National Aeronautics and Space Administration

Standing Review Board Handbook

SRB HB for NPR 7120.5D

DISTRIBUTION:
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Effective Date: November 12, 2009
Expiration Date: March 6, 2012

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Foreword

The Standing Review Board (SRB) for independent life-cycle reviews (ILCRs) is an Agency requirement as defined in National Aeronautics and Space Administration (NASA) Procedural Requirement (NPR) 7120.5D, National Aeronautics and Space Administration (NASA) Space Flight Program and Project Management Requirements. The purpose of the SRB Handbook is to provide the philosophy and guidelines for the setup, processes, and products of SRBs in support of the Agency's implementation of its ILCR process. The SRB Handbook is written to provide guidance to the NASA program and project communities and the SRBs regarding the expectations, processes, products, timelines, and working interfaces with NASA Mission Directorates (MDs), Centers, review organizations, and Management Councils.

The SRB Handbook can be supplemented and tailored to meet the needs of the Agency and Programs/Projects (P/p) being reviewed. For example, the level of implementation of ILCRs is based on the scope, complexity, priority, and risk of the P/p. The final agreement for each SRB ILCR is documented in its Terms of Reference (ToR).

The SRB Handbook is a Special Publication (SP) released from the NASA Office of Program Analysis and Evaluation (PA&E) which expands on the concept of the SRB introduced in the NPR 7120.5. The scope of the SRB Handbook includes ILCRs for P/p that are governed by NPR 7120.5. Programs and Projects that are governed by other NPRs, sub-projects, or any other activity not necessarily documented as a project may also wish to use these guidelines when appropriate.

The SRB Handbook consists of six core sections:

- **Section 1** provides the context for the process of ILCRs. This section introduces the concept of a single review team called the SRB. It identifies the objectives and intent of the philosophy behind the SRB process. Section 1 also defines the governance of the SRBs throughout the life-cycle of the P/p.
- **Section 2** defines the highest-level principles that govern the SRB. It includes the assumptions the reader must know to fully understand the process and products of ILCRs. Two significant parts in this section are a discussion of independence (of the SRB and individual members) and issue resolution.
- **Section 3** establishes the ILCR scope and expectations for the variety of NASA P/p through the life-cycle. This section uses tables (referred to as SRB engagement roadmaps) for each P/p type, depicting the SRB ILCRs, the typical independent assessments, and the reporting venues associated with each ILCR.
- **Section 4** defines the initiation of the SRB process including roles and responsibilities of key individuals during this initiation phase. SRB initiation includes principles for staffing the teams, and introducing the concept of the ToR.
- **Section 5** provides the products and responsibilities of the SRB performing an ILCR. This section introduces the independent assessments that will enable added depth of review in standard areas of significance.
- **Section 6** provides a notional review process approach for a single ILCR. This section provides a walk-through of an ILCR from end-to-end.

The appendices include reference material for the SRB that supplement the core sections.

References

NPD 1000.0, Governance and Strategic Management Handbook
NPD 1000.5, The NASA Acquisition Policy
NPR 7120.5D, NASA Space Flight Program and Project Management Requirements and the NASA Interim Directive (NID)
NPR 7123.1A, Systems Engineering Procedural Requirements

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1.0 Introduction

1.1 Purpose

The National Aeronautics and Space Administration (NASA) Procedural Requirement (NPR) 7120.5, NASA Space Flight Program and Project Management Requirements, introduces the concept of a single Independent Life-Cycle Review (ILCR) team called the Standing Review Board (SRB), which performs ILCRs defined in that document. The SRB process integrates the NPR 7120.5 requirements and the NPR 7123.1, Systems Engineering Procedural Requirements, into a single ILCR set.

The objective of implementing an SRB is to lower the burden of multiple ILCRs imposed on Program/project (P/p). The intent of the SRB implementation is to enhance the ILCR quality and efficiency through the development of common definitions and processes for an integrated SRB. The SRB implementation also ensures that P/p, Decision Authorities (DAs), and Technical Authorities (TAs) benefit from consistent, efficient, and value-added ILCRs and products.

The SRB implementation combines objectives of the Convening Authorities (CAs) and, as such, is a collaboration between the DAs, TAs, Mission Directorate Associate Administrator (MDAA), Chief Engineer and the Program Analysis & Evaluation (PA&E) Associate Administrator (AA). The needs and objectives of each are intended to be met through the SRB.

1.2 Governance

The requirement for SRBs is established under the authority of NPR 7120.5, which is the governing document for ILCRs processes and products. NPR 7120.5 also defines the CAs for ILCRs. In some cases, Center procedural requirements may also govern the SRB products and processes and will be addressed in the Terms of Reference (ToR) for that review. NPR 7120.5's governance of the SRB is consistent with NASA Policy Directive (NPD) 1000.0, Governance and Strategic Management Handbook.

2.0 Guidelines

The SRB Handbook consists of guidelines that are considered best practices for SRB processes and products. Some of these guidelines are worth noting as "major principles" that the reader should be cognizant of at the onset. Additional principles are noted throughout the SRB Handbook.

2.1 Major Principles

a. NPD 1000.5, NPR 7120.5 and NPR 7123.1 define the ILCR requirements; the SRB Handbook discusses how to implement those requirements.
b. Apart from the Organizational Conflicts of Interest (OCI) and the Personal Conflicts of Interest (PCI) review and clearance process discussed in paragraph 2.3, the SRB Handbook is strictly advisory; it is not a requirements document. This means that the SRB Handbook provides best practice guidance that has been proven in the field.
c. SRBs function independent of the P/p. SRB members are selected from outside the P/p advocacy (decisional) chain and are free of any OCI or PCI.
d. SRBs perform ILCRs and members can provide recommendations, but SRBs and their members do not impose requirements, give actions, or make decisions for P/p.
e. The explicit customers of the SRB are the ILCR CAs; the implicit customers are the P/p being reviewed.
f. A focus of the SRB is to promote Agency mission success.
g. The SRB remains intact, with the goal of having the same core membership for the duration of the P/p, although it may be modified or augmented over time with specialized reviewers as needed.
h. The SRB Chair and Review Manager (RM) manage the content and schedule of work that is performed by the SRB (in accordance with the ToR).

i. SRBs may write Request for Actions (RFAs), but will not write Review Item Discrepancies (RIDs)[1].
j. The SRB Chair and RM will coordinate with the P/p to minimize the SRB activity impact on resources and schedules, to the extent that is feasible without compromising the SRB requirements, so as to avoid duplication of effort, e.g., by attending internal meetings rather than requesting special sessions.
k. When an SRB member attends a P/p internal decisional review or meeting, the SRB member will be a non-voting observer, to ensure their continued independence.
l. The SRB RM, cost analyst and schedule analyst will be funded by the IPAO. The SRB Chair and all other SRB members including civil servant and non-civil servant board members and expert support will be funded by the Mission Directorate (MD). Contracts for non-civil servant board members and expert support will be through independent means, i.e., not the P/p organization; contracting for members of the SRB will be handled on a case-by-case basis between the Independent Program Assessment Office (IPAO) and the MD. The contracting organization has the responsibility and accountability to ensure all team members are vetted in compliance with the independence criteria as outlined in NPR 7120.5D.
m. SRB findings will be articulated to the P/p being reviewed prior to reporting at any other level.

2.2 Assumptions

a. The reader has a working knowledge of NPD 1000.5, NPR 7120.5 and NPR 7123.1 requirements, processes, and products.
b. The SRB independent review process is not an audit function.
c. Any unintended contradictions between the SRB Handbook and NPD 1000.5, NPRs 7120.5 and 7123.1 shall always be resolved in favor of the NPRs and the NPD.
d. Centers have institutionalized and maintain a closed-loop RFA process consistent with the process described in section 6.3.
e. Any dissention among the CAs is raised to the next level per the Agency governance structure.
f. NPR 7120.5, Section 2.5.1, (NID Section 2.5.2), notes that prior to an ILCR, P/p conduct internal reviews to initially establish, and then manage, the P/p baseline, e.g., peer, table-top, RID reviews, etc. These internal reviews are the decisional meetings wherein the P/p solidifies their plans, technical approaches, and programmatic commitments. This is accomplished as part of the normal systems engineering work processes of the P/p as defined in NPR 7123.1. The SRB independent review process is not intended to replace, upset, circumvent, define, or control the P/p internal review process.

2.3 Independence of Standing Review Boards

NASA accords special importance to the policies and procedures established to assure the integrity of SRB reports. The work of the SRBs are largely performed by persons from every part of the nation and from every sector of society -- academia, industry, government, and nonprofit. The technical skills and perspectives of these individuals are essential to the ability of NASA to consistently produce accurate and objective assessments of NASA P/p. Extensive efforts are made by NASA to assure the soundness of reports by selecting highly qualified SRB members. Yet, if a report is to be sound and effective, the report must be (and must be perceived to be) highly competent and the result of a process that is generally free of bias and fairly balanced in terms of the knowledge, experience, and perspectives utilized to produce it. In the SRB Handbook, independence is used in broad terms and the term “non-advocate,” used extensively in NASA policy, is considered encompassed by the term “independent.” Appendix C addresses the NASA Policy Guidance on SRB Composition, Balance and Conflicts of Interest (COIs). Appendix D is a copy of the NASA Form that includes Confidential COI Disclosure, and Non-Disclosure Certification that will be required from all non- civil servants who serve on a SRB.

2.3.1 Civil Servant Conflict-of-Interest and Independence Screening

All civil servants (CS) must have a current Office of Government Ethics (OGE) 450 or Standard Form (SF) 278, as applicable, form on file with NASA (or available to NASA) prior to being nominated for SRB membership. This form must be updated annually. Prior to installing any CS on an SRB, the Review Manager will contact the

[1] RIDs are part of the project’s internal process that influences the baseline.

Langley Research Center (LaRC) Office of Chief Counsel (OCC) for a PCI review. LaRC OCC will identify disqualifying PCIs in accordance with the relevant laws and regulations governing standards of ethical conduct.[2] In the event that LaRC OCC informs IPAO that such person cannot serve on the SRB due to a personal conflict of interest, IPAO may (i) find an alternative SRB member, (ii) request divestiture of the conflicting interest, or (iii) pursue a waiver for the disqualified individual. If IPAO chooses to pursue either divestiture or a waiver, they will coordinate the action with LaRC OCC. The RM will send an annual request, or at other times as circumstances require (e.g., after changes in P/p contractors), to LaRC OCC to review the relevant OGE 450/SF 278 forms.

In addition to conducting the relevant PCI analysis as articulated above the RM, in conjunction with the LaRC OCC, will also screen any CSs for internal conflicts of interest caused by their position within NASA or their involvement in the P/p as delineated in the "Employees of Sponsors" section of the NASA Policy Guidance on Standing Review Board Composition, Balance and Conflicts of Interest (Appendix C). LaRC OCC will consult with the Office of the General Counsel (OGC) on any perceived independence issues. This internal screening is performed to ensure the independence of any CS on an SRB.

2.3.2 Contractor Conflict-of-Interest Screening

To the extent consistent with the contractual requirements, the contracting officer (CO) on the relevant contract will be responsible for facilitating the screening of any proposed contractor SRB members for OCIs[3] and PCIs prior to initiating any work on SRB activities. The CO will also be responsible for taking appropriate action (e.g., Limitation of Future Contracting, firewalls, non-disclosure agreements) to ensure that SRB membership does not provide an unfair competitive advantage for SRB contractors.

With regard to OCIs, the CO will conduct OCI analysis in accordance with the Federal Acquisition Regulations (FAR), the requirements of the contract, and The NASA Policy Guidance on Standing Review Board Composition, Balance and Conflicts of Interest (Appendix C). If the CO determines that the contractor has an OCI that cannot be resolved, IPAO may pursue an OCI waiver in accordance with FAR 9.503 and NASA Far Supplement 1809.503.

Once any OCIs have been successfully addressed in accordance with the process above, the CO will facilitate a PCI screen of individual contractor employees and/or consultants proposed for the SRB, in conjunction with the OCC where the contract is located. The CO will direct the contractor to provide completed Confidential COI Disclosure, and Non-Disclosure Certifications (See Appendix D) for all proposed contractor SRB members. The CO will review these Certifications by applying the thresholds and standards applicable to Government employees discussed in Section 2.3.1 above. The local OCC will then screen the contractor for any PCI problems, and make a recommendation on those issues. In the event that the local OCC recommends that an individual contractor employee or consultant not serve on an SRB due to a PCI, the IPAO will coordinate with the CO to (i) request an alternative individual, (ii) inquire as to a possible divestiture of the conflicting interest, or (iii) pursue a PCI waiver[4] for the contractor employee or consultant. In case of PCI waiver, the CO, with the assistance of legal counsel, will draft an analysis in support of this recommendation for the Decision Authority. The CO will include the analysis and recommendation with the IPAO analysis in support of waiver, and the CO will forward the completed PCI waiver request package to the OGC. OGC will review the PCI waiver request package before forwarding the package and an OGC recommendation to the Decision Authority. The Decision Authority will make a decision based on the criteria for waiver in The NASA Policy Guidance on Standing Review Board Composition, Balance and Conflicts of Interest (Appendix C).

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[2] See 18 USC § 208, and "Standards of Ethical Conduct for Employees of the Executive Branch" contained in 5 CFR part 2635, as supplemented by 14 CFR 1207.

[3] The FAR provisions on organizational conflicts of interest only apply to contractors and consultants on an SRB. Those OCI provisions concerned with bias are designed in part to ensure the objectivity of any contractor or consultant on an SRB.

[4] Under The NASA Policy Guidance on Standing Review Board Composition, Balance and Conflicts of Interest, the Decision Authority has the authority to approve a written determination that a contractor's expertise outweighs their conflict of interest in those cases where the local OCC determines a personal conflict of interest exists.

2.4 Issue Resolution

If a disagreement occurs between the SRB and the P/p regarding the status of closure of a RFA, every effort should be made to resolve the differences at the SRB and P/p level. If the RFA resolution cannot be reached, information from both the SRB and the P/p is elevated to the next level. Resolution should be attempted at successively higher levels of the governance structure until resolved. If necessary, issue adjudication can progress to the Office of the Administrator.

3.0 Standing Review Board Scope and Reporting

SRBs are formulated to independently assess P/p throughout their life-cycles. Assessments are typically performed at the life-cycle reviews called for in NPR 7120.5; however, special reviews may be convened where SRB assessment will be required (reference NPR 7120.5 NID paragraph 2.5.14 for special reviews). The SRB is responsible for meeting the objectives of all CAs, which may vary throughout the P/p life-cycle. Broken down by life-cycle phases, roadmaps that are presented in this section anchor life-cycle activities to the Key Decision Points (KDPs) within the P/p life-cycle. The SRB remains inactive between life-cycle reviews except as requested by the CA or DA and further described in Section 5.0.

The SRB reporting venues for each of the P/p life-cycle reviews are as listed in subsequent paragraphs. Within 24 to 48 hours after the site review, the SRB Chair and PM will provide a one page briefing to the DA including a recommendation whether the P/p is ready to proceed to KDP. The Program Management Council (PMC) should be scheduled within 30 days after completion of the site review one page briefing as described in NPR 7120.5, NID paragraph 2.5.12.3. The scheduling and conducting of any interim briefing is the responsibility of the P/p. The SRB Chair and RM will make themselves available to support these interim briefings. To prepare for the briefings, the SRB Chair and RM will provide an internal review of the briefings to the IPAO Director and the PA&E AA.

3.1 Project Standing Review Board Reviews

NASA formulates projects to implement a diversity of products with widely varying costs and risks. For this reason, projects are categorized into three groups to define the level of management attention and KDP decision level appropriate to each project, based on cost and risk. Similarly, the SRB initiation and reporting process is somewhat different depending on the project category. NPR 7120.5 Table 2-1 provides guidelines for project categorization.

NPR 7120.5 breaks down projects as either robotic or human flight projects. Accordingly, robotic mission projects and human mission projects have assessment requirements and reporting venues. Hence, the roadmaps for each are different.

3.1.1 SRB Engagement Roadmap for Robotic Mission Projects

The SRB participation roadmap for robotic mission projects is depicted in Table 3-1. The table contains the project life-cycle phases from left to right. The SRB is intended to support the reviews in the life-cycle with a consistent core membership; however, the SRB Chair and RM will evaluate which SRB members are required to attend lower-level reviews to ensure a value-added review. Each of the life-cycle reviews is listed, followed by the level of SRB participation in each review. This participation can range from leading the review with full board attendance, e.g., the Preliminary Design Review (PDR), to attending as non-voting observers. Each of the project life-cycle reviews is defined in greater detail in Table 2-7 of NPR 7120.5 NID.

Consideration to project category and life-cycle review is required when determining the SRB reporting venue. Only Category 1 project SRBs report to the Agency PMC, all other project SRBs complete their reporting at the MD PMC level. If a Category 1 review does not conclude at a KDP (e.g., the Critical Design Review (CDR)), the SRB report ends at the MD PMC. At the discretion of the NASA AA, review results for projects may be further reported to the Agency PMC. The actual reporting requirements for each review with SRB participation

are determined with the preparation of the Addendum ToRs for that review (see section 4.2 for ToR details). The Addendum ToRs specify the reporting requirements of each review the SRB performs.

3.1.2 SRB Engagement Roadmap for Human Mission Projects

The SRB participation roadmap for human mission projects is depicted in Table 3-2. The table contains the project life-cycle phases from left to right. By definition this is also the life-cycle of the SRB. Each of the life-cycle reviews is listed next, followed by the level of SRB participation in the review. Each of the project life-cycle reviews is defined in greater detail in Table 2-7 of NPR 7120.5 NID.

Consideration to project category and life-cycle review is required when determining the SRB reporting venue. Category 1 project SRBs report to the Agency PMC. If a Category 1 review does not conclude at a KDP (e.g., the CDR), the SRB report ends at the MD PMC. At the discretion of the NASA AA, review results for projects may be further reported to the Agency PMC. The actual reporting requirements for each review with SRB participation are determined with the preparation of the Addendum ToRs for that review (see section 4.2 for ToR details). The Addendum ToRs specify the reporting requirements of each review the SRB performs.

