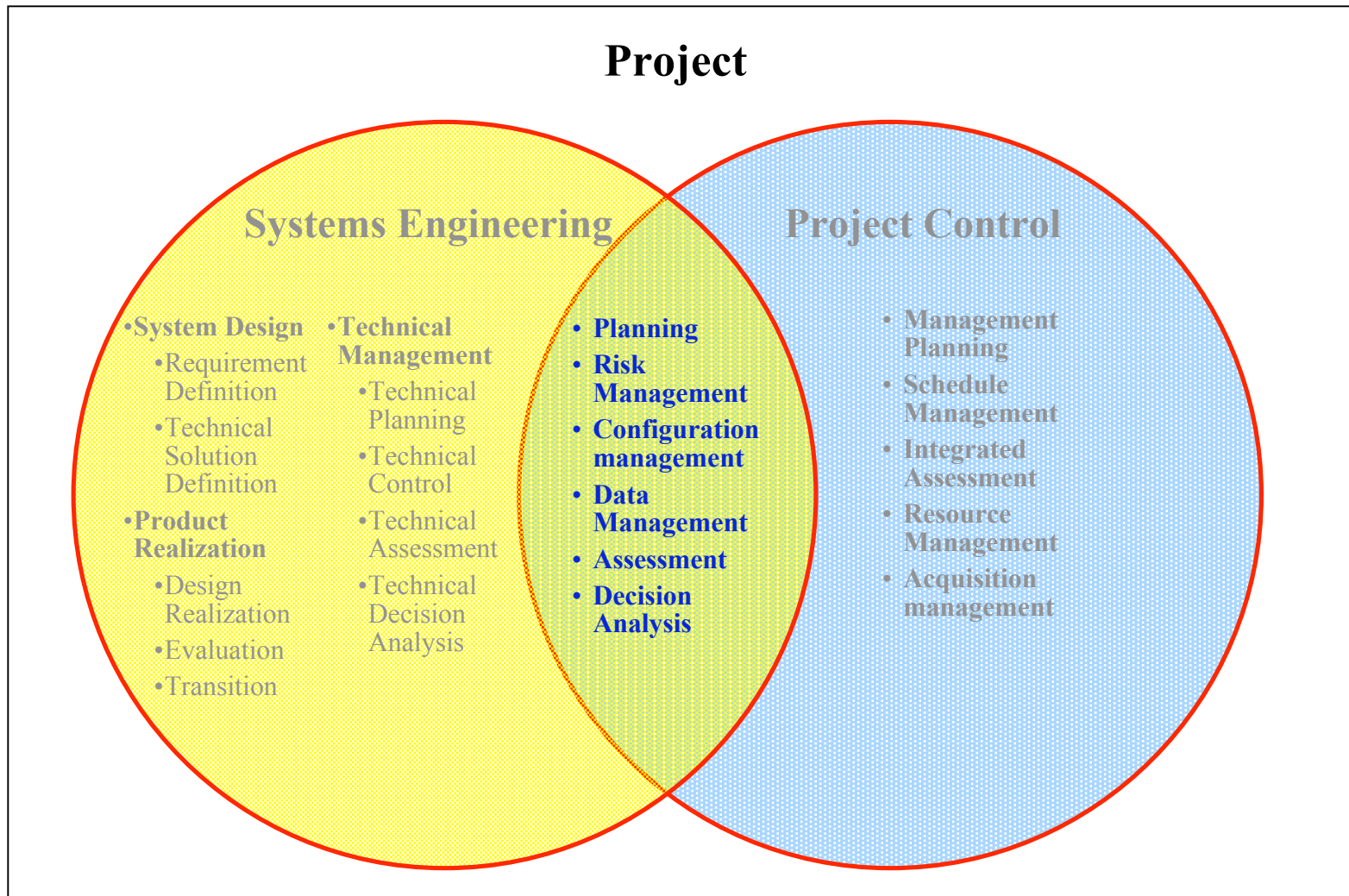


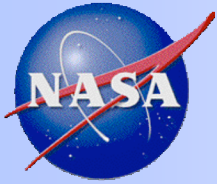
## ***Background***

- **NASA missions are becoming increasingly complex**
- **Many indications exist that support a need for consistent Agency SE Processes**
- **NPR 7123.1A's role is to articulate and establish requirements for performing, supporting, and evaluating systems engineering to ensure NASA products meet customer needs.**

