

### Independent Review Process NPR 7120.5D

This is one of a series of training presentations covering important topics in NPR 7120.5D.



#### **Purpose**

The objective of this presentation is to provide an understanding of the Independent Review Process specified in NPR 7120.5D.



# What Is the 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?

- NASA's success, as well as a program or project's success, is supported by:
  - The proper balance of power between organizational elements and
  - A robust check and balance system based on the principle that "No one can grade their own work".
- The Agency's governance structure which separates Programmatic Authority and Institutional Authority (includes the Technical Authorities) and the independent assessment process work together to provide the healthy tension that ensures decisions have the benefit of different points of view and are not made in isolation.



### 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 Key Elements

- Convening of the Review
- Assembling the Standing Review Board members
- Conducting the Review
- Issuing the Board Report (Findings and Recommendations)
- Program/project dispositioning of the report
- Center Management Council reporting its assessment
- Governing PMC reporting its assessment and providing a recommendation to the Decision Authority
- The Decision Authority making the readiness decision

More details to come



#### Who Convenes the Review?

- The Office of the Administrator, the MDAA, the Technical Authority Programmatic Authority, and PA&E are involved in convening the Standing Review Board (SRB) for life cycle reviews.
- In addition to the life cycle reviews, the Office of the Administrator, MDAA, or a Technical Authority may also convene special reviews they determine to be needed.



### What Is A Standing Review Board?

- The Standing Review Board (SRB) is the independent advisory board that makes independent Life-Cycle reviews.
- The goal is that the SRB remains intact having the same core membership for the duration of the program/project, although it may be augmented over time with specialized reviewers as needed.



#### **Board Members**

- Board members must be competent, current, and independent (not dependent on or affiliated with the program/project) and some members must be independent of the program/project's participating Centers.
- Board members are chosen based on their management, technical, and safety and mission assurance expertise, their objectivity, and their ability to make a broad assessment of the implementation of a program/project that employs numerous engineering and other disciplines.



### **Board Members** (Cont.)

- Board members responsible for the Independent Cost Analysis (ICA) of programs and Category 1 and 2 projects are provided by the Independent Program Assessment Office (IPAO).
- For Category 3 projects, board members responsible for the Independent Cost Estimate (ICE) may be provided by the IPAO, the Center Systems Management Office (SMO), or Center systems management function, as appropriate.



### How Is The Scope Of The Review Established?

The Terms of Reference (ToR) specifies the nature, scope, schedule, and ground rules for the independent review.

- NPRs 7120.5 and 7123.1 provide a general description of what should be covered in a milestone review. This includes the gate products that must be submitted for the key decision point being reviewed.
- The convening authorities include any specific review objectives or requirements in the ToR.



### Scope (Cont.)

#### **Programmatic Authority**

Assessment includes the accomplishments in fulfillment of programmatic requirements as well as program/project designs, interfaces, interactions, and processes.

#### **Institutional Authority**

Assessment includes Center support and whether the proper technical standards, processes, and practices are being applied

Assessment includes whether the Technical Authorities have properly evaluated and dispositioned waivers, applied the correct standards, provided the needed support to maximize the likelihood of success, etc.



### Scope (Cont.) Gate Products to be Submitted

| Products                                  | Formula         | tion     | Implementation |         |        |        |  |  |
|-------------------------------------------|-----------------|----------|----------------|---------|--------|--------|--|--|
| 1100000                                   | KDP 0           | KDPI     | KDP II         | KDP III | KDP IV | KDPn   |  |  |
|                                           | (if required by |          |                |         |        |        |  |  |
|                                           | the DA)         |          |                |         |        |        |  |  |
| Program Products                          |                 |          |                |         |        |        |  |  |
| 1. FAD                                    | Baseline        | Baseline |                |         |        |        |  |  |
| 2. PCA                                    |                 | Baseline | Update         | Update  | Update | Update |  |  |
| 3. Program Plan                           | Preliminary     | Baseline | Update         | Update  | Update | Update |  |  |
| 4. Interagency & International            |                 | Baseline | Update         | Update  | Update | Update |  |  |
| Agreements                                |                 |          |                |         |        |        |  |  |
| <ol><li>Traceability of Program</li></ol> | Preliminary     | Baseline | Update         | Update  | Update | Update |  |  |
| Requirements on Projects to the           |                 |          |                |         |        |        |  |  |
| Agency Strategic Plan                     |                 |          |                |         |        |        |  |  |
| 6. ASM minutes                            |                 | Final    |                |         |        |        |  |  |
| KDP Readiness Products                    |                 |          |                |         |        |        |  |  |
| 1. Standing Review Board Report           | Final           | Final    | Final          | Final   | Final  | Final  |  |  |
| 2. CMC Recommendation                     | Final           | Final    | Final          | Final   | Final  | Final  |  |  |
| 3. Program Manager                        | Final           | Final    | Final          | Final   | Final  | Final  |  |  |
| Recommendation (includes                  |                 |          |                |         |        |        |  |  |
| response to SRB Report)                   |                 |          |                |         |        |        |  |  |
| 4. MDPMC Recommendation                   | Final           | Final    | Final          | Final   | Final  | Final  |  |  |
| 5. Governing PMC                          | Final           | Final    | Final          | Final   | Final  | Final  |  |  |
| Recommendation                            |                 |          |                |         |        |        |  |  |