3.2 Program Standing Review Board Reviews

The most significant difference in the SRB assessment approach to NASA programs is whether the projects within each Program are coupled or uncoupled.

3.2.1 SRB Engagement Roadmap for Programs with Uncoupled or Loosely Coupled Projects

Programs consisting of multiple projects that are not directly connected to one another (either by schedule, cost, technical interfaces, or management structures) are characterized as uncoupled or loosely coupled programs in NPR 7120.5. There is a specific life-cycle for these programs, and hence, also a specific SRB roadmap. The SRB participation roadmap for uncoupled or loosely coupled programs is presented in Table 3-3.

The life-cycle phases depicted in the table are broken down in columns between formulation and implementation. The SRB life-cycle reviews for the Program are also listed – there are three life-cycle reviews for programs of these types required to have SRB participation. The Program System Requirements Review (SRR) (P/SRR) / Preliminary Program Approval Review (PPAR), and the Program /System Definition Review (P/SDR) / Program Approval Review (PAR) occur during the formulation of a new program. The third review, the Program Implementation Review (PIR), is a periodic review held biennially (~2 years) as the program implementation proceeds. Each of these program reviews is defined in greater detail in NPR 7120.5, NID Table 2-6. Note that a KDP is associated with each review. Appendix F provides PIR Advisory Guidance.

3.2.2 SRB Engagement Roadmap for Programs with Single or Tightly Coupled Projects

Programs consisting of just one large project or multiple projects that are directly connected to one another (e.g., Space Shuttle Program) are characterized as single-project or tightly coupled programs in NPR 7120.5. There is a specific life-cycle for these programs, hence, also a specific SRB roadmap. The SRB participation roadmap for single-project or tightly coupled programs is presented in Table 3-4.

The life-cycle phases are depicted in the table, broken down in columns between formulation and implementation. The life-cycle reviews for the Program are also listed, followed by the SRB participation in these reviews. The first two SRB reviews, the P/SRR (PPAR) and the P/SDR (PAR), occur during the formulation of a new program. The next life-cycle reviews cover the program acquisition phase. For single-project programs these reviews are synonymous with the project reviews until operations, after which ILCRs are held every two years as they are for other programs. Note the varying level of SRB participation in these reviews, which ranges from full board participation (Chair presides over the review) to non-voting observers. Nonetheless, there is sufficient SRB involvement in the program acquisition phase reviews to enable the SRB to completely assess the implementation progress of the Program.

For tightly coupled programs, these reviews "mirror" similar reviews within each of the constituent projects of the Program but typically occur after all "like" project reviews have been completed, in order to achieve an integrated assessment of the Program at that point in its life-cycle. During operations, program-level Post Launch Assessment Reviews (PLARs) and Critical Events Readiness Reviews (CERRs) may also be held for the benefit of the Program and their associated MD (only the SRB Chair or their designee attend these reviews). The SRBs participation in the Flight Readiness Review (FRR) and project level Post-Flight Assessment Review (PFAR) will be in accordance with NPR 7120.5, NID Table 2-3, and at the discretion of the MDAA. The Program SRB Chair and project SRB Chairs that are part of the mission are included as advisory members to the flight and mission operations review boards. Again, each of these reviews is defined in greater detail in NPR 7120.5, NID Table 2-6. Once in the operation phase of the Program life-cycle, PIRs/Program Status Reviews (PSRs)[5] are held biennially (~2 years) to assess the Program, just as is done in uncoupled or loosely coupled programs. Appendix F provides PIR Advisory Guidance.

[5] The PSR and the PIR are related but not the same. The PSR is conducted by the program to capture and present to its team members and the SRB the current state of the program and its plan for the future. The SRB participates in this review by conducting an independent assessment of the program and its plans. This independent assessment is the PIR. The SRB will work with the program to ensure that the PSR agenda includes all relevant topics necessary for the PIR.

Table 3-1. SRB Engagement Life-Cycle Roadmap for Robotic Mission Projects

NASA Life Cycle Phases	Formulation							Implementation									
	Pre-Systems Acquisition							*Systems Acquisition*								*Operations*	
	Pre-Phase A		Phase A			Phase B		Phase C				Phase D				Phase E	
Reviews	MCR		SRR	MDR (PNAR)		PDR (NAR)		CDR	PRR [1]	SIR		ORR	FRR	LRR		PLAR	CERR
Key Decision Points		KDP A			KDP B		KDP C				KDP D				KDP E		
SRB Participation	Case-by-case		Full Board	Full Board		Full Board		Full Board	Chair and Member Subset	Full Board		Full Board	Full Board	Full Board		Full Board	Full Board
Sample Assessments																	
Requirements	Requirements Traceability to Agency Strategic Plan		Functional and Performance Baseline ; Requirements Traceability	Flowdown to Functional Elements; System Requirements Document		Flowdown to Functional Elements, Descope Plans		Any Changes, Flowdown to Functional Elements, Descope Plans	Production processes, Certified design	Integration Plan and Procedures		Phase E, Descope plans	Flight operations are certified to proceed	Launch system and spacecraft/ payloads readiness for launch		Assess system inflight performance	critical activity design complies with requirements
Technical[3]	Mission System Architecture		Preliminary Approach, Project plan	Mission System Architecture		Design meets system requirements, Baseline the design		Design meets performance, TRL	Design documentation, Production Plans	Previous component, subsystem and system tests have been verified to support integration		All waivers and anomalies have been closed, Operational procedures and contingency planning	All waivers and anomalies have been closed, Operational procedures and contingency planning	Launch system and spacecraft/ payloads readiness for launch		Mission operations capabilities and anomaly resolution procedures	critical activity preparation is verified and validated
Integrated cost and schedule [4]	ROM, Cost Schedule Estimates		ROM, Cost Schedule Estimates	Preliminary: BOEs, IMS, Cost/Budget, UFE, CADRe, ICE		Baseline: BOEs, IMS, Cost/Budget, UFE, CADRe, JCL, ICE		Performance against plans, EVM, UFE	Production Plans	Performance against plans, EVM, UFE, JCL		Performance against plans, EVM, UFE	Performance against plans, EVM, UFE			Performance against plans, EVM, UFE	
Resources	Preliminary: Facilities, Workforce, Infrastructure		Preliminary: Facilities, Workforce, Infrastructure	Preliminary: Facilities, Workforce, Infrastructure		Baseline: Facilities, Workforce, Infrastructure		Update: Facilities, Workforce, Infrastructure	Update: Facilities, Workforce, Infrastructure	Update: Facilities, Workforce, Infrastructure		Review	Review			Facilities Workforce	Facilities Workforce
Risk	Preliminary Risks		Preliminary Risks	Preliminary: Risk Mgt Plan, Risk list, Mitigations		Baseline: Risk Mgt Plan, Risk list, Mitigations		Risk List, Mitigations	Risk List, Mitigations	Risk List, Mitigations		Risk List, Mitigations	Risk List, Mitigations			Risk List Mitigations	Risk List Mitigations
Management	Preliminary: Approach		Preliminary: Plans	Preliminary: Project Plans		Baseline: Project Plans		Performance against plans	Production Engineering and Planning	Performance against plans		Performance against Plans	Performance against Plans			Performance against plans	Performance against plans
Reporting Venues																	
Project	x		x	x		x		x	x	x		x	x	x		x	x
Program [2]	x		x	x		x		x	x	x		x	x	x		x	x
CMC [2]	x		x	x		x		x	x	x		x	x	x		x	x
DPMC	x[2]		x	x[2]		x[2]		x	x	x[2]		x	x[2]	x[2]		x[2]	x[2]
APMC	Cat 1			Cat 1		Cat 1				Cat 1			Cat 1			Cat 1	Cat 1

Notes:
1. PRRs are only needed when multiple flight system copies are being developed; timing is discretionary.
2. The SRB chair and RM will make themselves available to support these interim briefings.
3. Compliance with NPR 7123.1 review entrance and success criteria will be assessed.
4. Compliance with NPR 1000.5.

Table 3-2. SRB Engagement Life-cycle Roadmap for Human Mission Projects

NASA Life Cycle Phases	Formulation							Implementation									
	Pre-Systems Acquisition							*Systems Acquisition*									*Operations*
	Pre-Phase A		Phase A			Phase B		Phase C					Phase D				Phase E
Reviews	MCR [1]		SRR	SDR (PNAR)		PDR (NAR)		CDR	PRR [1]	SIR		SAR	ORR	FRR	LRR		PFAR
Key Decision Points		KDP A			KDP B		KDP C				KDP D					KDP E	
SRB Participation	Case-by-case		Full Board	Full Board		Full Board		Full Board	Chair and Member Subset	Full Board		Full Board	Full Board	Chair and Member Subset	Chair and Member Subset		Chair and Member Subset
Sample Assessments																	
Requirements	Requirements Traceability to Agency Strategic Plan		Functional and Performance Baseline, Requirements Traceability	Flowdown to Functional Elements, System Requirements Document		Flowdown to Functional Elements, Descope Plans		Any Changes, Flowdown to Functional Elements, Descope Plans	Production processes, Certified design	Integration Plan and Procedures		System meets acceptance criteria and has been verified and validated	Phase E, Descope plans	Flight operations are certified to proceed	Launch system and spacecraft/ payloads readiness for launch		Flight performance reporting
Technical [3]	Mission System Architecture		Preliminary Approach, Project plan	Mission System Architecture		Design meets system requirements, Baseline the design		Design meets performance, TRL	Design documentation, Production Plans	Previous component, subsystem and system tests have been verified to support integration		Technical data package, Certification package	All waivers and anomalies have been closed; Operational procedures and contingency planning	Hardware and software systems are configured for flight	Launch system and spacecraft/ payloads readiness for launch		Performance report and Anomaly resolution
Integrated cost and schedule [4]	ROM, Cost Schedule Estimates		ROM, Cost Schedule Estimates	Preliminary: BOEs, IMS, Cost/Budget, UFE, CADRe, ICE		Baseline: BOEs, IMS, Cost/Budget, UFE, CADRe, JCL, ICE		Performance against plans, EVM, UFE	Production Plans	Performance against plans, EVM, UFE, JCL		Remaining liens or open items and plans for closure	Performance against plans, EVM, UFE	Performance against plans, EVM, UFE			
Resources	Preliminary: Facilities, Workforce, Infrastructure		Preliminary: Facilities, Workforce, Infrastructure	Preliminary: Facilities, Workforce, Infrastructure		Baseline: Facilities, Workforce, Infrastructure		Update: Facilities, Workforce, Infrastructure	Update: Facilities, Workforce, Infrastructure	Update: Facilities, Workforce, Infrastructur		Review	Review	Review			
Risk	Preliminary Risks		Preliminary Risks	Preliminary: Risk Mgt Plan, Risk list, Mitigations		Baseline: Risk Mgt Plan, Risk list, Mitigations		Risk List, Mitigations	Risk List, Mitigations	Risk List, Mitigations		Risk List, Mitigations	Risk List, Mitigations	Risk List, Mitigations			
Management	Preliminary: Approach		Preliminary: Plans	Preliminary: Project Plans		Baseline: Project Plans		Performance against plans	Production Engineering and Planning	Performance against plans		Performance against Plans	Performance against Plans	Performance against plans			
Reporting Venues																	
Project	x		x	x		x		x	x	x		x	x				
Program [2]	x		x	x		x		x	x	x		x	x				
CMC [2]	x		x	x		x		x	x	x		x	x				
DPMC	x		x	x[2]		x[2]		x	x	x[2]		x	x				
APMC	Cat 1			Cat 1		Cat 1				Cat 1			Cat 1				

Notes:

1. PRRs are only needed when multiple flight system copies are being developed; timing is discretionary.
2. The SRB chair and RM will make themselves available to support these interim briefings.
3. Compliance with NPR 7123.1 review entrance and success criteria will be assessed.
4. Compliance with NPR 1000.5.

Table 3-3. SRB Engagement Life-cycle Roadmap for Programs with Uncoupled or Loosely Coupled Projects

NASA Life Cycle Phases	Formulation *Pre-Program Acquisition*				Implementation *Program Acquisition and Operations*	
Reviews	P/SRR (PPAR)		P/SDR (PAR)		PIR	
Key Decision Points		KDP 0		KDP I		KDP n
SRB Participation	Full Board		Full Board		Full Board	
Sample Assessments						
Requirements	Requirements Traceability to Agency Strategic Plan		Requirements Flowdown to Projects		Updated: Requirements Traceability to Agency Strategic Plan	
Technical [2]	Systems architecture		Preliminary SEMP		Updated: SEMP	
Integrated cost and schedule [3]	Preliminary: BOEs, IMS, Cost/Budget, UFE, WBS		Baseline: BOEs, IMS, Cost/Budget, UFE, JCL		Updated: BOEs, IMS, Cost/Budget, Performance against plans, EVM, UFE	
Resources	Preliminary: Facilities Workforce		Baseline: Facilities Workforce		Updated: Facilities Workforce	
Risk	Preliminary: Risk Mgt Plan		Baseline: Risk Mgt Plan, Risk list, Mitigations		Updated: Risk Mgt Plan; Risk list ; Mitigations	
Management	Baseline: FAD Preliminary: Program Plan; Preliminary traceability between the ASP, Program and Project requirements		Baseline: Program Plan, PCA, Inter-agency & International Agreements, Baseline traceability between the ASP, Program and Project requirements		Updated: Program Plan, PCA, Updates to Inter-agency & International Agreements, Updates of traceability requirements	
Reporting Venues						
Program	x		x		x	
CMC [1]	x		x		x	
DPMC [1]	x		x		x	
APMC	x		x		x	

Notes:

1. The SRB chair and RM will make themselves available to support the interim briefings.
2. Compliance with NPR 7123.1 review entrance and success criteria will be assessed.
3. Compliance with NPR 1000.5.

Table 3-4. SRB Engagement Life-cycle Roadmap for Programs with Single or Tightly Coupled Projects

NASA Life Cycle Phases	Formulation				Implementation													
	Pre-Program Acquisition				*Program Acquisition*								*Operations*					
Reviews	P/SRR (PPAR)		P/SDR (PAR)		PDR		CDR	SIR		ORR	FRR [1]	LRR [1]		PLAR [2]	CERR [2]	PFAR [1]	PIR	
Key Decision Points		***KDP 0***		***KDP I***		***KDP II***			***KDP***				***KDP IV***					***KDP n***
SRB Participation	Full Board		Full Board		Full Board		Full Board	Full Board		Full Board	Full Board	Full Board		Full Board	Full Board	Full Board	Full Board	
Sample Assessments																		
Requirements	Requirements Traceability to Agency Strategic Plan		Requirements Flowdown to Projects		Flowdown and Interproject Mgt, Descope plan		Any Changes, Flowdown to Functional Elements, Descope Plans	Integration Plan and Procedures, Descope plan		Descope plans	Flight operations are certified to proceed	Launch system and spacecraft/ payloads readiness for launch		Assess system inflight performance	critical activity design complies with requirements	Flight performance reporting	Updated: Traceability to Agency Strategic Plan	
Technical [4]	Mission System Architecture		Mission System Architecture		Design meets system requirements, Baseline the design		Design meets performance, TRL	Previous component, subsystem and system tests have been verified to support integration		All waivers and anomalies have been closed; Operational procedures and contingency planning	Hardware and software systems are configured for flight	Launch system and spacecraft/ payloads readiness for launch		Mission operations capabilities and anomaly resolution procedures	critical activity preparation is verified and validated	Performance report and Anomaly resolution	Updated: Mission System Architecture	
Integrated cost and schedule [5]	ROM, Cost Schedule Estimates		ROM, Cost Schedule Estimates		Preliminary: BOEs, IMS, Cost/Budget, UFE, CADRe, ICE		Performance against plans, EVM, UFE	Performance against plans, EVM, UFE JCL		Performance against plans, EVM, UFE	Performance against plans, EVM, UFE			Performance against plans, EVM, UFE			Updated: BOEs IMS Cost/Budget Performance against plans, EVM, UFE	
Resources	Preliminary: Facilities, Workforce, Infrastructure		Preliminary: Facilities, Workforce, Infrastructure		Baseline: Facilities, Workforce, Infrastructure		Update: Facilities, Workforce, Infrastructure	Update: Facilities, Workforce, Infrastructure		Facilities Workforce	Facilities Workforce			Review	Review		Updated: Facilities Workforce	
Risk	Preliminary Risks		Preliminary: Risk Mgt Plan, Risk list, Mitigations		Baseline: Risk Mgt Plan, Risk list, Mitigations		Risk List, Mitigations	Risk List, Mitigations		Risk List, Mitigations	Risk List, Mitigations	Risk List, Mitigations		Risk List, Mitigations	Risk List, Mitigations		Updated: Risk Mgt Plan Risk list Mitigations	
Management	Baseline: FAD Preliminary: Program Plan		Baseline: Program Plan, PCA, Inter-agency Agreements		Performance against plan		Performance against plan	Performance against plan		Phase E Mgt Plan	Performance against plan			Performance against plan	Performance against plan		Updated: Program Plan, PCA, Inter-agency Agreements	
Reporting Venues																		
Program	x		x		x		x	x		x	x	x		x	x		x	
CMC [3]	x		x		x		x	x		x	x	x		x	x		x	
DPMC	x		x[4]		x[4]		x	x[4]		x	x	x		x	x		x[4]	
APMC	x		x		x			x									x	

Notes:

1. The Flight Readiness Review (FRR), Launch Readiness Review (LRR), and Post-Flight Assessment Review (PFAR) for tightly coupled programs at the discretion of the MDAA. (Rather than utilizing a complete independent review board for these flight and mission operations reviews, the program SRB chair and project SRB chairs that are part of the mission are included as advisory members to the flight and mission operations review boards. The SRB input is provided during the board meeting.)
2. For human spaceflight missions, PLARs and CERRs are conducted by the Mission Management Team (MMT) and the SRB chair will participate; For robotic missions the SRB performs the review.
3. The SRB chair and RM will make themselves available to support these interim briefings.
4. Compliance with NPR 7123.1 review entrance and success criteria will be assessed.
5. Compliance with NPR 1000.5.

4.0 Standing Review Board Initiation

The Agency has established the following three options for conducting independent reviews by SRBs.