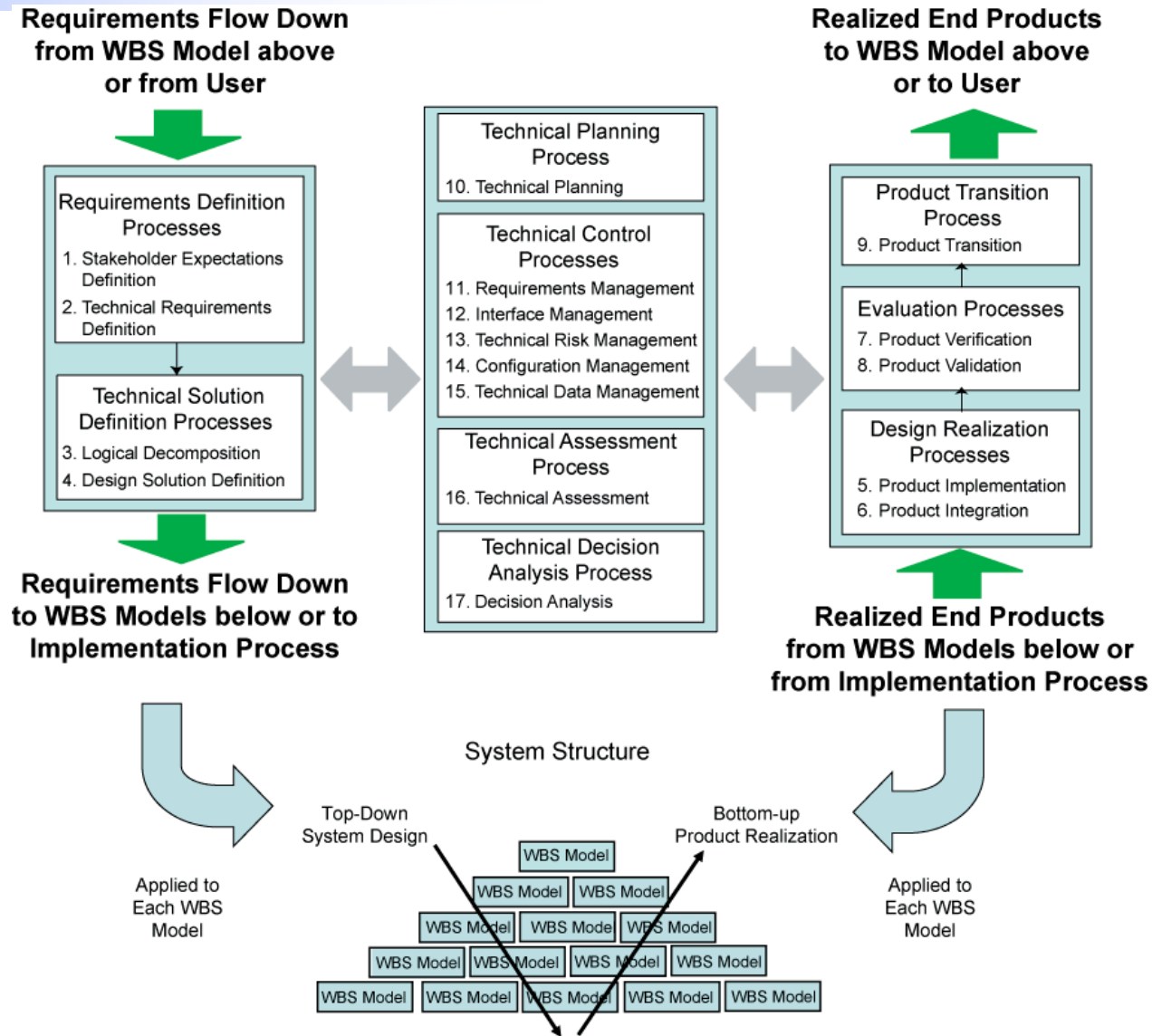


# Role of SE in context of PM

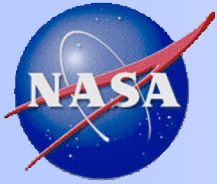