**Table 4-1 Program Gate Products Maturity Matrix** 



# What Determines The Depth Of Review?

- The Terms of Reference (ToR) and
- The depth at which the SRB can tell that the entire design holds together adequately and that the analyses, development work, systems engineering and programmatic plans (e.g., cost, schedule, etc.) support the design and the decisions that were made.

Typically, this requires evaluation of the work at the system level (e.g., propulsion), at least. For critical or complicated systems, the SRB may look at lower levels (e.g., parachutes).



## What Determines The Depth Of Review (Cont)?

- The decision on depth is the responsibility of the SRB.
- The depth must be sufficient to support the SRB providing NASA senior management with an accurate and objective assessment of the readiness of the program/ project to proceed to the next phase.
  - In the case of a special review, the depth must be sufficient to fulfill the task given.



### SRB Report

- Contains findings and recommended actions and documentation of Dissenting Opinions
- Is sent to the relevant individuals (e.g., Decision Authority, MDAA, Program Manager, Project Manager, Technical Authorities, Associate Administrator for PA&E, and participating Center Directors)
- Findings and recommendations are dispositioned by the program/project
  - Once the program/project internal reviews and the SRB independent life cycle review are complete, the life cycle review milestone is considered complete.



### **Governing PMC**

- Evaluates the:
  - SRB Report
  - Program's/project's proposed disposition of SRB findings and recommendations
  - Center Management Council (CMC) assessment
  - Other inputs (e.g., from the Technical Authorities).
- Recommends to the Decision Authority whether the program/project has fulfilled the required gate products and should proceed into the next phase.



## Who is the Decision Authority?

 NASA Associate Administrator for Programs and Category 1 projects

Mission Directorate Associate
 Administrator for Category 2 and 3 projects



#### **Conclusion**

The NASA governance structure and the independent review process, which centers on the SRB, work together to support program/project success.



#### Back up



### Example of An Agenda For A Milestone Review

- Purpose of the review & the charge to SRB by the Convening Authorities
- Project overview & status
- System engineering & status
  - Requirements & V&V plans
  - Trade studies
  - Technical margins
- WBS-program/project level design state & status for each area
  - System design
  - Key requirements
  - Trade studies
  - Technology readiness
  - Acquisition strategy & long lead
  - Logistics & facilities
  - Challenges & risks



## Example of An Agenda For A Milestone Review (Cont.)

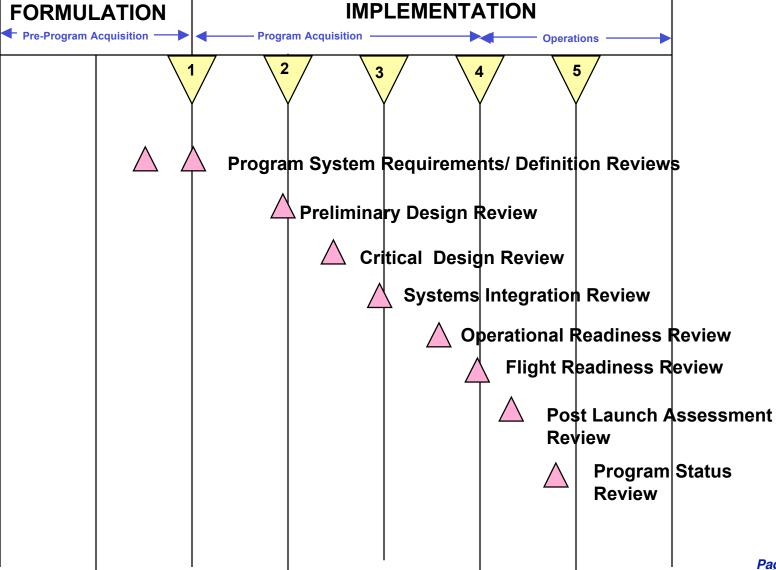
- Integrated system (e.g., power) state & status for each area
- I & T
- S&MA
- Human rating
- Risk
- Schedule
- Cost
- Wrap-up