1) Civil Service Consensus Board- no Expert Support (CS)
2) Civil Service Consensus Board with Expert Support (CS2)
3) Non-Consensus Mixed Board (NC)

The Civil Service Consensus Board- no Expert Support is an Agency approved SRB board wherein the SRB Chair and the members are all Civil Servants (CSs). SRB consensus is permissible. The SRB board is responsible for preparing the SRB report, and the SRB Chair briefs the report.

The Civil Service Consensus Board with Expert Support is an Agency approved SRB board wherein the SRB Chair and the members are all CSs. The SRB board can seek the support of experts for purposes of analyses to factor into their findings. SRB consensus is permissible but is limited to the CSs. The SRB board is responsible for preparing the SRB report, and the SRB Chair briefs the report.

The Non-Consensus Mixed Board is an Agency approved SRB board wherein the SRB Chair and the members can be CSs or consultants. The RM may be a CS or from Jet Propulsion Laboratory (JPL). SRB consensus is not permissible on this board. The RM documents the findings of the SRB members, and the SRB Chair presents the briefings with his/her recommendations as an individual.

Appendix E defines these options and the decision tree in selecting an appropriate option. The approach regarding organization, management, and reporting to the Agency differs between the three options.

4.1 Membership Selection Principles

This section provides a number of principles to consider when forming a new SRB. The factors for membership are prioritized as: 1) competency, 2) currency, and 3) independence. There is no master formula or "one size fits all" philosophy or predetermination for staffing teams.

SRB Composition and Balance

When considering SRB membership, having a well-rounded, diverse set of expertise should provide the most versatile perspective of opinions. Members can be selected both from within the Agency and from external sources, including such communities as the Department of Defense (DoD), private industry, academia, and other government agencies. When looking internal to the Agency, various NASA Centers and cross-mission opportunities, e.g., robotic versus human project expertise, can add unique insights. For project SRBs in particular, the goal should be that no more than half of the members should come from the host Center. With regards to civil servant members of a SRB the individual and the individual's supervisory chain must not be located within the chain of command for programmatic level decisions made at the program or project level. Regardless of the representation, all nominees must satisfy the independence criterion as discussed in section 2.3 (and Appendix C). While this does not preclude selection from the host Center staff, special care must be taken to ensure clear organizational independence from the Project itself. The bottom line is to select the highest qualified, independent team in terms of knowledge, training, and experience, regardless of where they are from. For an SRB to be fully competent its membership should represent a balance of diverse backgrounds and professional and organizational perspectives.

Conflict of Interest

The specifics of COI are in Appendix C. Appendix D includes the form that will be used to collect background information, confidential COI disclosure, and non-disclosure certification, towards qualification for a position on a SRB.

SRB Team Size

A very important philosophy when forming the SRB is determining the "right size" team that can meet the expectations of the life-cycle review charter. Minimizing the number of members on the team has been considered best practice; however, every SRB team size decision requires consideration of many variables. The number of members, which includes the Chair and RM, are selected for the duration of the P/p life-cycle and should be kept to a minimum. Multiple disciplines can sometimes be covered by one member (i.e., electrical and systems engineering). Specialists may be considered to be added temporarily to review specific items identified by the members.

There are a number of Mission Support Offices (MSOs) internal to the Agency that are defined by the Agency governance model to be independent of the P/p. These MSOs can give a team a second level of support when analysis is to be done. For example, the IPAO may have one cost analyst defined as a team member yet when discrete cost risk analyses are to be completed; this member may utilize a "reach back" capability into their organizations to garner support to complete the additional task, thus reducing the need for permanent, active SRB members. Such support consultants can come from the Office of Safety and Mission Assurance (OSMA), the NASA Safety Center (NSC), Center Safety & Mission Assurance (S&MA) organizations, the Office of the Chief Engineer (OCE), the NASA Engineering and Safety Center (NESC) and Center engineering organizations. Another option to leverage existing resources is to use membership from other related teams: e.g., project SRB Chairs may have membership on program SRBs.

Competent and Current

Depth and breadth of knowledge are phrases most often used to describe well-rounded candidate reviewers. Depth is usually related to a competency in one or more subject areas and is a prerequisite for being nominated to fill a particular discipline area on the SRB. Competency should not only be thought of from a technology standpoint but also from management and integration. Those who have one or more competencies are considered to have a breadth of knowledge that is sought after for an SRB candidate. However, competency is just one attribute to be emphasized. A second and related attribute is relevant and current expertise as a practitioner. In NASA, where technology, process, and policy are changing rapidly, currency is an important aspect to consider for a reviewer. Hence, it is important to balance competence with current or recent experience in the selection of well-qualified SRB members.

4.1.1 SRB Chair Selection

The Chair of the SRB is the first member selected and is expected to ensure that the independent review process is executed by the SRB. A person who is well recognized for expertise related to the P/p being reviewed typically fills this position. Also, it is expected that the Chair have a depth of technical knowledge and the breadth of experience that goes with the elevated level of distinction of leading the SRB. Personal attributes for the Chair include a combination of good communication skills (both written and oral), organizational skills, and leadership skills. The Chair is recruited with the intent to lead the SRB for the full life-cycle of the P/p. The prospective Chair must understand the full importance of this commitment prior to acceptance of this responsibility. Additionally, it is preferable to have CS Chairs, and SRB Civil Service Consensus Boards as the preferred board.

Selection Process for the SRB Chair

The selection process is collaboration between the DA, TA, MDAA, and PA&E. While it is initiated at the Center for projects and MD for programs, it is intended to be a group effort between all of the CAs until a suitable SRB Chair is selected. Final approval of a candidate for the SRB Chair rests solely with the CAs.

a. The first step in the initiation of the SRB formulation process is the Chair nomination and is depicted in Figure 4-1. For a project, the Center Director (CD) or his/her representative recommends a Chair nomination. For all programs, including single-project programs, the MDAA recommends a Chair nomination and provides a schedule date for the review.

b. The recommended Chair nomination should be sent to the PA&E/IPAO for a program or Category 1 and Category 2 Life-Cycle Cost (LCC) ≥ $250M) projects, or the host Center review organization for Category 2 (LCC < $250M) and Category 3 projects.
c. After reviewing the Chair nomination, the IPAO Director (or Center review organization) assigns a RM to facilitate the completion of the SRB formulation process.
d. The IPAO facilitates the Chair nomination process with the remainder of the CAs. Every CA will have the opportunity to review the nomination(s) and submit nominations of their own. The IPAO distributes the Chair nomination(s) to all the CAs and requests unofficial approval or alternative nominations.
e. Simultaneously, the RM facilitates the due diligence of the Chair nomination(s). Due diligence includes, but is not limited to, a check on availability and independence, distribution of Agency documentation to give the candidate the big picture view of the services he/she is being requested to provide, etc.
f. The RM facilitates the prioritization of the CAs' nominations then gains the appropriate approvals/concurrence by each. The Chair and RM have to comply with the OCI/PCI policy.
g. If agreement cannot be reached between the CAs, the DA as defined by NPR 7120.5 will make the final decision.
h. The RM concludes the process by documenting and archiving the decision in a Chair and RM approval letter. The Chair and RM approval letter will be submitted as a Memorandum of Record signed by the CA and the DA and contain the following as a minimum:

    i. A description of the P/p for which the Chair and RM are nominated and assigned, respectively.
    ii. A short bio of each with relevant information that justifies nomination for that position on the SRB.
    iii. A verification statement about their independence and compliance with policy.
    iv. The SRB option selected from the board types.

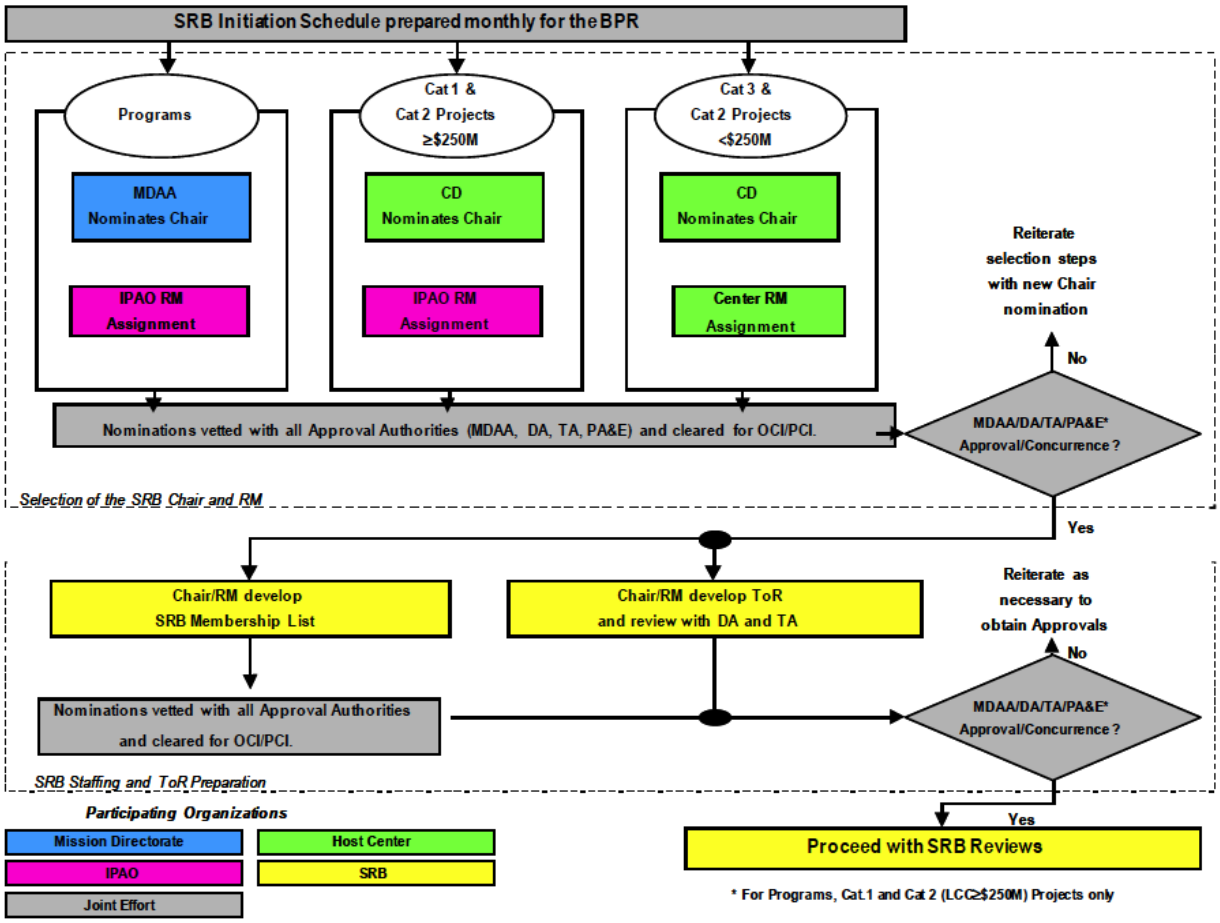

Figure 4-1. Formulation Process Flow

4.1.2 Review Manager Selection

The RM provides a critical function in the ILCR process. The RM ensures consistency in the implementation of Agency policy, process, and products as defined in the ILCR process. The RM must possess a high level of knowledge of the P/p and SRB policy (i.e., NPD 1000.5, NPR 7120.5 and NPR 7123.1) and processes such as those defined in the Systems Engineering and SRB Handbooks. The RM may also serve on the SRB as a specific discipline expert.

Selection Process for a Review Manager

a. The RM is assigned by PA&E/IPAO for a program review and Category 1 and Category 2 (LCC > $250M) projects or the host Center review organization for Category 2 (LCC < $250M) and Category 3 projects (see Figure 4-1). The RM will comply with the OCI/PCI policy in Appendix C.
b. The RM assignment is approved by the same process as the Chair and simultaneously by way of a Chair and RM approval letter described in section 4.1.1 *Selection Process for Chair*.

4.1.3 Board Member Selection

When forming a team, the following are considered:

a. The disciplines necessary to make up the team must be derived from the P/p content. A good practice is to start with the P/p work breakdown structure (WBS). Consideration should be given to risk areas of the P/p.
b. Available expertise that might be used to fill the roster. A good practice has been to build a matrix that crosses disciplines with available experts keeping in mind that certain individuals may fill more than one role.
c. Take into account the principles of section 4.1 of non-host Center and functional support office membership. In other words, no office has an automatic right to representation. The team should be made up of the best people available, wherever they are from.
d. Compliance with the OCI/PCI policy in Appendix C is mandatory.
e. Additionally, it is preferable to have CS SRBs.

As described in section 4.1 *Membership Selection Principles*, there is no “one size fits all” circumstance for team composition.

Selection Process for SRB Members

a. The Chair has the responsibility for developing the candidate membership list for the SRB. However, the CAs approve the membership. The RM will support the Chair by providing points of contact for Center and MD nominations.
b. The IPAO facilitates the nomination process with the CAs (see Figure 4-1). All CAs have the opportunity to review the nomination(s) and submit alternative nominations. Specifically, the IPAO distributes the initial nomination(s) to the CAs and requests unofficial approval or alternative nominations.
c. Simultaneously, the RM facilitates the due diligence of the nominated members. Due diligence includes, but is not limited to, a check on availability and OCI/PCI policy, distribution of Agency documentation to give the candidates the big picture view of the services he/she is being requested to provide, etc.
d. The RM facilitates the prioritization of the CAs’ nominations, and then gains the appropriate approvals/concurrence of each.
e. If agreement cannot be reached between the CAs, the DA as defined in NPR 7120.5 will make the final decision.
f. When the membership of the SRB changes (adding or removing a member) a formal nomination letter will be sent to the CAs.

g. The RM concludes the process by documenting and archiving the decision in a Team Member approval letter. The Team Member approval letter will be submitted as a Memorandum of Record signed by the CA and DA and contain the following as a minimum:

   i. A description of the P/p for which the nominations are requested.
   ii. A short bio of each team member with relevant information that justifies nomination for that position on the SRB.
   iii. A verification statement about their independence or a disclosure of anything that could be perceived as lack of appearance of independence. Refer to Appendices C and D.
   iv. A note about the importance and priority for the services being rendered (this is especially important for the priority of this work over other commitments of CSs).
   v. A matrix demonstrating how the membership will cover the areas of interest.
   vi. SRB option selection.

h. The CAs must approve any change in membership.

4.2 Terms of Reference

A ToR is an agreement between the SRB and the CAs. In general, a ToR documents the SRB charter, scope, and agreements between the CAs and the SRB.

There is one ToR, which has a baseline and addendums. For configuration control purposes, the baseline ToR will be the governing document and Addendum ToRs will be added as each ILCR takes place. The first review performed by the SRB will have a baseline and the first Addendum ToR approved simultaneously; subsequent reviews will only require Addendum ToRs. This means that each Addendum ToR that is attached will be approved and reflected in the change log of the baseline ToR.

4.2.1 Baseline Terms of Reference

A baseline ToR is written once for the life-cycle of a P/p and should include all the ILCRs to be performed by the SRB. For a new P/p or the first time a P/p goes through the SRB formulation process, the baseline ToR is written simultaneously with the membership selection process (see Figure 4-1).

The typical content of a baseline ToR consists of:

a. A short description of the P/p as it exists at the time of writing.
b. A list of all known life-cycle reviews the SRB is being assigned to review.
c. A notional schedule for each life-cycle review (quarter and/or year may be sufficient).
d. A list of special assessments that will be required throughout the life-cycle of the P/p, e.g., reliability assessments, human rating assessment, special technical assessments, etc.
e. Any special circumstances or risks that should be considered that could affect team size or makeup.
f. A statement of cooperation, that between life-cycle reviews and prior to an Addendum ToR being written for a specific review, the P/p, the Chair, and the RM will work together for the appropriate notice and participation of internal reviews or subsystem reviews that are necessary and appropriate for the SRB to attend.

4.2.2 Addendum Terms of Reference

An Addendum ToR is written for each specific ILCR and will be attached to the Baseline ToR for configuration control. For a new P/p or the first time a P/p goes through the SRB formulation process, the first Addendum ToR will be developed and submitted along with the Baseline ToR.

The typical content of an Addendum ToR consists of:

a. A short description of all changes in budget and/or content compared to that described in either the baseline ToR or previous Addendum ToRs that might affect the size or the makeup of the SRB.
b. The specific gate products, entrance and exit/success criteria for that review.
c. Specific Center or MD review objectives.
d. Special assessments to be performed, e.g., reliability assessments, human rating assessment, special technical assessments, etc.
e. A list of points of contact for internal communication.
f. A list of P/p deliverables (documents requested).
g. A list of SRB products (reports, e.g., oral and written).
h. A high-level schedule of events, including all reports and reporting venues. A timetable of events anchored by a project-controlled milestone event, e.g. conclusion of the internal reviews. The reviews referenced should specifically be internal reviews, ILCRs and KDPs. Exact dates are not required unless available. The month or quarter in which the event is scheduled is sufficient. A link to milestone dates will be provided. See Appendix F.

4.2.3 Terms of Reference Approval Process

a. The ToR development process is spearheaded by the SRB Chair and facilitated by the RM. The Chair and RM must work collaboratively with the CAs and the P/p to develop a ToR that meets the expectations for the Agency and embraces the needs of the P/p to become a value-added effort for all stakeholders.
b. The RM facilitates the vetting process with all CAs prior to circulating the ToR for approvals/concurrences.
c. The RM facilitates the submittal of each ToR for approval/concurrence (see Figure 4-1).

5.0 SRB Products and Responsibilities

The SRB is charged with the responsibility of making an independent assessment. The SRB's role is to provide the CAs with an expert judgment concerning the adequacy of the P/p technical and programmatic approach, risk posture, and progress against the Management Baseline and the readiness against criteria in NPR 7120.5 NID and NPR 7123.1. The depth of review penetration is the responsibility of the SRB and must be sufficient to meet the ToR and to permit the SRB to understand whether the P/p design is adequate and the analyses, development work, systems engineering, and programmatic plans support the design and key decisions that were made. In the case of a special review (see 2.5.15), the depth must be sufficient to fulfill the task assigned. When appropriate, individual members may offer the CAs their views as to what would improve performance and/or reduce risk. The SRB does not have authority over any P/p content. SRB outputs are briefed to the P/p under review prior to being provided to the next higher level of management.