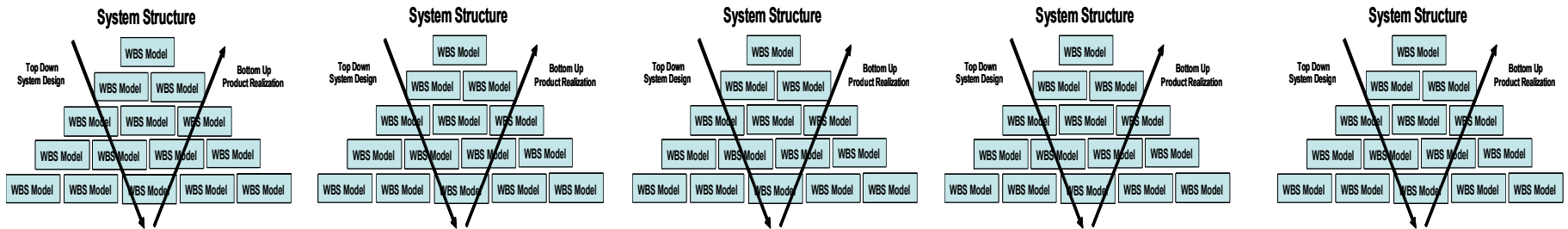
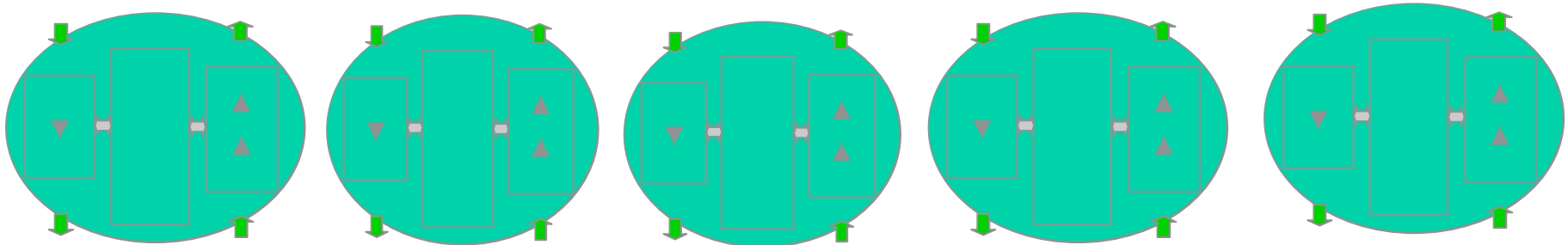
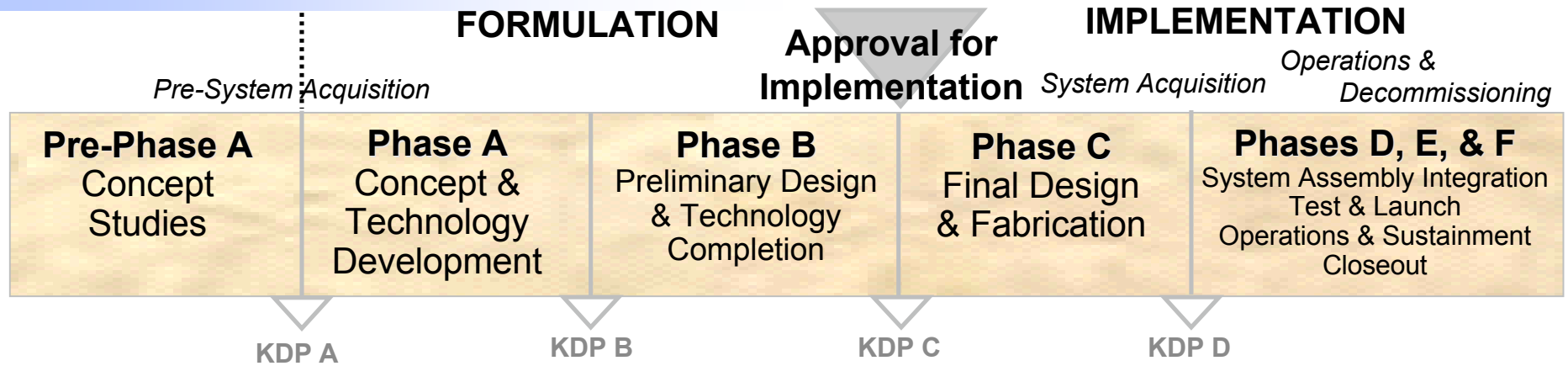
# Application of SE Processes