### Program Life Cycle Simplified

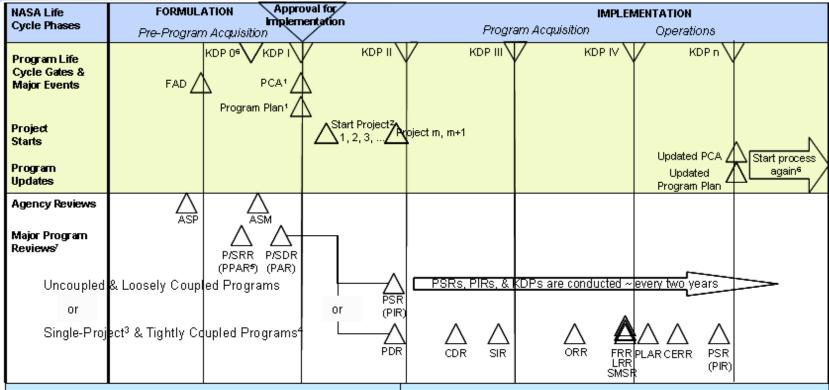
Key Decision Points

Major Reviews





#### **Program Lifecycle**



#### **FOOTNOTES**

- PCA and Program Plans are baselined at KDP I and reviewed and updated, as required, to ensure program content, cost, and budget remain consistent.
- Projects, in some instances, may be approved for formulation prior to KDP II. Initial project pre-formulation generally occurs during program formulation.
- 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.
- 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.

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 Brents 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—Peliminary Program Approval Review
P/SDR—Program/System Definition Review
P/SRR—Program/System Requirements Review
PSRR—Program Status Review
SIR—System Integration Review
SRB—Standing Review Board
SMSR—Safety and Mission Success Review



### Project Life Cycle

#### **Simplified**

|                        | FORMULATION        |                                        |                                        | IMPLEMENTATION                   |                                        |                       |            |           |        |
|------------------------|--------------------|----------------------------------------|----------------------------------------|----------------------------------|----------------------------------------|-----------------------|------------|-----------|--------|
| Project                | Pre-A              | Α                                      | В                                      | С                                | D                                      | E                     | F          |           |        |
| Phases                 | Concept<br>Studies | Concept &<br>Technology<br>Development | Preliminary<br>Design &<br>Tech. Comp. | Final<br>Design &<br>Fabrication | Sys.<br>Assembly,<br>Test, &<br>Launch | Ops. &<br>Sustainment | Closeout   |           |        |
| Key Decision<br>Points |                    | A .                                    | В                                      | , L                              | E                                      |                       | <b>=</b>   |           |        |
|                        |                    | Mission C                              | oncept Revi                            | ew                               |                                        |                       |            |           |        |
|                        |                    | igwedge Sy                             | stems Requ                             | irements Re                      | view                                   |                       |            |           |        |
| Major                  |                    | $\wedge$                               | Mission D                              | efinition Re                     | view                                   |                       |            |           |        |
| Reviews                |                    |                                        |                                        | Preliminary                      | Design Rev                             | riew                  |            |           |        |
|                        |                    |                                        |                                        | A Crit                           | ical Design                            | Review                |            |           |        |
|                        |                    |                                        |                                        |                                  | Systems I                              | ntegration I          | Review     |           |        |
|                        |                    |                                        |                                        |                                  | <u></u> Оре                            | rational Re           | adiness Re | view      |        |
|                        |                    |                                        |                                        |                                  |                                        | Flight Re             | adiness Re | view      |        |
|                        |                    |                                        |                                        |                                  |                                        | Post La               | unch Asses | sment     | Review |
|                        |                    |                                        |                                        |                                  |                                        |                       |            | mmissi    | oning  |
|                        |                    |                                        |                                        |                                  |                                        |                       | Revie      | <b>eW</b> | Page 2 |