An SRB has three primary tasks or functions: 1) to perform complete comprehensive independent assessments of the P/p; 2) to develop findings and formulate recommendations based on these assessments; and 3) to report its results to the P/p and TAs and DAs. Each of these tasks is discussed in greater detail below. Appendix G shows the Standard Engagement Timeline for an ILCR. This timeline is referenced from the NID. The timeline is referenced throughout the document.

The "standing" feature of the SRB means that the SRB's core membership should remain stable over the P/p life-cycle. This ensures a strong and consistent knowledge base about the P/p under review and minimizes the need for the SRB to be re-oriented prior to each review. In the event that members must be added or replaced, the process for member selection described in NPR 7120.5 and in this handbook will be followed.

Because the SRB will be inactive between life-cycle reviews, it will be the responsibility of the RM to maintain contact with the P/p and inform/coordinate with the SRB Chair, regarding the materials provided to team members outside of the life-cycle reviews for informational purposes (i.e., quarter reviews, risk reviews, major decisional change boards, etc.). Examples of materials that may be provided to the SRB team are significant presentation material from periodic reviews, e.g., quarter reviews, risk reviews, major decisional change boards,

etc. The SRB members will not routinely attend, either as observers or participants, internal P/p meetings, reviews, etc, outside of the life-cycle reviews unless requested.

5.1 Independent Assessments

NPR 7120.5 provides a set of six assessment criteria to be used in integrated P/p technical and programmatic reviews. These criteria are helpful in establishing the scope of SRB independent assessment activities.

The P/p success criteria are also used by the SRB to organize and summarize their findings as discussed below in section 5.2, *Findings and Evaluations*. Each of the independent assessments is discussed in greater detail below.

5.1.1 Requirements Assessment

One of the first assessments each SRB must perform in the P/p life-cycle is the alignment of the P/p requirements with Agency needs, goals and objectives, and how well these requirements have been flowed down to drive all defined levels of the Program content or project design. This assessment typically takes place in the formulation phase leading to the P/SRR or SRR, and, for projects, may continue into Phase B as the Project continues to refine the definition of its design at the subsystem and component levels. The assessment focuses on completion of the requirements flow-down, without stray or open-ended requirements, and monitors requirements fulfillment as the design matures. The System Requirements Document (SRD) and Requirements Traceability Report are two key documents that the SRB should use in conducting this assessment. The SRB should complete their initial assessment findings before program acquisition or the start of the Project Phase B.

5.1.2 Technical Assessments

Technical assessments are somewhat different for Projects and Tightly Coupled Programs versus Uncoupled or Loosely Coupled Programs, so each is discussed separately in the subsections that follow.

Technical Assessments for all Projects and Tightly Coupled Programs

The SRB conducts an independent technical assessment of the Project at each life-cycle review beginning in formulation, continuing during implementation, and concluding during operations phase.). Beginning with design, this assessment subsequently focuses on technical readiness, fabrication, integration, verification/validation testing, operations (including launch), and finally mission products. Throughout this process, technical risk, failure tolerance, and margins adequacy should be continually reviewed. Guidance for these assessments can be found in the entrance and success criteria for each review as provided in NPR 7123.1, as well as NASA Center-specific engineering process documentation.

The SRB needs a broad set of engineering skills to conduct these assessments. The exact mix of skills must be tailored to the mission/flight system design of the Project. A combination of “generalists” and specialists should be considered for board membership. The generalist is someone who has extensive technical and programmatic experience and knowledge that enables him/her to perform assessments over a broad range of P/p. He/she may be an expert in one or more areas, but has a systems orientation and is able to penetrate issues and evaluate the trades and risks a project is faced with over a wide range of technical disciplines. The specialist may be engaged to participate in the assessment of subsystems as necessary. Some of these assessment skills are used throughout the life-cycle, while others may only be needed prior to specific life-cycle reviews. SRB membership (from review to review) must be sufficiently flexible to adapt to changing demands. Knowledge of the NASA project engineering life-cycle is helpful when making SRB membership decisions.

Performing these assessments requires considerable effort on the part of each assigned SRB member. Each assessment effort begins with a thorough review of the appropriate P/p documentation, followed by selective attendance (as observers) at internal project reviews, may include off-line analyses checking, and concludes with participation in project life-cycle reviews. Additional meetings with project personnel may be necessary (within reason and sensitive to limited project resources and time) to ensure full understanding of complex

issues and solutions. Each assessment should respond to issues defined in the previous review and identify important issues to be resolved before the next review.

Technical Assessments for Uncoupled or Loosely Coupled Programs

For uncoupled or loosely coupled programs SRB technical assessments are characterized by specific contents, defined during the initial technical assessment for program approval, that are then periodically reexamined after program acquisition in status/implementation reviews performed typically every two years. These assessments are conducted at a less-detailed level of engineering than project reviews because they are performed at a higher level. Nonetheless, similar skills are needed within the SRB membership to ensure adequate technical readiness within the Program's mission implementation plan/roadmap. This program plan/roadmap should typically cover a decade in order to understand the Program's strategy for pursuing Agency goals and objectives. Project conceptual definitions within the plan should be of sufficient detail to support budget, schedule, and technology development plans within the Program. Technical assessment also includes evaluation of the Program's advanced technology development to ensure Technology Readiness Level (TRL) maturity consistent with the Program plan. Each assessment should respond to issues defined in the previous program review and identify important issues to be resolved before the next status reviews.

5.1.3 Independent Programmatic Assessments

Performing independent programmatic assessments is also a role of the SRB. Independent programmatic assessment topics include: 1) LCC, 2) Life-Cycle Schedule, and 3) Management. Independent life-cycle cost assessments are based on independent budget analyses, NPD 1000.5, NPR 7120.5, SRB requirements, which takes the form of an Independent Programmatic Analysis (IPA). Management assessments break down into three sub-assessments: 1) a Resources (other than budget) assessment; 2) a Risk Management assessment; and 3) a P/p Management Practices assessment including acquisition strategy and contract management performance. The level of detail and the type of assessment in each topic area varies, depending on whether it is a P/p and where it is in its life-cycle. It is important for the SRB to have full ownership of these programmatic assessments because they link the cost, schedule, and management with the technical aspects of the P/p. To perform an independent, integrated cost and schedule analysis in a timely fashion the SRB's cost and schedule analysts will work with the P/p to understand the integrated cost and schedule estimates, including models, developed by the P/p in accordance with the Joint Confidence Level (JCL) requirements of NPD 1000.5, prior to the ILCR in order to meet the formal Agency reporting constraints directed by the Agency (refer to Appendix C). The maximum interval between the internal/system project review and the ILCR can be from zero to six months as shown in Appendix G, Standard Engagement Timeline. This interval is used to complete the work to prepare the integrated cost, schedule and technical baseline for final assessment by the SRB at the ILCR as described in the internal review one page[6]. Note that this interval is zero if the ILCR is held concurrently with the internal system/project review. If this election is made then all the requirements of the ILCR are required to be satisfied in particular the provisions stated above pertaining to early coordination of the cost and schedule models. The integrated cost, schedule and risk assessment will be documented in a single product, the IPA.

Cost and Schedule Assessments

Independent Cost Analysis (ICA)

The SRB conducts an ICA of P/p resources including the budget and financial management associated with the program content. ICAs include, but are not limited to, the assessment of the Basis of Estimate (BOE) of cost estimates, budgets, and schedules in relation to the P/p and its constituent projects' technical content, performance, and risk. BOEs are evaluated by the SRB on the basis of completeness, transparency, accuracy and realism. Using the ICA, the SRB assesses the adequacy of the budget and management practices to accomplish the work scope through the budget horizon.

[6] One Page template available for review.

Independent Cost Estimates (ICE)

An ICE is an independent cost estimate that is sometimes prepared as an internal benchmark to support the ICA. ICEs are typically produced at KDP B (Mission Definition Review (MDR), SDR/Program Non-Advocate Review (NAR)) and KDP C (PDR/NAR) but are also generated if warranted by special circumstances to support the review. ICEs are generally developed using primarily parametric estimating methods and are also supplemented by the use of factors and other estimating methodologies. The ICE is based on the same project definition documentation and technical baseline as used for project Life-Cycle Cost Estimate (LCCE) then is adjusted to reflect the design, development state, and difficulty of the project, based on the expertise of the SRB team members and their assessment of the technical risks.

The ICE will be endorsed by the SRB technical members, and the SRB team as a whole will take ownership by validation of the inputs into the estimating methodologies. The ICE will be a product of the entire SRB. Under circumstance where the SRB is not willing to fully endorse the ICE, the Programmatic Analysis Group (PAG) analyst will document the findings in the IPA and presented as a dissenting opinion.

Independent Schedule Assessment/Schedule Risk Analysis (ISA/SRA)

The schedule assessment is the responsibility of the full membership of the SRB. It is based on an ISA/SRA so the SRB can develop an understanding of the realism and completeness of the P/p schedule, assess risk, and identify where there may be inadequate phasing of available resources verses required resources.

The entire technical team should participate in identifying schedule risk areas based on sound technical judgment and area of expertise. As with the cost estimate, the SRB members must take ownership of the results of the assessment.

A program ISA/SRA is performed more from a strategic viewpoint using the program plan/roadmap to assess the viability of the program planning for the next 5 years. A program ISA/SRA assesses the Program's long-term alignment with sponsor goals and objectives. In tightly coupled programs individual project schedules should be rolled up into an Integrated Master Schedule (IMS) allowing the SRB to assess the integrated effects across all projects.

A project ISA/SRA focuses on the detail implementation plan for that specific project. Items used in performing the assessment include the project plan, WBS, project and SRB identified risks, project IMS, and project detail schedules.

Joint cost and schedule Confidence Level Assessments

Per NPD 1000.5 each P/p being reviewed is required to submit a Joint cost and schedule Confidence Level (JCL) at specific KDPs (i.e., KDP C and D). This assessment is intended to show the level of confidence that the Agency can commit to, and that the P/p will be able to accomplish its technical goals, and execute its plan on schedule within budget. The SRB is responsible for analyzing the submitted P/p JCL to determine the quality of the product. Additionally, the SRB will assess the P/p risks and adjust any likelihood/consequence assumptions or add new risks to the P/p JCL model/estimate and evaluate the impact to the plan. The fundamental ICA,ISA and SRAs support the assessment of the JCL.

Management Assessments

Resources (other than budget) Assessment

Resources (other than budget) are essential elements of successful program functionality, or project implementation and operation. These resources include: manpower, fabrication/assembly/test facilities and equipment, test beds, ground support equipment, launch sites, communication networks, and mission operation centers. They can be either government or privately held resources.

The SRB is expected to assess the adequacy (availability and capacity) of these resources relative to the needs of the P/p throughout the life-cycle. The SRB's assessment should consider not only the adequacy of the proposed/acquired resources, but also alternatives that might reduce cost or risk, or improve the performance of associated life-cycle activities. As with the other assessments, understanding the margins within the proposed resources is also essential, especially as it relates to current and planned manpower loading.

Risk Management Assessment

Each P/p is expected to execute a Risk Management Plan as part of their responsibilities. It is important to understand, particularly for projects, that this is not a plan to reduce mission risk. Rather, the plan is an approach for managing risks associated primarily with the development of the flight system. Hence, it focuses on identifying potential development problems and programmatic risks that might affect the cost and/or schedule of the Project. It is also used in program management to anticipate problems that could delay new starts, or cause approved projects problems when resources beyond their control are either deficient or unavailable as planned. P/p risk management entails a four-step process: 1) identification, 2) risk level determination 3) mitigation strategy, and 4) resource lien allocation. During the life-cycle the P/p will carry an evolving set of risks, with associated liens against reserves. Risk management is a dynamic activity with new risks being added as existing risks are retired, either through mitigation actions or diminished likelihood. The SRB is expected to assess the P/p management of risk for its adequacy to deal with all significant threats to its success. Hence, periodic risk management review, typically in conjunction with the life-cycle reviews, is an ongoing responsibility of the SRB.

Management Practices Assessment

The SRB is expected to perform an evaluation of how well the P/p is managing its responsibilities as part of each ILCR. The scope of this evaluation includes the management approach (organizational structure, integrated product teams, lines of authority, etc.); management practices (how effective control methods are likely to be, how earned value management (EVM) tools are being used, etc.); acquisition planning adequacy (make/buy decisions, procurement strategies, partnership arrangements; and methods of communication/reporting (meetings, document obligations, leadership participation, etc.). An expected benefit of this SRB assessment is the contribution of lessons-learned from the background of experience that a well-qualified SRB team can offer. The SRB also identifies problems/issues within the P/p's controlling organization (Program, Center, or Directorate) that may be hindering the P/p's ability to succeed.

5.2 Findings and Evaluations

It is recommended that the SRB follow a step-wise evaluation process in their assessments of P/p. This process proceeds from the development of findings to the ultimate P/p SRB rating for a review through the following steps:

a. Findings (identification of strengths and weaknesses) and possibly recommendations;
b. ToR success criteria, which will include evaluation of NPR 7120.5 Success Criteria and may include assessment of Center or MD specific review objectives, open RFA action items including potential impact; and
c. SRB rating.

5.2.1 Findings

A finding is a conclusion reached by the SRB based on examination or investigation. A finding can be a weakness (concern, issue), or strength. The SRB's assessment of P/p's readiness to proceed into the next phase of its life-cycle should begin at the most detailed level in terms of strengths and weaknesses, with respect to the scope of the review as defined in the ToR.

Strengths

Strength is a finding of the SRB that describes a feature of the P/p that in the judgment of the SRB is better than expected at a particular stage of the life-cycle. Additional detail may be provided, as appropriate, to more clearly explain why the identified finding is considered a strength. The SRB may identify the benefit(s) expected to accrue to the P/p in its subsequent implementation and operation activities. A strength could also be an observed attribute from which the rest of the Agency could benefit.

Weaknesses (Issues & Concerns)

At the conclusion of a P/p life-cycle review, the SRB may identify different weaknesses. The SRB should then determine which of these weaknesses constitute a threat to the future success of the P/p. If it is deemed critical, it should be treated as an "issue" in the SRB findings. Each issue should be accompanied by observations that substantiate the criticality of the issue to P/p success. With this perspective, the SRB should identify as part of its findings, a recommendation(s) for correcting the weakness, along with a timetable that is consistent with the subsequent implementation/operation activities planned.

If the SRB determines a weakness is worthy of mention, but is not critical to the future success of the P/p, it should be treated as a "concern" in the findings. Each identified concern may be accompanied by a recommendation(s) for correcting the weakness that the P/p is encouraged to consider, again placed in context with subsequent implementation/operation activities.

5.2.2 NPR 7120.5 Assessment Criteria

NPR 7120.5 requires that six criteria be used for all project approval reviews and for program reviews. These criteria will be used for all reviews. Using the same set of criteria with different emphasis throughout the life-cycle creates a consistent metric for traceability. These six success criteria that are defined as follows:

1. Alignment with and contributing to Agency needs, goals, and objectives, and the adequacy of requirements flow-down from those;
2. Adequacy of technical approach as defined by NPR 7123.1 entrance and success criteria;
3. Adequacy of the integrated cost and schedule estimate and funding strategy in accordance with NPD 1000.5;
4. Adequacy and availability of resources other than budget;
5. Adequacy of risk management approach and risk identification/mitigation per NPR 8000.4; and
6. Adequacy of management approach.

The contribution of each of these criteria to the overall state of the P/p varies as the P/p proceeds through its life-cycle. For example, the first criterion (Alignment with Agency Goals) should be completely met early in the life-cycle, preferably by PDR, or the Project should not be allowed to proceed. The SRB should continue to monitor the P/p against this criterion, because Agency goals do change over the decade or more life-cycle of many P/p. However, the likelihood of there being an issue in meeting this criterion should be significantly lower later in the life-cycle.

NPR 7123.1 provides guidance on the temporal importance of each of the entrance and success criteria for each of the P/p life-cycle reviews. These more detailed exit criteria can be mapped into the six success criteria itemized above for each P/p life-cycle review (as an example see Table 5-1, which shows this mapping for the SRB PDR life-cycle review).

Table 5-1. Example Mapping NPR 7123.1 Success Criteria to NPR 7120.5 Success Criteria

Project Life-Cycle Review: Preliminary Design Review (PDR)						
NPR 7123.1 Success Criteria	NPR 7120.5D Review Criteria (Project Adequacies)[1]					
	a. Reqmnts	b. Technical	c. Integrated Cost and Schedule	d. Resources	e. Risks	f. Mgmt
1. The top-level requirements - including mission success criteria, TPMs, and any sponsor-imposed constraints - are agreed upon, finalized, stated clearly, and consistent with the preliminary design.	Primary Relevance	Secondary Relevance				P
2. The flow down of verifiable requirements is complete and proper or, if not, an adequate plan exists for timely resolution of open items. Requirements are traceable to mission goals and objectives.	P					P
3. The preliminary design is expected to meet the requirements at an acceptable level of risk.	S	P			S	
4. Definition of the technical interfaces is consistent with the overall technical maturity and provides an acceptable level of risk.		P			S	P
5. Adequate technical interfaces are consistent with the overall technical maturity and provide an acceptable level of risk.						
6. Adequate technical margins exist with respect to TPMs.	S	P				
7. Any required new technology has been developed to an adequate state of readiness, or back-up options exist and are supported to make them a viable alternative.		P	S			
8. The project risks are understood and have been credibly assessed, and plans, a process and resources exist to effectively manage them.			P	P	P	P
9. Safety, reliability, maintainability, quality, and EEE parts assessments have been adequately addressed in preliminary design and any associated product, such as the PRA, hazard analysis, failure modes and effects analysis, have been approved at a level consistent with the level of design maturity.	S	P			S	P
10. The operational concept is technically sound, includes (where appropriate) human factors, and includes the flow down of requirements for its execution.	S	P		S		

1. NPR 7120.5D Criteria
a. Alignment with and contributing to Agency needs, goals, and objectives and the adequacy of requirements flow-down from those;
b. Adequacy of technical approach as defined by NPR 7123.1 entrance and success criteria;
c. Adequacy of the integrated cost and schedule estimate and funding strategy in accordance with NPD 1000.5;
d. Adequacy and availability of resources other than budget;
e. Adequacy of the risk management approach and risk identificationand mitigation per NPR 8000.4; and
f. Adequacy of management approach.