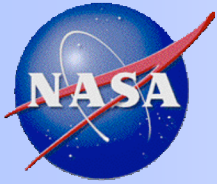


3.1 – Figure 3-2 Application of SE Engine Processes within System Structure

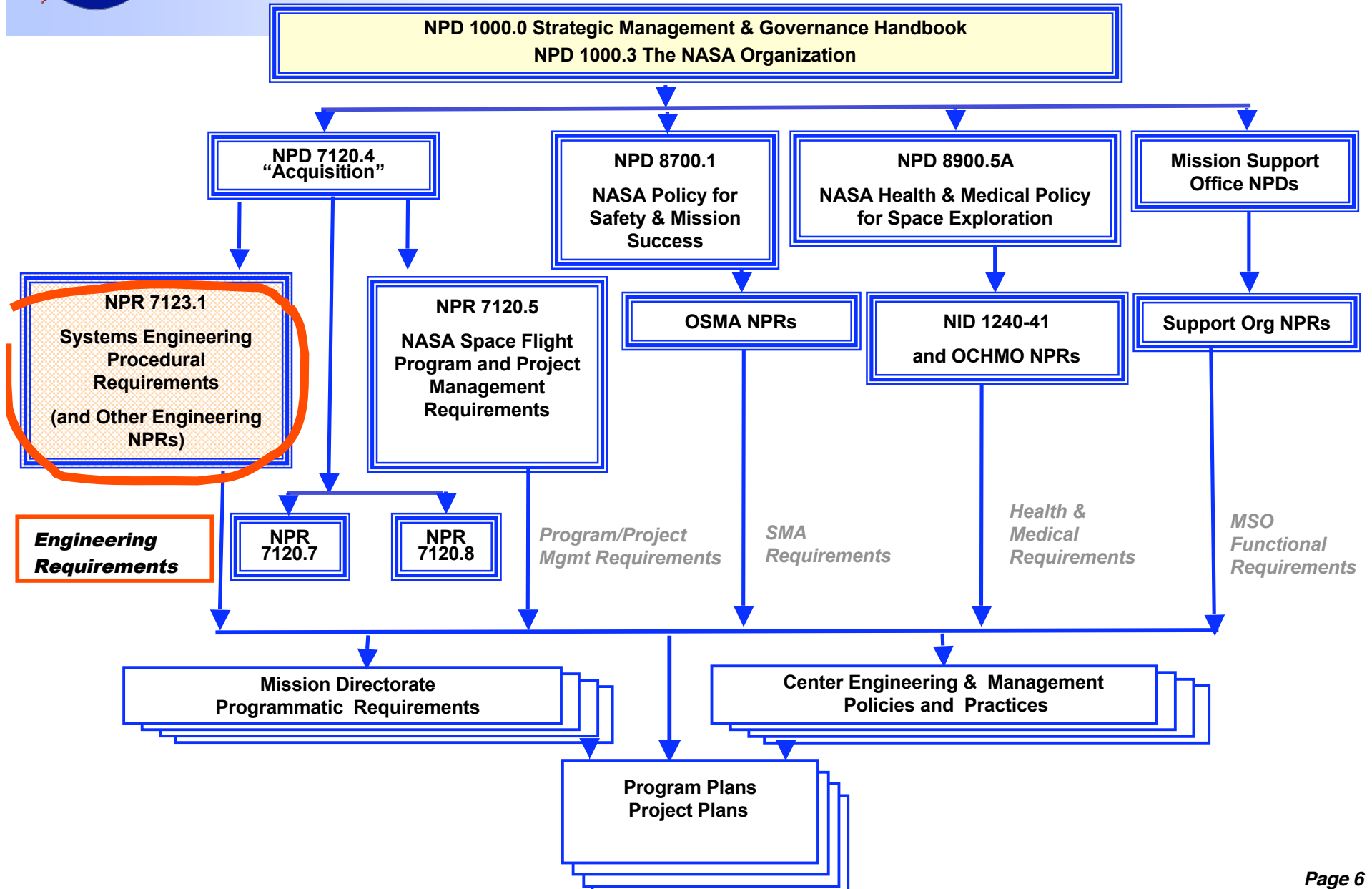


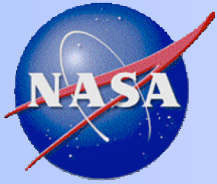
# NPR 7123.1A Used Throughout The Life Cycle