### **Project Lifecycle**

| NASA Life                                                                                        |                                                                                                                                                                                                                                                                          | FORMULATION Appro                                                                                                |                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | IMPLE                                              | PLEMENTATION                                     |                              |  |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|------------------------------|--|
| Cycle Phases                                                                                     | Pre-Systems                                                                                                                                                                                                                                                              | Acquisition                                                                                                      | Implen                                                                                   | nentation System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | s Acquisition                                      | Operations                                       | Decommissioning              |  |
| Project<br>Life Cycle<br>Phases                                                                  | Pre-Phase A:<br>Concept<br>Studies                                                                                                                                                                                                                                       | Phase A:<br>Concept & Technology<br>Development                                                                  | Phase B:<br>Preliminary Design &<br>Technology Completion                                | Phase C:<br>Final Design &<br>Fabrication                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Phase D:<br>System Assembly,<br>Int & Test, Launch | Phase E:<br>Operations<br>& Sustainment          | Phase F:<br>Closeout         |  |
| Project<br>Life Cycle<br>Gates &<br>Major Events                                                 | KDP A<br>FAD<br>Draft Project<br>Requirements                                                                                                                                                                                                                            | KDP B Preliminary Project Plain                                                                                  | KDP C \ Baseline Project Plan?                                                           | KDP D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | KDP E                                              | MIDP F  Sumch End of Missio                      | Final Archival<br>on of Data |  |
| Agency<br>Reviews                                                                                | ASP <sup>5</sup>                                                                                                                                                                                                                                                         | ASMF                                                                                                             |                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                    |                                                  |                              |  |
| Human Space<br>Flight Project<br>Reviews <sup>1</sup>                                            | ∠<br>MC                                                                                                                                                                                                                                                                  | R SRR SDR                                                                                                        | PDR (NAR                                                                                 | CDR/ SIF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SAR ORR FR                                         | R PLAR CERR <sup>3</sup> End of                  | ∆<br>DR                      |  |
| Re-flights                                                                                       |                                                                                                                                                                                                                                                                          | (100                                                                                                             | Re-enters appropriate life                                                               | ycle phase if                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Refinbishment.                                     |                                                  |                              |  |
| Robotic<br>Mission Project<br>Reviews¹                                                           | _                                                                                                                                                                                                                                                                        |                                                                                                                  | modifications are needed t                                                               | Δ Δ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                    | D PFAR D                                         | $\triangle$                  |  |
| Launch<br>Readiness<br>Reviews                                                                   | мс                                                                                                                                                                                                                                                                       | R SRRMDR*<br>(PNAR                                                                                               | PDR<br>) (NAR                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | R ORR FF                                           | R PLAR CERR <sup>3</sup> SMSR,LRR (LV), FRR (LV) | DR                           |  |
| Supporting<br>Reviews                                                                            |                                                                                                                                                                                                                                                                          | Peer P                                                                                                           | Reviews, Subsys                                                                          | em PDRs, Subsys                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | em CDRs, and Syst                                  | em Reviews                                       |                              |  |
| equivale documer the indep 2. PRR net 3. CERRs; 4. For robor 5. The ASP 6. Includes 7. Project F | nt information is provided<br>inted in the Project Plan. I<br>bendent SRB. See Sectio<br>eded for multiple (24) syst<br>are established at the SRR and<br>its missions, the SRR and<br>and ASM are Agency re<br>recertification, as require<br>Plans are baselined at KD | tem copies. Timing is not<br>cretion of Program Office:<br>d the MDR may be combi<br>wiews, not life-cycle revie | oroach is fully<br>ted by the project for<br>ional.<br>s.<br>ned.<br>ws.<br>d updated as | ACRONYMS  ASP—Acquisition Strategy Planning Meeting ASM—Acquisition Strategy Meeting CDR—Critical Design Review CERR—Critical Events Readiness Review DR—Decommissioning Review FAD—Formulation Authorization Document FRR—Flight Readiness Review KDP—Key Decision Point LRR—Launch Readiness Review MCR—Mission Concept Review NAR—Mon-Advocate Review NAR—Mon-Advocate Review SRR—System Definition Review SMSR—System Integration Review SMSR—System Requirements Review SRR—System Requirements Review |                                                    |                                                  |                              |  |