The standard metric for the SRB success criteria evaluations is a three-level metric scale, i.e., successful (green), partially successful (yellow), or unsuccessful (red). This is sometimes referred to as a "stoplight" assessment. Tables 5-2 and 5-3 provide an example of how to apply these metrics to the evaluation of each of the six success criteria for P/p life-cycle reviews, respectively. The SRB is expected to provide its evaluation for each of the success criteria, along with supporting rationale that addresses the topics provided as guidance in these tables. Note that the metrics in the tables should be used as guidance only. As the P/p matures, the metrics for the criteria should become more demanding. A deficiency that might be acceptable early in the P/p is likely to be unacceptable later. It is up to the SRB to use its expertise to evaluate the P/p, taking into account the stage in the life-cycle or other circumstances, and assess the risks that any deficiencies against the "green" standard pose to the successful execution of the P/p.

Table 5-2. Example Project Success Criteria Evaluation Guidance

Success Criteria	Project Evaluation Metrics		
	Successful	Partially Successful	Unsuccessful
Alignment with Goals	Project objectives are well-aligned with strategic goals; Project aligns with level 2 requirements; objective-driven requirements are clearly flowed down thru the WBS and drive the baseline mission design; project is in compliance with required NASA policy directives (NPDs) and procedural requirements (NPRs).	Traceability of Project objectives to strategic goals is unclear; project is working to align with level 2 requirements; requirements flow-down is incomplete; design capabilities are not yet consistent with requirements; project is satisfactorily working to meet compliance with required NPDs and NPRs.	Concept capabilities are driving project objectives; project does not align with level 2 requirements; objectives do not align with strategic goals; requirements flow-down is haphazard, without traceability, and/or not driving the design; Project does not appear to be able to meet compliance with NPDs and NPRs.
Technical Adequacy	There is an acceptable baseline design; the design is requirements driven; the capabilities of the design ensure adequate technical margins against the requirements.	The design has not yet stabilized; design trades remain open beyond expected milestones; some baseline design margins are inadequate against requirements; technical readiness (TRL 7) is a concern.	There is an inadequate baseline design; technical margins are clearly inadequate at this point in the project life-cycle; technical maturity (TRL 7) is unlikely within planned schedules.
Schedule Adequacy*	A realistic master schedule with sufficient detail appropriate to life-cycle phase exists; critical paths are understood; schedule can be justified by performance of similar projects. Schedule margins are consistent with project JCL** results.	The master schedule is incomplete or lacks maturity relative to project lifecycle phase; schedule duration only partially supported by historical project experience; critical path identification is flawed; risk mitigation plans have not been incorporated. Schedule margins consistent with JCL** have only been partially accommodated.	The master schedule is not available or only notional; critical paths are not identified; schedule durations are unsupported by historical experience. Schedule margins do not conform with JCL**.
Budget Adequacy*	An adequate basis-of-estimate exists for the baseline LCC; annual phasing fully supports the scheduled work content. The commitment baseline incorporates the UFE required to support the JCL**; the project's management baseline includes an appropriate allocation of the UFE.	The basis-of-estimate is incomplete or at issue for baseline LCC; annual phasing partially supports the scheduled work content or is inadequate in some years. The commitment baseline incorporates only some the UFE required to support the JCL**; the project's management baseline includes an inadequate allocation of the UFE.	The basis-of-estimate is not provided or is substantially at issue for baseline LCC; annual phasing inadequately supports the scheduled work content or is insufficient in many years. The commitment baseline doesn't incorporate the UFE required to support the JCL**; the project's management baseline does not include an allocation of the UFE.
Resource Adequacy	All resources and facilities have been identified and are available; project is adequately staffed.	Availability of some needed resources and/or facilities are questionable; staffing may be inadequate or lagging plan.	Needed resources and/or facilities are either not identified or not available within schedule or cost constraints, and staffing is clearly inadequate.
Risk Management Adequacy	An adequate risk management plan exists; risks have been identified with mitigation plans; reserves are adequate to manage top risks.	A risk management plan exists, but risk identification and/or mitigation is incomplete; reserves may not be adequate to manage risks. Risk management plan implementation incomplete or ineffective.	A risk management plan does not exist, or is incomplete; top risks have not been identified; not possible to determine adequacy of reserves to manage risks. Risk management plan implementation incomplete or ineffective.
Project Joint Confidence Level Assessment Credibility**	The project's assessment of its integrated cost, schedule, risk plan has been developed using standard best practices, includes the impact of risk drivers on critical and near critical paths, and identifies both time dependent and time independent resources	Does not include all major risks that can impact cost and schedule, discrete risks are not clearly linked to the proper activities, resources may be missing, schedule or simulation model of schedule has minor flaws that can be corrected	Model used for assessment does not clearly simulate the project integrated cost, schedule, risk plan, schedule or simulation model of schedule does not pass health check, major flaws in the model impact the credibility of the outcome
Project Management Adequacy	An effective organization structure exists; mgmt processes exist and are being proactively used to effectively direct/control the project and its contractors; essential interfaces are defined and agreements in place.	Organizational structure is lacking in some areas; control processes are questionable or have latency issues; interfaces are incomplete.	Organizational structure is unacceptable; necessary interfaces don't exist; control processes are notional and not in place.

*Cost and schedule are integrated

** JCL is not reviewed at every KDP, example criteria should be adjusted as appropriate

Table 5-3. Example Program Success Criteria Evaluation Guidance

Success Criteria	Program Evaluation Metrics		
	Successful	Partially Successful	Unsuccessful
Alignment with Goals	Program objectives are prioritized and well-aligned with strategic goals; objective-driven L1 requirements are defined for current and near-term projects	Program objectives are not well-aligned with strategic goals; L1 requirements for near-term projects are immature	Program objectives are notional and/or don't align with strategic goals; L1 requirements for existing projects may be lacking and do not exist for near-term projects
Technical Adequacy	A 10-year architecture exists, consistent with program/agency goals; project concepts exist for the architecture that are driving near-term technology investments; key external interfaces/needs are defined	The 10-year architecture is notional and not always consistent with Agency goals; future mission concepts are inadequate for planning guidance; external needs are poorly defined	A 10-year architecture does not exist; future mission concepts are without basis; little or no planning guidance exist for current readiness investments
Schedule Adequacy*	A program roadmap exists, aligned with the program architecture, and is credible in terms of technical readiness and baseline budget adequacy; near-term roadmap milestones are specific; longer-term milestones are robust to program uncertainties; provides for adequate schedule margin to support both project and program JCLs**.	The program roadmap is incomplete; future milestones and associated needs may be inadequate to support budget and/or technical planning needs; provides for only some of the margin needed to support the project and program JCLs**.	A program roadmap does not exist; future key milestones are unknown; there is no basis for scheduling program investments and readiness activities; provides inadequate schedule margin required to support both project and program JCLs**.
Budget Adequacy*	The current program budget and phasing is adequate to support existing program scope; the approved 5-year budget plan is sufficient to implement the program plan; the program funding wedge is adequate for the formulation of projects beyond the 5-year horizon; the project and program UFE is adequate to support the program JCL**.	The current and approved 5-year baseline budgets and phasing may not be adequate to support the program plan; the program funding wedge may not be adequate for the formulation of projects beyond the 5 year horizon; program and project UFE is either phased inappropriately or falls short of levels needed to support program and project JCLs**.	The current program budget and phasing are inadequate to support program content; no plan exists to bring program content and budget into alignment; the 5-year budget plan is inadequate to support program expectations; the program funding wedge is inadequate for the formulation of projects beyond the five year horizon; the program and project UFE or the phasing of the UFE do not support the program and project JCLs **.
Resource Adequacy	All key implementation facilities have been identified and are available to support near term (5-year) missions; staffing resource needs have been determined and are available; needed external resources are available.	All key resources and facilities may not be identified to support near term (5-year) missions; known resources may not be available when needed; external resource needs are notional.	Needed resources and/or facilities are not identified; availability of either internal or external resources is unknown.
Risk Management Adequacy	A program risk management plan exists; existing and near-term projects are properly categorized, meet classification requirements and are executing risk management processes; a longer-term risk strategy exists and is consistent with program resources and importance.	The risk management plan is immature; some near-term projects have not been categorized, projects don't meet all classification requirements or aren't fully executing risk management processes; the longer-term program risk strategy is notional at best.	A risk management plan does not exist; categorization of current projects is inconsistent; near-term projects havenot been categorized, projects don't meet classification requirements or aren't executing risk management processes ; no longer-term program risk strategy exists.
Program Joint Confidence Level Assessment Credibility**	All project JCL assessments have been completed; program logic networks are complete (where appropriate) ; program level risk are all included; all risks have been included and appropriately quantified; performance to date on cost and schedule have been incorporated. Program documents and provides all necessary inputs to enable calculation of Program JCL.	Only some project JCL assessments have been completed; program logic networks are incomplete (where appropriate); program level risk are only partially included; risks have been partially or inappropriately quantified; performance to date on cost and schedule have not been fully incorporated. Program documents and provides only a portion of inputs required to enable calculation of Program JCL.	Many project JCL assessments have not been completed; program logic networks are incomplete (where appropriate); program level risks are not included; risks have not appropriately quantified; performance to date on cost and schedule has not been incorporated. Program documents and provides only a portion of inputs required to calculate a Program JCL.
Project Management Adequacy	The program organizational structure is defined and effective; interfaces to projects are clear; program policies and controls are defined; the program base (R&A, Adv Dev, etc.) is adequate.	The program organizational structure lacks clarity; lines of authority may be duplicated; policies/controls are not well defined; interfaces are incomplete; weak program base.	Organizational structure is unacceptable; control processes are notional and not in place; necessary interfaces are not defined; program base not defined.

*Cost and schedule are integrated
** JCL is not reviewed at every KDP, example criteria should be adjusted as appropriate

5.2.3 Center/Mission Directorate Review Objectives

Some Centers/MDs will define a set of objectives for life-cycle reviews that, if met, represent successful completion of the phase or life-cycle review the P/p has just completed. These objectives usually consolidate the content of more detailed success criteria (as just discussed in the previous subsection) into two or three statements or questions. As an example, the following set of three questions has been used by a Center to determine a successful project CDR:

a. Do the designs and processes meet requirements and are they sufficiently defined and documented to proceed within the risk policy of the Project?
b. Are the plans for resolving remaining problems consistent with available resources and the Project risk policy?
c. Are the test approach and the status of test products thorough and acceptable?

In order to facilitate communication when the SRB debriefs the results, an evaluation of the specified objectives should be performed by the SRB during its review assessment. Again, in addition to determining whether or not the review objectives have been met, a rationale should be provided with each response to substantiate the SRB's evaluation.

This evaluation request is optional for the Centers/MDs. To determine whether or not a Center/MD evaluation should be performed, the SRB Chair and RM should contact the appropriate representative prior to preparing the Addendum ToR for the review. If there is a request, these objectives can be incorporated in the Addendum ToR, ensuring a comprehensive response as part of the overall SRB assessments and evaluations.

5.2.4 SRB Rating

When the SRB has completed all evaluations and independent assessments, reviewed its findings and possible recommendations, its final responsibility is to assess whether the P/p is ready for its SRB rating life-cycle review. This is the ultimate manifestation of its assessment. When determining the SRB rating conclusion, rationale must be provided. Unless a satisfactory conclusion is given without reservations, the rationale should both explain why the SRB has reservations, and what corrective action needs to take place to put the P/p back on the preferred track, e.g., mitigation of specified liens. Regardless of its conclusion, it is not the responsibility of the SRB to determine if and when a delta-review might be necessary, i.e., the DA may authorize a P/p to proceed in lieu of a non-passing conclusion given by the SRB.

5.3 SRB Reporting Guidance

In the case of the NC board (refer to Appendix E), while open discussion may occur, consensus on findings and recommendations are not permitted. In this case, each member will prepare his/her own report and should complete individual rating against the NPRs 7120.5 and 7123.1 criteria. The Chair will prepare findings and recommendations (which may be informed by earlier discussions with the SRB team) for presentation to the P/p, CAs, and DA. The NC board's recommendations and SRB rating will be the personal findings and recommendations of the Chair alone. The RM will prepare the final report by compiling the findings and will summarize the findings of individual members of the team, including that of the Chair.

In the case of CS-2 boards (refer to Appendix E) where there are expert support personnel, consensus will be reached in the absence of the support personnel, i.e., the consensus process will only include the civil service members. Any minority reports will be included in the briefing and the final report. The RM, in the preparation of the final report, will summarize the opinion of the expert support personnel. As in the case of the NC board, technical discussions and data exchange may occur outside of the consensus process.

The CS board will have one report from the SRB documenting their consensus opinions. It is the responsibility of the SRB Chair and RM to compile the report. Any minority reports will be included in the briefing and the final report.

5.3.1 Preparation of the SRB One Page

As a prerequisite to starting the site review, the SRB should have compiled their issues and concerns list developed through their participation in the P/p's internal reviews, and the P/p one page to the DA that includes the plan forward to the ILCR. (Refer to the Standard Engagement Timeline in Appendix G.) The independent programmatic analysts will also have worked with the P/p to understand their cost and schedule approaches/models and have completed their benchmarking work.

At the completion of the P/p Site Review, the SRB will convene to: (1) establish their findings; (2) coordinate these findings with the P/p; (3) develop their recommendations; (4) complete a draft of the SRB final briefing; and (5) prepare the one page. Upon completion of these items, the SRB Chair and the PM will report the one page of results to the DA within 24-48 hours. Under normal circumstances (i.e., no requirement for presentation at an agency Baseline Performance Review (BPR)), within one month of the completion of the ILCR (site visit) or as specified in the ToR, the SRB presents its report in a briefing to the DA. In the case of a NC SRB, free and open technical discussions are allowed but the reported findings and recommendations and subsequent coordination and briefings are performed by the Chair with the support of the RM and independent programmatic analyst.

The one page prepared by the SRB and/or Chair highlights the major issues identified by the SRB and can include the P/p responses and the plan forward to KDP. The SRB final briefing will be completed 30 days from the conclusion of the DA one page or as specified in the ToR.

5.3.2 Briefing Reports

The briefing report captures a summary of the review process and highlights the SRB findings and recommendations, and summarizes the RFAs. It is used to communicate the results of the review, starting with the P/p and including the reporting venues in order, as identified for the specific review.

The SRB Chair and RM develop the briefing report with inputs from SRB team members. In the case of the NC SRB, the briefing reflects the SRB Chair's personal opinion.

5.3.3 Written Reports

The written report provides a complete and comprehensive documentation of the review. It is intended to provide the details of the review process with particular emphasis on the findings and any associated recommendations. The written report is due 30 days after the final DA briefing.

This section refers to written reports prepared by SRBs formed under the CS and CS2 and the Chair under the NC board. The SRB produces a CS report with findings of fact and recommendations; and RFAs (or equivalent) from individual members. Reports and RFAs can contain individual recommendations. The SRB produces a CS2 report with findings of fact and recommendations; RFAs (or equivalent) from any individual; reports from individual experts. Reports and RFAs can contain individual recommendations. The NC written report will be a compilation of individual team member's inputs, the SRB Chair's report and the SRB prepared RFAs. The RM will develop an executive summary of all the individual reports, and any relevant information concerning the review. This compilation will be accomplished by the RM and reviewed by the Chair. The NC report will also include sections regarding SRB formation, organization, approach, etc.

Once completed, the RM will distribute the report, in accordance with NPR 7120.5. Only the appropriate NASA authorities can distribute SRB reports external to the Agency.
The decisional addendum must be included as part of the release of any SRB work to ensure the SRB's final conclusion always is part of any disclosure.

The Responses, Recommendations and Decisions (RRD) report serves as a stand-alone archive of the review's products and process. The RRD report will include P/p, Center and Mission Directorate responses, and the final decision by the DA as agreed to in the KDP decision package.

The organization responsible for assigning the RM is responsible for maintaining an archive for each review they have responsibility for.

6.0 SRB Notional Review Approach

The purpose of this section is to walk the reader through a representative ILCR, from the creation of the baseline and Addendum ToR to the final briefing to the governing PMC, by providing lessons-learned guidance on how this can best be conducted. It should be noted at the outset, that the intent is to provide a *guidance* process, not a *required* process. Since every review has some unique aspects to consider, one approach will not fit every review situation. Refer to the Standard Engagement Timeline in Appendix G. Common sense and flexibility are always needed when planning and executing the approach for an SRB review.

It is also important to note that this section is written generically and assumes the SRB composition of either a CS or a CS-2 SRB as defined in Appendix E. There will be no consensus when a NC SRB, as defined in Appendix E, is selected.

An overview of the SRB review approach is presented in Figure 6-1. There are three areas of responsibility in the approach: 1) the SRB Chair and RM's specific responsibilities, 2) the responsibilities of all the SRB Members, and 3) the responsibilities expert consultants performing the support assessments. The review approach is divided into four generic functions, as indicated by the colors applied to each task in the figure. These functions are:

a. Review Preparations
b. Performing Supporting Analyses
c. Conducting the Review
d. Finalizing assessments.

As shown in Figure 6-1, within each responsibility block (gray background) the order of functions being completed proceeds from top to bottom. Each of these functions is discussed in detail in the subsections below.

ILCR schedules vary widely across different P/p and different reviews. As such, it is not possible to develop a single schedule that covers all P/p ILCRs. However, there is a natural sequence of functions that are performed and align with the functions listed above.

The actual review schedule is formulated as part of the preparation of the Addendum ToR for the ILCR. Dates for the schedule are determined on a case-by-case basis with the preparation of each Addendum ToR.