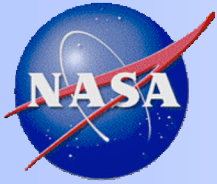
# Realignment of Governing Documents





# ***Applicability***

- **NASA Headquarters and NASA Centers, including component facilities and technical support centers. It also applies to the Jet Propulsion Laboratory to the extent specified in their contracts.**
- **Service contractors that use NASA processes in support of NASA**
- **All new programs and projects, as well as those in Formulation and Implementation as of the effective date of NPR 7123.1A**
- **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**
- **Does not apply to NASA contracts except as the NASA technical team flows down the systems engineering responsibilities to all members of the system team including contractors and subcontractors.**



# ***Document Structure***

## Chapters

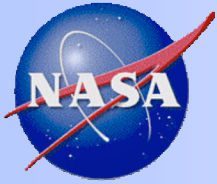
1. Introduction
2. Institutional & Programmatic Requirements
3. Requirements for Common Technical Processes
4. NASA Oversight Activities on Contracted Projects
5. Systems Engineering Technical Reviews
6. Systems Engineering Management Plan

## Appendices

- A. Definitions
- B. Acronyms
- C. Technical Management Processes
- D. Systems Engineering Management Plan
- E. Hierarchy of Related NASA Documents
- F. Tailoring
- G. Technical Review Entrance & Success Criteria
- H. Templates
- I. Additional Reading
- J. Index

**33 Pages (57 “Shall Statements”)**



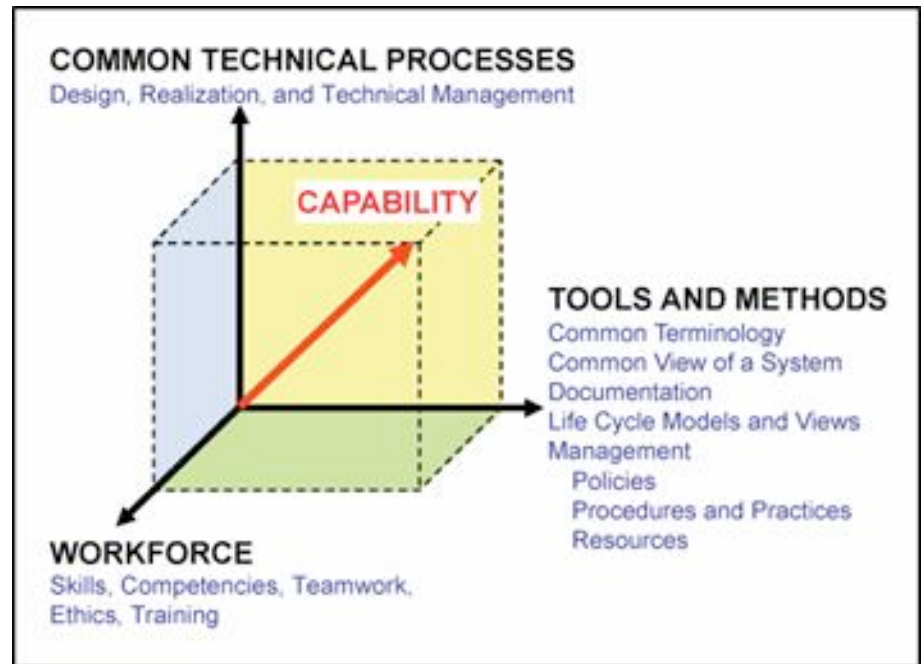


# Chapter 1

## Systems Engineering Framework

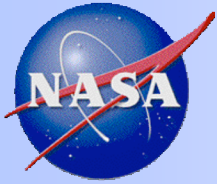
### Elements:

- 1: Technical Processes
- 2: Tools and Methods
- 3: Workforce



Chapter 1: Figure 1-1

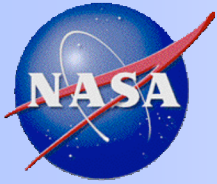
Elements provide an Agency-wide capability to perform successful Systems Engineering.



## **Chapter 2**

### **Roles and Responsibilities**

- The Headquarters Office of Chief Engineer maintains **policies** and ensures **compliance**.
- Center Directors develop applicable **Center policies, procedures and processes** and the SE Implementation Plan.
- **Technical Teams execute** the Center processes implementing NPR 7123.1A.