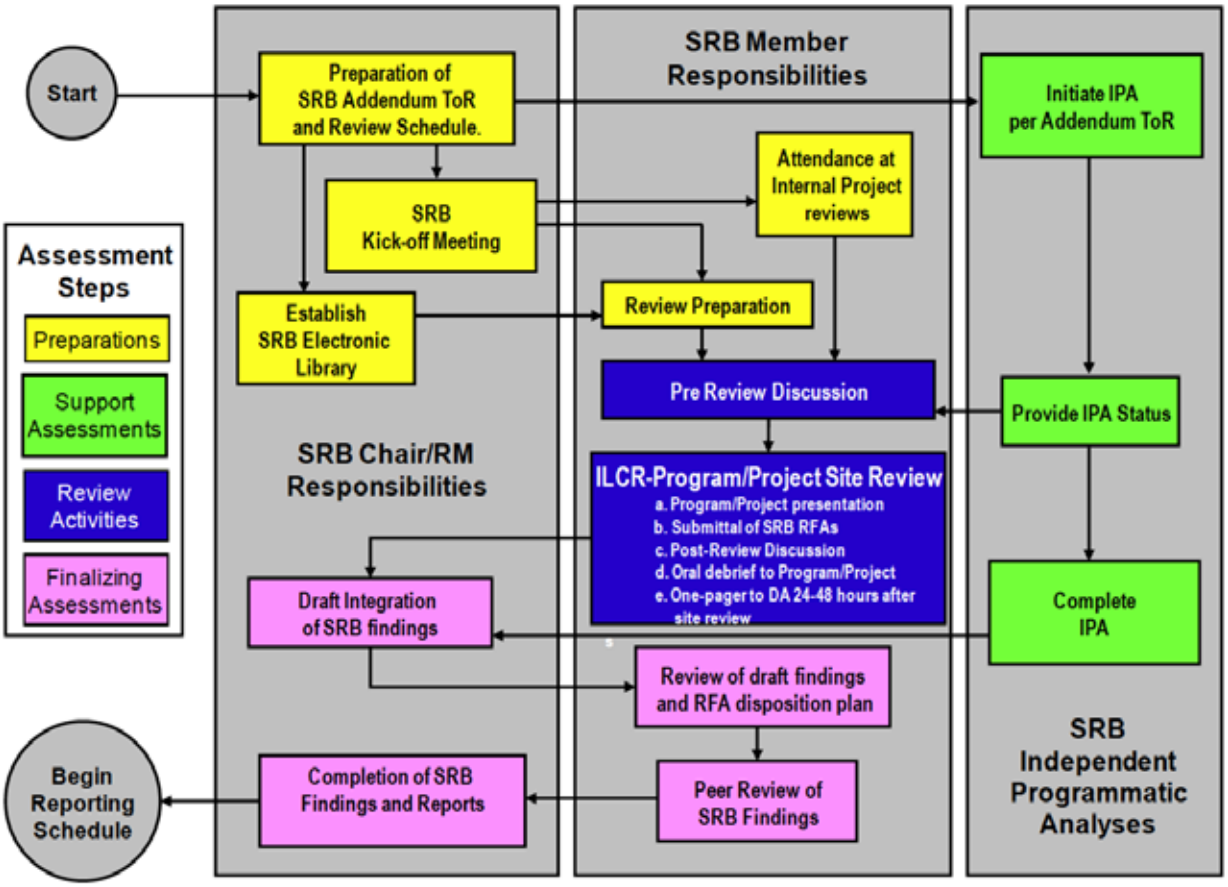

Figure 6-1. SRB Review Process Flow

6.1 SRB Engagement Prior to the Site Review

The first task in the review approach is to prepare the Baseline and the Addendum ToR for the review. This should be done as soon as possible. Timely completion of the Addendum ToR is important, because it establishes the schedule of the many groups/individuals involved in the review process, and it defines the roles and responsibilities of the SRB members across the life-cycle phase of the P/p leading up to the ILCR. It also informs the P/p of their responsibilities/deliverables in supporting the SRB's charter, i.e., the review entrance criteria (NPR 7123.1) and the Phase requirements (NPR 7120.5), which determine review readiness. Refer to section 4.2.2 for the preparation details of Addendum ToRs. Once the Addendum ToR has been completed, it is submitted for approval.

One additional preparation activity, typically undertaken by the SRB Chair and RM early in the life-cycle of projects, is to schedule a kick-off meeting with the SRB membership. The goal of this meeting is to educate the SRB on the goals/objectives of the review. This early interaction eliminates many "informational" questions asked by SRB members during the time-constrained agendas of the ILCRs. Strategic Investments Division (SID) will provide the SRB with P/p reporting and status as part of the kick-off meeting. For programs or projects, the kick-off meeting can be conducted before each life-cycle review. For uncoupled or loosely coupled programs, it may be appropriate to schedule these meetings before each PIR, since these occur on two-year intervals, and since events can occur within a program during a two-year period. At the kick-off meeting the Chair and RM make the planned membership assignments, configure the SRB Document Library and facilitate P/p document access, and ensure the initiation of the appropriate independent programmatic analyses.

Each member then proceeds to prepare for the ILCR. Their preparation activities may include attending various internal project reviews, reviewing P/p documentation, and beginning the support assessments. Internal review attendance must be at the invitation of the Chair of the internal review and/or the P/p manager (PM). If the SRB members are scheduled to attend internal P/p reviews, this must first be coordinated with the SRB Chair and RM so they may manage the SRB activities. During this preparatory period, there may be multiple contacts with P/p personnel, including requests for supporting documentation. All such contacts should be coordinated

through the SRB Chair and RM to avoid overburdening the P/p organizations and to ensure management of SRB resources.

Within 24-48 hours of the conclusion of the internal review (System or Mission Level, e.g., internal SRR, SDR, PDR, etc), the P/p manager and SRB Chair will prepare a one page summary to be presented to the DA. This one page includes high level issues resulting from the internal reviews, and is provided by the SRB Chair. It is the first one page as illustrated in Appendix G, Standard Engagement Timeline. At this time the Project will also include in the one page a schedule of activities leading to the ILCR site visit that is within six months after completion of the internal review. During the period (between the completion of the internal review and the ILCR site visit, which can be from 0 to 6 months) the P/p will finalize its integrated technical and programmatic position for presentation to the SRB. The P/p determines when they will be prepared for the ILCR. At the conclusion of the internal review, the SRB Chair will make a qualitative assessment of the P/p's readiness for the ILCR. As part of the one page summary, the SRB will inform the P/p in the event the SRB concludes there are too many open items to successfully execute the ILCR. At the one page briefing, the DA may determine that further discussions are needed regarding the P/p's readiness to proceed and direct that the Project, Program or MD provide a status of progress at a future BPR.

It is noted that NPR 7120.5 recognizes that some P/p, particularly in some of the robotics projects, may not conduct a separate internal review and ILCR. In this case, the P/p may opt to go directly to the ILCR after completion of the lower level internal reviews, foregoing the internal review. In this event, it remains the P/p's responsibility to have an integrated technical, risk, cost, and schedule position at the time of the single review.

At least a month before the site review, the SRB Chair or RM should request a draft review agenda from the P/p. This agenda should be vetted with the SRB membership to ensure that the expected P/p content is included in the planned presentations. Often the level of detail desired at an ILCR is determined by where the SRB believes the P/p implementation challenges occur. Hence, SRB review of the agenda provides an opportunity to "adjust" the planned presentations to include the information needed by the SRB to complete its evaluation.

Thirty to sixty days prior to the SRB site review, the PA&E SID analyst assigned to the Project will pre-populate the Baseline Report (Word document) based on the project pages in the most recent Congressional budget for the Project to update, to reflect the proposed integrated baseline. SID will work with the Project to populate the cost and schedule Data Template (Excel document) based on the Project's Cost Analysis Data Requirement (CADRe) information. Completing these forms may require P/p and Mission Directorate interaction and support.

6.2 Independent Programmatic Analyses

Independent programmatic analyses are performed in two phases:

Phase 1: Early review of and coordination of SRB programmatic analysts with the P/p regarding the integrated (technical, cost, & schedule) baseline or plans. As noted in NPR 7120.5 NID, this includes a review and understanding of the P/p cost/schedule plan, any models used, and the JCL (when appropriate). The P/p will deliver any processes, or models, including the JCL (when appropriate), to be used to introduce independent assumptions or risks identified by the SRB.

Phase 2: Development of the SRB assessment of the P/p integrated baseline or plans. This phase of the independent programmatic assessment process includes an assessment by the SRB of any risks and the baseline set of assumptions that impact the P/p cost/schedule plan or baseline. The SRB will evaluate the baseline assumptions, adjust the likelihood and consequence of previously identified P/p risks, as well as introduce new risks not already included into the P/p process/models. The independent SRB assessment information will be used as input into the P/p process/models, delivered in Phase 1, to evaluate the impact. This assessment may necessitate the establishment of a measurement benchmark by the independent programmatic analyst in the form an ICE and or ISA to support the evaluation. The analysis will result in a list of the greatest risks and the cost and schedule impacts compared to the P/p plan or baseline for presentation to the DA.

It is essential that Phase 1, and most of the Phase 2, be complete prior to the conduct of the ILCR Site Review. This is necessary because of the time required to perform the analyses that support the assessment process. If the P/p integrated technical, cost and schedule baseline is not complete prior to the start of the Site Review, the P/p will identify the schedule by which it will be completed and present this plan to the DA for disposition.

The result of Phase 2 is developed by inputs from all SRB team members and is an integral part of the SRB assessment. The process of converging on the independent programmatic assessment results may be iterative as the assumptions and risks are evaluated in the course of the analyses.

6.3 Conducting the Independent Life-Cycle Review

In this handbook the phrase "the ILCR" refers to the period of time when the P/p provides standup presentations to the SRB (the "site review") and the SRB completes its final briefing to the designated DA on its findings and recommendations (see Appendix G).

As noted in NPR 7120.5, the P/p is responsible for required briefings to other CAs. The SRB, in particular the SRB Chair, RM and independent programmatic analyst, will be prepared to support the briefings which will be scheduled by the P/p.

Per NPR 7120.5 NID paragraph 2.5.12.1 the independent life-cycle review has three parts: (1) presentation of the P/p's integrated technical content, cost, and schedule baseline; risk status (including performance); and future plans; (2) the preparation of a preliminary SRB briefing/report with P/p responses to the major issues (which may be as long as five-ten working days depending on the complexity of the P/p); and (3) presentation of the findings to the DA.

During the review, the P/p presents its status through sequential briefings for each topic, typically given by the P/p lead. The SRB Chair presides over the review, and is responsible for keeping on schedule. The agenda for the review will have been coordinated between the P/p and the SRB Chair/RM and will include programmatic discussions of acquisition strategy, risks, costs, and schedules.

The presenters answer questions from the SRB members in real time if possible. If further detail is required, the P/p may offer to provide the necessary information later in the review, or a splinter session may be arranged in parallel with additional presentations.

6.3.1 Submittal of SRB RFAs

If a SRB member feels their concern is not adequately addressed, and is unlikely to be resolved within the time-span of the review or needs more information, they may submit a RFA. The P/p is required to provide a written response explaining how the RFAs will be dispositioned. After reviewing the intended disposition, the author of the RFA determines whether the P/p understands the issue and whether the disposition is appropriate. The RFA author should also endorse any actions arising from the RFA before it can be closed. It is acceptable practice for an SRB member to sponsor an RFA submitted by an observer or expert consultant at the review, if the SRB member feels the subject matter is appropriate/important to the review. Each Center should have an established RFA process that the P/p can use. The process should ensure that each RFA can be tracked from submission to closure. The P/p is responsible for tracking, closing by getting concurrence of the initiator, and reporting the status of RFAs.

Features of a typical RFA process include:

a. A unique number for each RFA.
b. A person responsible for developing a response to the RFA from the P/p.
c. A database that contains each RFA and the data used to close the action.
d. Each RFA is tracked per specific review and the status (open, closed, pending) reported at the next ILCR. If open, the risk associated with that RFA should be reported.

e. Closure process includes concurrence by the RFA originator and SRB Chair. Note: if the originator refuses to sign the RFA closure, the Chair can override the process and close the RFA if the Chair believes the RFA has been properly addressed. In this event, the RFA originator has the option of writing a dissenting opinion which will be a part of the SRB final report.

At the completion of the review, each member prepares an Individual Member Independent Report (IMIR) and submits the IMIR to the SRB Chair and RM. The Chair collects all RFAs written during the review and is responsible to review the RFAs for clarity and scope, thus eliminating redundancies, rejecting those that are out-of-scope, and/or requesting rewrites if the intent/description is unclear.

Within 24-48 hours of the completion of the ILCR Phase 2, the SRB Chair and the PM will prepare a one page summary for the DA which includes the major SRB findings and Project responses and the SRB's assessment of the Project's readiness to proceed for the governing PMC. If there are disagreements about major issues/responses, the DA may require the P/p to present more details about the issues and their responses at an Agency BPR.

6.4 Finalizing Assessments

6.4.1 Post-site review Discussions/Exchange and One Page/Preliminary Final Report Preparation

SRBs are constructed under three different options, i.e., CS, CS2, or NC. The process to arrive at the SRB findings and recommendations differs depending on the type of SRB i.e., CS, CS2 or NC.

For the CS SRBs, consensus is at the civil servant level.

In case of the CS2 SRB, consensus can only be reached with the civil servant members (in the absence of non-civil service expert consultants).

For the NC SRB, technical and programmatic discussions are permitted among the SRB members and expert support, but the Chair presents his/her personal findings and recommendations to the CAs and DA. These findings and recommendations are informed by technical discussions among members of the board and documented in the IMIRs required of the SRB team members and the expert support. If there is a dissenting finding, a minority report is submitted.

For all three board constructs the SRB will meet immediately after the review to discuss and establish their findings and recommendations, prepare the one page for presentation to the DA, and complete a preliminary briefing/report.

This paragraph summarizes the KDP Decision Package process. The Project is to provide the draft KDP Decision Package at the SRB site review to the SRB, the PMC Executive Secretary (ES), and the SID analyst. Subsequently, the P/p and MD may modify the KDP Decision Package as needed. Prior to the PMC pre-brief, the P/p is to provide the updated KDP Decision Package to the PMC ES and the SID analyst.

Coordination of the SRB's findings and recommendations may involve technical discussions to clarify misunderstandings or to provide additional data. Also at this time, the P/p will present their preliminary responses to the findings/recommendations of the SRB in an informal setting. The result of this activity will be documented by the SRB as part of the one page and preliminary final briefing and preliminary final report. The one page is intended to summarize for the DA a quick qualitative status of the review, the most significant issues along with the associated P/p responses, the highlights of the cost assessment and the forward plan to the KDP.

The Chair may also solicit an opinion from the members on their evaluation of the P/p against the review success criteria (see discussion of success criteria in section 5.2.2) and their overall opinion of the P/p SRB rating review. In the case of the CS2 or NC boards, the non-civil service members will prepare IMIRs and

assessments against review success criteria. This information may be used by the Chair to inform their opinions. The RM will compile these individual reports in the final report.

The completion of the one page and preliminary briefing/report formally marks the end of the site review period and starts the clock on the thirty days for the briefing to the DA. The RM will coordinate with the ES of the appropriate PMC to finalize the schedule for the DA outbrief.

6.5 Debriefing the Standing Review Board Findings

SRB debriefings occur in three varieties: 1) one page to the DA; 2) support to the debriefings organized by the P/p to CAs (and others); and 3) debriefing to the DA. The SRB Chair is responsible for debriefing the SRB findings. Typically, at a minimum, the RM and IPA analysts accompany the Chair to these debriefs. Copies of the SRB's final briefing are distributed to each venue (P/p and management council) in advance of the scheduled debriefs. The specific course and number of debriefs given by the SRB Chair depends on whether it is a P/p review; and for a project, its categorization.

The format of SRB debriefs is established by the organization to whom it is being presented. Previously, many debriefs were held in point-counter point fashion, alternating between the SRB and Project for each issue. Currently, and required by the Agency PMC (APMC), the PM makes the entire presentation with comments from the SRB Chair. The RM will coordinate the debrief format of choice and will provide the Chair and P/p templates or examples as available.

To complete formal actions at a KDP, the DA makes and documents the decision and its basis (including materials presented, major issues, options and open action items); signs the ensuring KDP decision memo; and archives the documents. If changes are required, the KDP decision memo is revised, all necessary signatures obtained and the KDP decision memo resubmitted to the DA for final signature. Appeals must go to the next higher DA.

Once the last management council in the debrief process has been briefed, the RM will compile the RRD report. The RRD report will be the official position of the Agency with regards to the response, recommendations and decisions of the ILCR. This report will include the SRB report and its briefing, the P/p response to SRB findings, the briefings by the Engineering, Health and Medical, and Safety and Mission Assurance TAs and the minutes from the Center Management Council (CMC), the MDPMC and the APMC. The RRD report will be archived by the IPAO or the organization responsible for the review.

Appendix A. Glossary

Advocate. A person in the direct chain-of-command of the P/p DA.

Agency Program Management Council (Agency PMC). The senior management group, chaired by the NASA AA or designee, responsible for reviewing formulation performance, recommending approval, and overseeing implementation of programs and Category 1 projects according to Agency commitments, priorities, and policies.*

Approval. Authorization by a required management official to proceed with a proposed course of action. Approvals must be documented.*

Approval (for Implementation). The acknowledgment by the DA that the P/p has met stakeholder expectations and formulation requirements, and is ready to proceed to implementation. By approving a P/p, the DA commits the budget resources necessary to continue into implementation. Approval (for Implementation) must be documented.*

Architecture. A term used to describe the structure and content of a NASA Program. It is not to be confused with program roadmap, which describes how/when program architecture, is executed.

Baseline (general context). An agreed-to set of requirements, cost, schedule, designs, documents, etc. that will have changes controlled through a formal approval and monitoring process.**

Baseline Design. The mission design of a project, when it is sufficiently mature to comply with all requirements, has an implementation and operational schedule, and is consistent with approved/planned funding; within the Project life-cycle; the baseline design is expected at or shortly before the end of the formulation phase, i.e., in time for a PDR.

Benefit. A strength identified by the SRB, which is clearly "better than expected" at that point in the P/p life-cycle, and offers definable value-added to NASA.