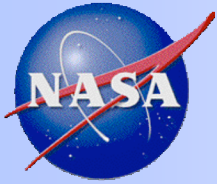
## **Chapter 2**

# **Systems Engineering Management Plan**

## **The SEMP**

**Identifies the roles and responsibility interfaces of the technical effort and how those interfaces will be managed.**

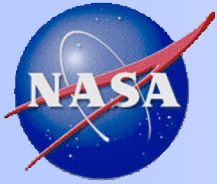
**Is the vehicle that documents and communicates the technical approach. This includes the application of the common technical processes, resources to be used, and key technical tasks, activities, and events along with their metrics and success criteria.**



## **Chapter 2**

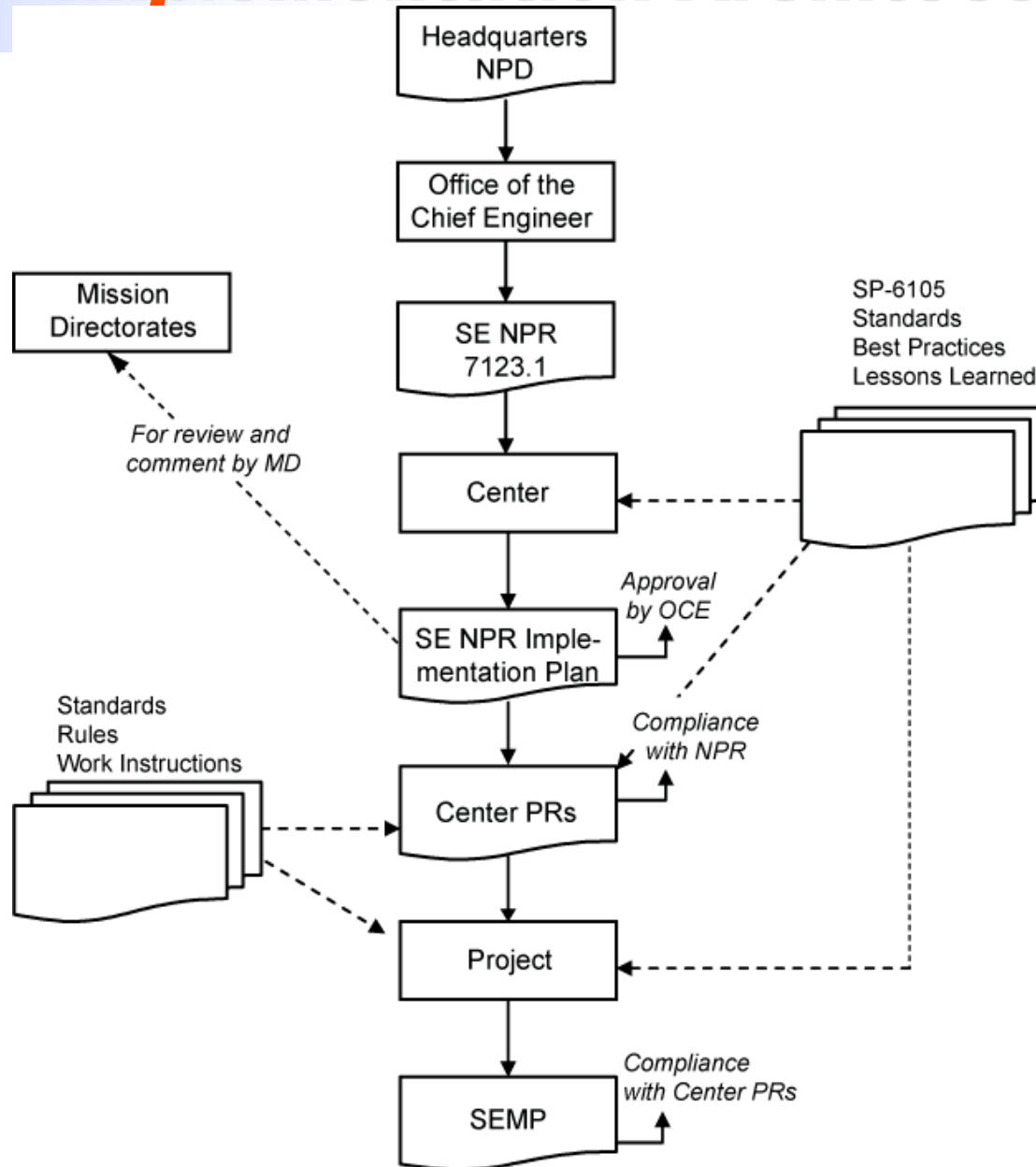
### **Roles and Responsibilities (Cont.)**

- **The Center Director or designee) is the Designated Governing Authority with responsibilities that include:**
  - **Evaluation of program or project technical content to ensure it meets key documents (e.g., the SEMP)**
  - **Approving tailoring of or waivers to NPR 7123.1A requirements**
- **The Program/Project Manager manages the program/project SEMP, technical reviews and similar project-specific SE products and reviews.**

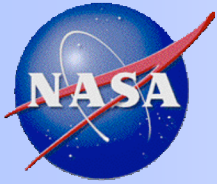


# Chapter 2

## Implementation Architecture

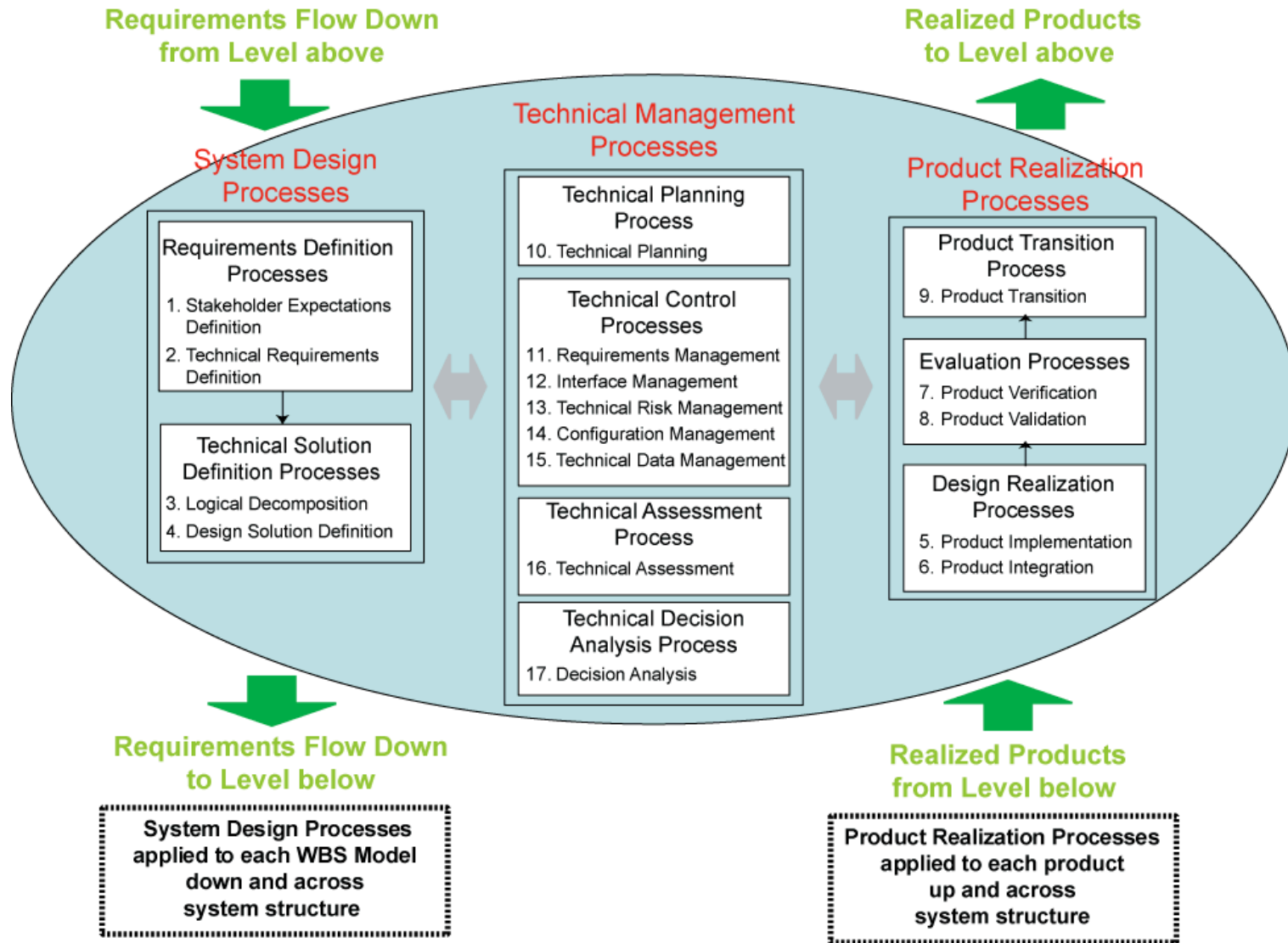


Chapter 2: Figure 2-1

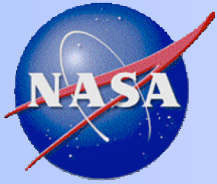


# Chapter 3

## Common Technical Processes



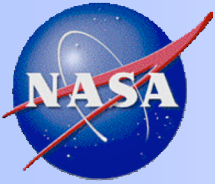
3.1 – Figure 3-1 SE Engine



## **Chapter 4** **Technical Oversight Activities**

Presents the minimum set of requirements for cases where NASA provides oversight of supplier projects when a prime or other external contractor does the majority of the technical work.

- The **NASA technical team prepares a SEMP**
- The **common processes** are used by the NASA technical team to:
  - **Develop the technical inputs and deliverables**
  - **Evaluate/oversee contract activities**

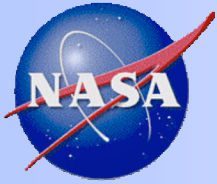


## **Chapter 5**

# **Technical Reviews**

- **NASA product lines**
  - **Flight Systems and Ground Support (FS&GS)**
  - **Basic and Applied Research (BAR)**
  - **Advanced Technology Development (ATD)**
  - **Institutional Projects (IPs)**
- **All product lines are monitored throughout the life cycle to ensure technical goals are achieved and technical direction is appropriate.**
- **A minimum set of required reviews are specified for FS&GS and IP programs and projects (Includes entrance and exit criteria).**
- **Technical Reviews are event driven and occur before a KDP when specified entrance criteria are satisfied.**

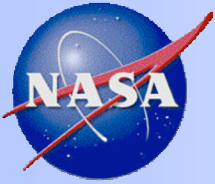