Categorization. A means of establishing Agency expectations of PMs relative to oversight council and planning detail; projects are either Category 1, 2, or 3, with Category 1 receiving the highest level of scrutiny (see section 2.1.4 of NPR 7120.5 for a full explanation).

Center Management Council (CMC). The council at a Center that performs oversight of P/p by evaluating all P/p work executed at that Center.*

Concern. A finding identified by the SRB; SRB concerns are typically documented and briefed to the P/p, but not specifically addressed with the management councils (unless asked).

Concurrence. A documented agreement by a management official that a proposed course of action is acceptable.*

Conflict of Interest (COI). A COI involves the abuse—actual, apparent, or potential—of the trust that NASA has in its personnel. A COI is a situation in which financial or other personal considerations have the potential to compromise or bias professional judgment and objectivity. An apparent COI is one in which a reasonable person would think that the individual's judgment is likely to be compromised. A potential COI involves a situation that may develop into an actual COI. A COI exists whether or not decisions are affected by a personal interest; COI implies only the potential for bias, not likelihood.**

Convening Authority. The management official(s) responsible for convening a P/p review, establishing the ToR, including review objectives and success criteria, appointing the SRB Chair, concurring in SRB membership, and receiving documented results of the review.*

Cost Analysis Data Requirement (CADRe). A formal document designed to help managers understand the cost and cost risk of space flight projects. The CADRe consists of a Part A "Narrative", a Part B "Technical Data" in

* From NPR 7120.5
** From NID

tabular form, both provided by the P/p to the ICE team. A "Project Life-Cycle Cost Estimate", produced by the Project team, is appended as Part C, but the ICE team does not see Part C until it has produced its own independent estimate.*

Critical Path Analysis (CPA). Critical path assessment including verification of the primary schedule critical path and any other secondary critical paths that are less than the available schedule slack behind the primary critical path.

Decision Authority (DA). The Agency's responsible individual who authorizes the transition of a P/p to the next life-cycle phase.*

Decision Memo: (Key Decision Point Decision Package) This package includes a memo for signature which provides the internal (management or project) and external (commitments at KDP-C; estimated range at KDP-B) baseline including life-cycle cost, development cost, key schedule milestone (launch readiness date (LRD), initial operational capability (IOC), or full operational capability (FOC)), length of operations, and JCL for life-cycle cost and for development. The package also includes a Baseline Report providing additional information about the project (e.g., purpose, acquisition strategy) as well as a cost and schedule Data Template providing additional cost and schedule information.

Entrance Criteria. The readiness requirements imposed by NPR 7123.1 on P/p for all life-cycle reviews; these criteria are used as a helpful reminder by P/p as they prepare for each life-cycle review.

Evaluation. The continual self evaluation, and independent assessment of the performance of a P/p and incorporation of the evaluation findings to ensure adequacy of planning and execution according to plan.**

Finding. A conclusion reached by the SRB based on examination or investigation; a finding can be a concern, issue, or strength.

Formulation. The identification of how the P/p supports the Agency's strategic needs, goals, and objectives; the assessment of feasibility, technology and concepts; risk assessment, team building, development of operations concepts and acquisition strategies; establishment of high-level requirements and success criteria; the preparation of plans, budgets, and schedules essential to the success of a P/p; and the establishment of control systems to ensure performance to those plans and alignment with current Agency strategies.*

Governance. The combination of processes and structures implemented by NASA in order to inform, direct, manage and monitor the activities of the organization toward the achievement of its objectives.

Host Center. The Center with defined responsibility for a P/p at the Acquisition Strategy Planning (ASP) meeting and documented in the Formulation Authorization Document (FAD).

Implementation. The execution of approved plans for the development**{**xe "development" \i**}** and operation**{**xe "operation" \i**}** of the P/p, and the use of control systems to ensure performance**{**xe "performance" \i**}** to approved plans and continued alignment with the Agency's strategic needs, goals, and objectives.*

Independence. Unbiased and outside the advocacy chain of the P/p. The freedom from conditions that threaten objectivity or the appearance of objectivity. Such threats to objectivity must be managed at the individual reviewer and organizational levels.

Independent Cost Analysis (ICA). An independent analysis of P/p resources (including budget) and financial management associated with the P/p content over the Program's budget horizon, conducted by an impartial body independent from the management or advocacy chain of the P/p. ICA includes, but is not limited to, the assessment of cost estimates, budgets, and schedules in relation to a P/p and a Program's constituent Projects' technical content, performance, and risk. ICAs may include ICE, assessment of resource management, distribution and planning, and verification of cost-estimating methodologies. (ICAs are not LCCEs, but are assessments of the adequacy of the

* From NPR 7120.5
** From NID

budget and management practices to accomplish the work scope through the budget horizon; as such, ICAs can be performed for P/p when a life-cycle ICE is not warranted.)[**]

Independent Cost Estimate (ICE). An independent P/p cost estimate prepared by an office or other entity that is not under the supervision, direction, advocacy, or control of the P/p (or its chain of command) that is responsible for carrying out the development or acquisition of the P/p. An ICE is bound by the P/p scope (total life-cycle through all phases), schedule, technical content, risk, ground rules, and assumptions and is conducted with objectivity and the preservation of integrity of the cost estimate. ICEs are generally developed using parametric approaches that are tailored to reflect the design, development state, difficulty, and expertise of team members.[**]

Independent Life-Cycle Review (ILCR). The analysis of a proposed P/p by a (non-advocate) team composed of management, technical, and resources experts from outside the advocacy chain of the P/p. It provides Agency management with an independent assessment of the readiness of the P/p to proceed. NPR 7120.5 provides a complete list of P/p life-cycle reviews in Tables 2-5/2-6 and describes the purpose of each of these reviews.

Issue. A finding identified by the SRB; SRB issues are documented and briefed to the P/p and the management councils; issues typically drive the SRB's success criteria assessment and ultimate determination of the SRB rating for each review.

Joint Cost and Schedule Confidence Level (JCL). (1) The probability that cost will be equal to or less than the targeted cost, and schedule will be equal to or less than the targeted schedule date. (2) A process and product that helps inform management of the likelihood of a Project's programmatic success. (3) A process that combines a Project's cost, schedule, and risk into a complete picture. JCL is not a specific methodology (e.g., resource-loaded schedule) or a product from a specific tool (e.g., @RISK).[**]

Key Decision Point (KDP). The event at which the DA determines the readiness of a P/p to progress to the next phase of the life-cycle (or to the next KDP).[*]

Life-Cycle Cost (LCC). The total of the direct, indirect, recurring, nonrecurring, and other related expenses incurred, or estimated to be incurred, in the design, development, verification, production, operation, maintenance, support, and disposal of a project. The LCC of a project or system can also be defined as the total cost of ownership over the Project or system's life-cycle from formulation through implementation. It includes all design, development, deployment, operation and maintenance, and disposal costs.[*]

Life-Cycle Phase. The life-cycle of NASA P/p is divided into phases, each of which defines the activities/achievements to be accomplished before proceeding to the next phase; at the highest level there are two phases for both programs and projects: the formulation phase, followed by the implementation phase. For programs the formulation phase entails pre-program acquisition, while the implementation phase involves program acquisition and operations; for projects the formulation phase entails pre-systems acquisition (Phases A and B), and the implementation phase involves system acquisition (Phases C and D), operations (Phase E), and decommissioning (Phase F).

Management Baseline. The integrated set of requirements, cost, schedule, technical content, and associated JCL that forms the foundation for P/p execution and reporting done as part of NASA's performance assessment and governance process.[**]

Management Council. NASA maintains three levels of management councils to ensure the appropriate level of management oversight of P/p; proceeding from lowest to highest these councils are: 1) the Center Management Council (CMC), 2) the Mission Directorate Program Management Council (MDPMC), and 3) the Agency Program Management Council (APMC); the purpose of these councils is to assess the status of P/p and recommend to the next higher council, or the Decision Authority (DA) – as ultimately appropriate, recommendation for continuation/termination of P/p, typically at each KDP; for a more complete description of these management councils, consult section 2.4 of NPR 7120.5.

[*] From NPR 7120.5
[**] From NID

Mission Directorate Program Management Council (MDPMC). The senior management group, chaired by an MDAA or designee, responsible for reviewing project formulation performance, recommending approval, and overseeing implementation of Category 2 and 3 projects according to Agency commitments, priorities, and policies.*

Phase Requirements. NPR 7120.5 (Chapter 4) specifies requirements for each life-cycle phase of P/p that must be completed before proceeding to the next phase; these requirements are broken down into life-cycle review entrance criteria within each phase by NPR 7123.1.

Program. A strategic investment by a Mission**{**xe "Mission"**}** Directorate**{**xe "Mission Directorate"**}** or Mission Support Office that has a defined architecture and/or technical approach**{**xe "architecture" \i**}**, requirements**{**xe "goals" \i**}**,**{**xe "objectives" \i**}** funding**{**xe "funding" \i**}** level, and a management structure**{**xe "management structure" \i**}** that initiates and directs one or more projects. A program defines a strategic direction that the Agency has identified as critical.*

Project. A specific investment identified in a Program Plan having defined requirements, a life-cycle cost, a beginning, and an end. A project yields new or revised products and services that directly address NASA's strategic needs. A project also has a management structure and may have interfaces to other projects, agencies, and international partners. **

Reporting Venues. The means by which SRBs communicate their findings, and possibly recommendations, to all relevant parties within the Agency; reporting venues include oral and table-top briefings to P/p, and stand-up briefings to all the pertinent management councils for the P/p.

Request for Action (RFA). A formal written request from the SRB that asks for additional information from, or action by, the P/p team.

Review Manager (RM). The RM has the responsibility to ensure the objectivity, quality, integrity and consistency of each assigned independent review and will: define the scope of the review (with the CAs); facilitate the identification and approval of the Chair and team members; participate on the SRB as an authority in the programmatic aspects (compliance to NPR 7120.5 and generally accepted rules of good project management, cost, schedule, and risk), and in specific technical areas, if appropriate; facilitate the review process; ensure that the scope of the review is fully exercised; and be accountable for ensuring that the results of the review have been properly vetted, documented and reported.

Risk. The combination of the probability that a P/p will experience an undesired event and the consequences, impact, or severity of the undesired event, were it to occur. The undesired event may come from technical or programmatic sources (e.g., a cost overrun, schedule slippage, safety mishap, health problem, malicious activities, environmental impact, failure to achieve a needed scientific or technological objective, or success criterion). Both the probability and consequences may have associated uncertainties.*

Risk Assessment. An evaluation of a risk item that determines (1) what can go wrong, (2) how likely is it to occur, (3) what the consequences are, and (4) what are the uncertainties associated with the likelihood and consequences.*

Risk Management. Risk management includes risk-informed decision making and continuous risk management in an integrated framework. This is done in order to foster proactive risk management, to better inform decision making through better use of risk information, and then to more effectively manage implementation risks by focusing the Continuous Risk Management (CRM) process on the baseline performance requirements emerging from the Risk Informed Decision Making (RIDM) process. (See NPR 8000.4, *Agency Risk Management Procedural Requirements*). **

Roadmap. A term used to describe the execution sequence of an organization's responsibilities; roadmaps are used two ways in the SRB Handbook: 1) to describe the sequence of reviews conducted by an SRB during P/p life-cycles, and 2) to describe the planned implementation of a program architecture, i.e., a program roadmap.

* From NPR 7120.5
** From NID

Schedule. The time-phased sequence of activities performed by a P/p over its life-cycle; project schedules are particularly important since they are a means of measuring formulation/implementation progress and can reveal bottlenecks and/or resource drivers through critical path analyses; they are also essential to planning multi-years funding of budgets.

Stakeholder. An individual or organization having an interest (or stake) in the outcome or deliverable of a P/p.[*]

Standing Review Board (SRB). The board responsible for conducting independent reviews (life-cycle and special) of a P/p and providing objective, expert judgments to the CAs. The reviews are conducted in accordance with approved ToR and life-cycle requirements per NPR 7120.5 and NPR 7123.1.[**]

Strength. A strength is a finding of the SRB that describes a feature of the P/p that in the judgment of the SRB is better than expected at a particular stage of the life-cycle.

SRB Chair. The independent leader of the SRB; the SRB Chair is nominated by the TA, approved by TAs, DAs, and AA PA&E (as specified in NPR 7120.5), nominates the members of his/her board, and usually presides over the P/p ILCRs

Success Criteria. That portion of the top-level requirements that defines what must be achieved to successfully satisfy NASA Strategic Plan objectives addressed by the P/p.[*]

Systems Engineering. A disciplined approach for the definition, implementation, integration, and operation of a system (product or service). The emphasis is on achieving stakeholder functional, physical, and operational performance requirements in the intended use environments over its planned life within cost and schedule constraints. Systems engineering includes the engineering processes and technical management processes that consider the interface relationships across all elements of the system, other systems, or as a part of a larger system.[*]

Technical Authority (TA). Technical Authorities are part of NASA's system of checks and balances and provide independent oversight of P/p in support of safety and mission success through the selection of individuals at delegated levels of authority. These individuals are the TAs. TA delegations are formal and traceable to the Administrator. Individuals with TA are funded independently of a P/p.[**]

Terms of Reference (ToR). A document specifying the nature, scope, schedule, and ground rules for an independent review or independent assessment[*]; each SRB has a Baseline ToR, and multiple Addendum ToRs; the Baseline ToR defines the scope of the SRB and its activities; the Addendum ToRs specify the detailed schedule and activities of the SRB for each of the P/p life-cycle reviews.

Unallocated Future Expenses. The portion of estimated cost required to meet specified JCL that cannot yet be allocated to the specific Project WBS sub-elements because the estimate includes probabilistic risks and specific needs that are not known until these risks are realized.[**]

[*] From NPR 7120.5
[**] From NID

Appendix B. Acronyms

AA	Associate Administrator
APMC	Agency Program Management Council
ASP	Acquisition Strategy Planning
BOE	Basis of Estimate
BPR	Baseline Performance Review
CA	Convening Authority
CADRe	Cost Analysis Data Requirement
CD	Center Director
CDR	Critical Design Review
CERR	Critical Events Readiness Review
CMC	Center Management Council
CO	Contracting Officer
CoFR	Certification of Flight Readiness
COI	Conflict of Interest
CPA	Critical Path Analysis
CRM	Continuous Risk Management
CS	Civil Servant
DA	Decision Authority
DoD	Department of Defense
DPMC	Directorate Program Management Council
ES	Executive Secretary
EVM	Earned Value Management
FAD	Formulation Authorization Document
FAR	Federal Acquisition Regulations
FOC	Full Operational Capability
FRR	Flight Readiness Review
ICA	Independent Cost Analysis
ICE	Independent Cost Estimate
ILCR	Independent Life-Cycle Review
IMIR	Individual Member Independent Report
IMS	Integrated Master Schedule
IOC	Initial Operational Capability
IPA	Independent Programmatic Analysis
IPAO	Independent Program Assessment Office
ISA	Independent Schedule Assessment
JCL	Joint Confidence Level
JPL	Jet Propulsion Laboratory
KDP	Key Decision Point
LaRC	Langley Research Center
LCC	Life-Cycle Cost
LCCE	Life-Cycle Cost Estimate
LRD	Launch Readiness Date
LRR	Launch Readiness Review
MCR	Mission Concept Review
MD	Mission Directorate
MDAA	Mission Directorate Associate Administrator
MDPMC	Mission Directorate Program Management Council
MDR	Mission Definition Review
MSO	Mission Support Office
NAR	Non-Advocate Review
NASA	National Aeronautics and Space Administration
NC	Non-Consensus
NSC	NASA Safety Center
NESC	NASA Engineering and Safety Center
NID	NASA Interim Directive

NODIS	NASA Online Directives Information System
NPD	NASA Policy Directive
NPR	NASA Procedural Requirement
OCC	Office of Chief Counsel
OCI	Organizational Conflict of Interest
OCE	Office of the Chief Engineer
OGC	Office of the General Counsel
OGE	Office of Government Ethics
ORR	Operational Readiness Review
OSMA	Office of Safety & Mission Assurance
P/p	Program/project
P/SDR	Program System Definition Review
P/SRR	Program System Requirements Review
PA&E	Program Analysis & Evaluation
PAG	Programmatic Analysis Group
PAR	Program Approval Review
PCI	Personal Conflict of Interest
PCA	Program Commitment Agreement
PDR	Preliminary Design Review
PFAR	Post-Flight Assessment Review
PIR	Program Implementation Review
PLAR	Post-Launch Assessment Review
PM	P/p Manager
PMC	Program Management Council
PPAR	Preliminary Program Approval Review
PRA	Probabilistic Risk Assessment
PRR	Production Readiness Review
PSR	Program Status Review
QSR	Quarterly Status Report
RFA	Request for Action
RID	Review Item Discrepancy
RIDM	Risk Informed Decision Making
RM	Review Manager
RRD	Responses, Recommendations and Decisions
SA	Schedule Assessment
SAR	System Acceptance Review
SBU	Sensitive But Unclassified
SDR	System Definition Review
SEMP	Systems Engineering Management Plan
SF	Standard Form
SID	Strategic Investments Division
SIR	System Integration Review
S&MA	Safety & Mission Assurance
SOPI	Standard Operation Procedure Instructions
SP	Special Publication
SRA	Schedule Risk Analysis
SRB	Standing Review Board
SRD	System Requirements Document
SRR	System Requirements Review
TA	Technical Authority
ToR	Terms of Reference
TPM	Technical Performance Measure
TRL	Technology Readiness Level
UFE	Unallocated Future Expenses
WBS	Work Breakdown Structure

Appendix C: The National Aeronautics and Space Administration Policy Guidance on Standing Review Board Composition, Balance and Conflicts of Interest

The National Aeronautics and Space Administration

POLICY ON
STANDING REVIEW BOARD (SRB)
COMPOSITION, BALANCE, AND **CONFLICTS OF INTEREST**

December 2008[7]

Introduction

The National Aeronautics and Space Administration (NASA) accords special importance to the policies and procedures established to assure the integrity of Standing Review Board (SRB) reports. The work of the SRBs are largely done by persons drawn from every part of the nation and from every sector of society -- academia, industry, government, and nonprofit. The technical skills and perspectives of these individuals are essential to the ability of NASA to consistently produce accurate and objective assessments of NASA programs and projects.