## **Chapter 5**

# **FS&GS Technical Reviews**

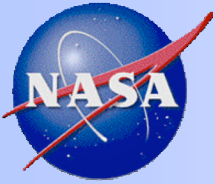
- Mission Concept Review (MCR)
- System Requirements Review (SRR) and/or Mission Definition Review (MDR)
- System Definition Review (SDR)
- Preliminary Design Review (PDR)
- Critical Design Review (CDR)
- Production Readiness Review (PRR)
- System Integration Review (SIR)
- Test Readiness Review (TRR)
- System Acceptance Review (SAR)
- Operational Readiness Review (ORR) (Programs)
- Flight Readiness Review (FRR) (Programs)
- Post-Launch Assessment Review (PLAR)
- Critical Event Readiness Review (CERR)
- Post-Flight Assessment Review (PFAR)
- Decommissioning Review (DR) (Programs)



## **Chapter 6**

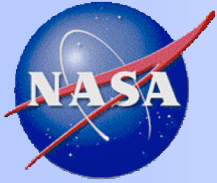
# **Systems Engineering Management Plan**

- **Required** for each project
- Provides the **basis for implementing the common technical processes** to each WBS Model within the system structure for the applicable life cycle phase and communicates roles and responsibilities
- **Provides plan on how each process will be used** – activities, tasks, costs, schedule, people, resources
- It is a **living document** that captures a project's current and evolving systems engineering strategy and guides all technical aspects of the project.
- The **Designated Governing Authority** and the Program/Project Manager sign the SEMP.



## **Key Appendices**

- **Appendix C - Practices for Common Technical processes**
  - Contains best typical practices as extracted from industry and national/international standards for each of the 17 common processes of Chapter 3.
- **Appendix D – Systems Engineering Management Plan**
- **Appendix G - Technical Review Entrance and Exit Criteria**
- **Appendix H – Templates**
  - SE NPR Implementation Plan
  - SE NPR Center Survey



## ***Conclusion***

**NPR 7120.5D and NPR 7123.1A  
form the foundation for  
NASA Space Flight Programs and Projects**