Extensive efforts are made by NASA to assure the soundness of reports by selecting highly qualified SRB members. Yet, if a report is to be not only sound but also effective, the report also must be, and must be perceived to be, the result of a process that is generally free of bias and fairly balanced in terms of the knowledge, experience, and perspectives utilized to produce it.

Questions of SRB Composition and Balance

All individuals selected to serve on SRBs must be highly qualified in terms of knowledge, training, and experience -- often highly specialized and particularized -- to properly address the tasks assigned to the SRB. NASA identifies such individuals by drawing upon a network of national resources. Suggestions of potential SRB members come from the SRB Convening Authorities (CAs) and their staffs, from groups that have an interest in the underlying subject matter of a particular study and from other professionals with knowledge and expertise in relevant disciplines who have an interest in the programs and projects to be addressed.

Individual qualifications are not the only determinant in this process. Having an SRB of highly qualified and capable individuals is necessary but is not the only element necessary for successful reviews. When considering SRB membership, a well-rounded, diverse set of backgrounds can provide the most versatile perspective of opinions. Members should be selected both from within the Agency and from external sources, including such communities as private industry, academia, and other government agencies including the Department of Defense (DoD). When looking internal to the Agency, various NASA Centers and cross-mission opportunities, e.g., robotic versus human project expertise, can add unique insights. Therefore, the knowledge, experience, and perspectives of potential SRB members must be thoughtfully and carefully assessed and balanced in terms of the subtleties and complexities of the particular scientific, technical, and other issues to be addressed and the functions to be performed by the SRB. Diversity and balance of knowledge, design/development experience and organizational experience ensures the greatest opportunity to provide an independent perspective. These factors should be taken into to consideration when making recommendations for SRB membership.

[7] This Policy has been implemented since December 2008 and it is being issued with the Standing Review Board Handbook, dated November 2009.

Questions of Conflict of Interest

The work of SRBs cannot be compromised by issues of bias and lack of objectivity. In most cases these issues are caused by various forms of conflicts of interest that individual SRB members may have. For purposes of this policy, "conflict of interest" means any financial or other interest which conflicts with the individual's service on an SRB because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization. This policy involves two different types of conflicts. The first type of conflict, known as an organizational conflict of interest, is based upon the interests of the individual's employer. The second type of conflict, known as personal conflicts of interest, is based upon the personal interests of the individual. No individual that has a conflict of interest that is significant enough, as determined by NASA, to likely impair their judgment, relative to the functions to be performed, can be appointed to serve (or continue to serve) on an SRB. In some cases, such as unique expertise, it may be in the best interest of the government to approve potential SRB members despite the presence of conflicts of interest. This policy describes the process that must be followed when this occurs.

General Principles: Organizational Conflicts of Interest

Organizational conflicts of interest (OCI) concern the interests of the contractor for whom the individual being considered for service on an SRB, works. Subpart 9.5 of the FAR contains guidance on OCIs which the agency must follow any time the agency uses a contract to obtain the services of an individual for an SRB. The regulations on OCI involve the two principles: preventing the existence of conflicting roles that might bias a contractor's judgment where a contractor may be a position to favor its own capabilities; and preventing unfair competitive advantage. There are three types of organizational conflicts of interest that emerge from these principles.

- "Unfair access to data" occurs when a contractor has access to nonpublic information as part of its performance and that information may provide the firm an unfair competitive advantage in a later competition for a government contract. The principle of unfair competition is involved in this conflict. An example of this conflict involves an SRB member having access to proprietary data that could gives its employer an unfair competitive advantage in future competitions.
- "Biased ground rules" occurs when a contractor has the opportunity to skew a competition, whether intentionally or not, in favor of itself. The principles of unfair competition and bias are involved in this conflict. This conflict includes the interest of affiliates. An example of this conflict occurs when an SRB has substantial influence over a statement of work for a future competition when a member of that SRB intends to propose on the future competition.
- "Impaired objectivity" involves conflicting roles that might bias a contractor's judgment. This conflict contains two elements – the use of subjective judgment by the contractor and whether a contractor has a financial interest in the outcome of its performance. This conflict includes the interest of affiliates. The principle of bias is involved in this conflict. An example of this conflict occurs when an SRB member evaluates the work of its employer or of a competitor of its employer.

Strategies to avoid, neutralize, or mitigate conflicts can be addressed in a formal avoidance/mitigation plan submitted by the contractor when required by contract. In accordance with the FAR and NFS, if the contracting officer determines that a certain contractor presents an OCI that cannot be effectively avoided, neutralized or mitigated, individuals cannot serve on an SRB absent the granting of an OCI waiver by the Assistant Administrator for Procurement[8]. Waivers of FAR Subpart 9.5 on organizational conflicts of interest will be granted on a case-by-case basis when it is determined to be in the Government's interest to do so.

General Principles: Personal Conflicts of Interest

A personal conflict of interest means something more than individual bias. There must be an *interest*, ordinarily financial, that could be directly affected by the work of the SRB.

Personal conflicts of interest are objective - they exist or they don't exist. They are not an assessment of one's actual

[8] This section would only apply to members on an SRB who are not civil servants.

behavior or character, one's ability to act objectively despite the conflicting interest, or one's relative insensitivity to particular dollar amounts of specific assets because of one's personal wealth. Assessments of conflicts of interest by NASA are designed to determine if certain specific, potentially compromising situations might create a conflict of interest. Eliminating or preventing these conflicts of interests protect the individual, the other members of the SRB, NASA, and the public interest.

Personal conflicts of interest refer to *current interests*. They do not apply to past interests that have expired, no longer exist, and cannot reasonably affect current behavior. Nor does it apply to possible interests that may arise in the future but do not currently exist, because such future interests are inherently speculative and uncertain. For example, a pending formal or informal application for a particular job is a current interest, but the mere possibility that one might apply for such a job in the future is not a current interest.

Personal conflicts of interest are not only assessed against the personal financial interests of the individual but also to the *interests of others* with whom the individual has substantial common financial interests if these interests are relevant to the functions to be performed. Thus, in assessing potential personal conflicts of interest, consideration must be given not only to the interests of the individual but also to the interests of the individual's spouse and minor children, the individual's business partners, and others with whom the individual has substantial common financial interests. Consideration must also be given to the interests of those for whom the individual is acting in a fiduciary or similar capacity (e.g., being an officer or director of a corporation, whether profit or nonprofit, or serving as a trustee).

In assessing potential conflicts of interest in connection with an individual's service on an SRB, particular attention will be given to the following kinds of *financial interests* if they are relevant to the program or projects to be reviewed and evaluated: employment relationships (including private and public sector employment and self-employment); consulting relationships (including commercial and professional consulting and service arrangements, scientific and technical advisory board memberships, and serving as an expert witness in litigation); stocks, bonds, and other financial instruments and investments including partnerships; real estate investments; patents, copyrights, and other intellectual property interests; commercial business ownership and investment interests; services provided in exchange for honorariums and travel expense reimbursements; and research funding and other forms of research support.

The Decision Authority has the authority to approve a written determination that a contractor’s expertise outweighs the contractor’s conflict of interest when the local Office of the Chief Counsel determines that a personal conflict of interest exists. In the case of NASA employee, only the NASA Administrator may approve a written determination that the employee’s expertise outweighs the employee’s personal conflict of interest.

Access to Restricted Information

For the purposes of this policy, “Restricted Information,” means information that is not available to the public, such as information developed at private expense embodying trade secrets or comprising commercial or financial information that is privileged or confidential; information determined by NASA to be restricted, such as U.S. Government Sensitive But Unclassified information as defined in NASA Procedural Requirement (NPR) 1600.1; and “contractor bid or proposal information” or “source selection information” as defined in the FAR. The opportunity to have access to Restricted Information during the course of SRB activities at NASA, if abused or misused, may confer an unfair competitive advantage on certain contractors. Thus, individuals selected to serve on SRBs will be asked to sign a *Non-Disclosure Agreement* that provides restrictions on the individual’s use of Restricted Information obtained during the course of SRB activities (a model *Non-Disclosure Agreement* is attached hereto). If an individual during the course of participating in a P/p activity obtains and uses, or intends to use, Restricted Information for the individual's own direct and substantial economic benefit, such conduct constitutes a breach of the Non-Disclosure Agreement and will be grounds for removal from the SRB. The same rule applies if the individual discloses, or intends to disclose, such information to other individuals or to organizations in such a manner that a direct and substantial economic benefit may be conferred on such individuals or organizations. These restrictions do not apply to information once it has become publicly available.

Employees of Sponsors[9]

There are special rules for employees of sponsors[10]. To the extent not prohibited by Federal or state laws or regulations, such an individual may serve as a member of such an SRB where the following requirements are met: (1) the service of the individual on the SRB must be based upon the unique scientific, technical or programmatic expertise which the individual brings to the SRB; (2) the individual and the individual's supervisory chain must not be located within the chain of command for programmatic level decisions for the P/p; (3) it must be specifically determined during the SRB appointment process that service by the individual will not compromise the independence or objectivity of the review.

Implementation of this Policy

Background Information and Confidential Conflict of Interest Disclosures

To address questions of SRB composition, balance and conflict of interest, individuals being considered for selection to serve on SRBs are required to submit certain background information, and certain information regarding conflicts of interest, relative to the P/p to be reviewed. The responsible independent review office (typically the Independent Program Assessment Office for all programs and projects with a life-cycle cost >$250 million) will ensure that all potential members provide the necessary information and work with appropriate procurement, legal and Convening Authorities in determining suitability for SRB service and appropriate SRB diversity and balance. To facilitate collection of this information from non-federal members, the "*Background Information and Confidential Conflict Of Interest Disclosure*" form (attached) will be used by appropriate contracting officers and contractors to collect the information. Disclosure of relevant information is a *continuing obligation* for the duration of the SRB for which the "*Background Information and Confidential Conflict Of Interest Disclosure*" form was prepared. If during an individual's period of service on the SRB it becomes apparent to the individual that there have been changes in the information disclosed, or that there is new information that needs to be disclosed, such information must be reported promptly to the Review Manager for the P/p for which the form was completed. For proposed federal SRB members, the Office of Government Ethics (OGE) Form 450 or Standard Form (SF) 278 (as appropriate) will be used.

In addition to the submission of these forms, SRBs are asked to discuss the issues of SRB composition, balance and conflict of interest, and the relevant circumstances of their individual members, at the first kick-off meeting, and annually thereafter.

Except as required by law or court order, *specific conflict of interest information obtained by NASA will be held in confidence by NASA*. Access to such information will be limited to those offices whose proper business requires access to such information. Such information is not otherwise released by *NASA* except with the approval of the individual to whom the information pertains, unless release is required by law.

Determinations on Composition, Balance and Conflicts of Interest

The specific factors to be considered by NASA in assessing questions of SRB composition and balance will generally depend in each case upon the particular facts and circumstances involved. The resolution of these matters will be based in the final analysis upon the independent judgment of the CAs in conjunction with the appropriate support offices. Final authority over SRB appointments rests with the Decision Authority for the particular program or project under review. However, nothing in this section authorizes the Convening Authority or Decision Authority to make determinations required by, or reserved to another official by, statute, regulation or NASA directive; including, without limitation, 18 U.S.C. § 201, *et seq.* (criminal conflict of interest statutes), 5 CFR Part 2635 (Standards of Conduct), 48 CFR Subpart 9.5 (Federal Acquisition Regulation organizational conflict of interest regulation) and 48 CFR Subpart 1809.5 (NASA FAR Supplement organizational and consultant conflict of interest regulation).

[9] For purposes of this policy, the term "sponsor" means an organization that institutionally supports the program or project e.g., a NASA Center or Mission Directorate.
[10] This paragraph only applies to members of an SRB who are civil servants.

Once a Convening Authority provides a list of candidates for membership that reflects the desired composition and balance for a particular SRB, the Review Manager will initiate the independence verification process to identify and analyze potential organizational and personal conflicts of interest. The list of candidates should include more individuals than are required to serve on an SRB to allow for alternate members if another candidate cannot serve due to a conflict of interest or other reason.

For any SRB, *the focus of the conflict of interest inquiry is on the identification and assessment of relationships to the program or projects to be reviewed and evaluated, as well as on other interests that might be directly affected by the review and evaluation.* The concern is the individual's objectivity while participating in the review and evaluation process could be impaired if that individual (or others with whom the individual has substantial common financial interests) has current interests, which could be directly affected by the P/p being evaluated. When contractors/consultants are or are being considered as members of SRBs, each member and his/her company must also be considered in the context of organizational conflicts of interest in relation to the program or project being independently reviewed as set forth in the FAR and the NFS.

Information obtained from the "*Background Information and Confidential Conflict Of Interest Disclosure*" forms (or OGE 450/SF 278 as appropriate) and from confidential SRB discussions of SRB composition, balance and conflict of interest at the initial SRB meeting and annually thereafter, will be used by the responsible officials in addressing and resolving questions of conflict of interest (both personal and organizational). No individual can be appointed to serve (or continue to serve) on an SRB if NASA determines a personal conflict of interest exists that is significant enough to raise questions about that individual's ability to provide unbiased advice and recommendations. A written determination that the need for the individual's expertise outweighs their conflict of interest will be made and approved by the Decision Authorities or Administrator as part of the nomination process in cases where an individual has a personal conflict of interest.

The responsible independent review office will manage the determination and maintenance of the SRB member independence. In accomplishing this task, contractors who provide proposed non-Federal members to the SRB will initiate the process of completing the "*Background Information and Confidential Conflict Of Interest Disclosure*" forms and will make an initial determination as to whether any OCI exists. In these cases, the support contractor will work with the responsible independent review office and the appropriate contracting officer to determine the degree of conflict and to devise appropriate mitigation plans. An assessment and determination will also be made on the existence of personal conflicts of interest and whether they can be eliminated or special approval obtained. Additionally, any mitigation plans or OCI waivers that are necessary for an individual's participation on an SRB must be completed prior to a final recommendation of SRB membership to the Convening Authority.

The responsible independent review office will review and analyze all relevant information; will finalize recommendations for SRB member participation and will submit a letter of nomination for the proposed SRB members defining the rationale for each member's nomination. Such letter will include the disposition of any conflict of interest waivers or mitigation plans, and no member shall be recommended without appropriate resolution of any conflicts. This letter will be directed to the CAs for their approval. When changes occur that affect previous determinations of conflicts of interest and independence, the same process will be followed leading to approval or removal of SRB members.

Appendix D: SRB Membership Background Information, Confidential Conflict of Interest Disclosure, and Non-Disclosure Certification

The National Aeronautics and Space Administration

BACKGROUND INFORMATION AND CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE

NAME: _____ TELEPHONE: _____

ADDRESS: _____

_____

EMAIL ADDRESS: _____

CURRENT EMPLOYER: _____

PROGRAM/PROJECT SRB: _____

There are three parts to this form, Part I Background Information, Part II Confidential Conflict of Interest Disclosure, and Part III, Certification. Complete all parts, sign and date this form on the last page, and return the form to _____. Retain a copy for your records.

PART I **BACKGROUND INFORMATION**

INSTRUCTIONS

Please provide a curriculum/resume that identifies your relevant experience, organizational affiliations, government service, etc. to this SRB activity. In addition, please specifically respond to the 3 specific areas identified below to facilitate an overall assessment of any biases that may exist relative to this SRB activity.

I. ORGANIZATIONAL AFFILIATIONS. Report your relevant current business relationships (e.g., as an employee, owner, officer, director, consultant) and your relevant current remunerated or volunteer non-business relationships (e.g., professional organizations, trade associations, public interest or civic groups).

II. OTHER SUPPORT. Report relevant information regarding both public and private sources of current support (other than your present employer), including sources of funding, equipment, facilities.

III. ADDITIONAL INFORMATION. If there are relevant aspects of your background or present circumstances not addressed above that might reasonably be construed by others as affecting your judgment in matters within the assigned task of the SRB or panel on which you have been invited to serve, and therefore might constitute an actual or potential conflict of interest or source of bias, please describe them briefly. This could include your relationships with individuals (rather than organizations) involved in the subject of the SRB activity.

SPECIFIC AFFLIATIONS, SUPPORT AND OTHER INFORMATION:

PART II **CONFIDENTIAL CONFLICT OF INTEREST DISCLOSURE**

INSTRUCTIONS

It is essential that the work of SRBs not be compromised by any significant conflict of interest. For this purpose, the term "conflict of interest" means any financial or other interest which conflicts with the individual's service on an SRB because it (1) could significantly impair the individual's objectivity or (2) could create an unfair competitive advantage for any person or organization. Additional information regarding potential biases and conflicts of interest are provided in the *NASA Policy on Standing Review Board (SRB) Composition, Balance and Conflicts Of Interest*

1. **RELATIONSHIPS TO THE PROGRAM/PROJECT(S)** BEING EVALUATED. Taking into account your interests and the interests of other individuals with whom you share substantial common financial interests (e.g., spouse, close research colleagues and collaborators, business partners) –

(a) Do you or such others receive current *financial support* (e.g., research and/or development grants or contracts, procurement contracts, consulting contracts, other grant support) from the program/project(s) being evaluated?

(b) Do you or such others receive substantial current *non-financial support* (e.g., equipment, facilities, industry partnerships, research assistants and other research personnel), from the program/project(s) being evaluated?

(c) Do you or such others have *any other current financial interest* (e.g., patent rights, interests in partnerships and commercial ventures) obtained from or through the program/project(s) being evaluated?

If the answer to all of the above questions under RELATIONSHIPS TO THE PROGRAM/PROJECT(S) being evaluated is either "no" or "not applicable," check here _ (NO).

If the answer to any of the above questions under RELATIONSHIPS TO THE PROGRAM/PROJECT(S) being evaluated is "yes," check here _(YES), and briefly describe the circumstances on the last page of this form.

2. **INVESTMENT INTERESTS**. Taking into account stocks, bonds, and other financial instruments and investments including partnerships (but excluding broadly diversified mutual funds and any investment or financial interest valued at less than $15,000) --

(a) Do you or your spouse or minor children own directly or indirectly (e.g., through a trust or an individual account in a pension or profit-sharing plan) any stocks, bonds or other financial instruments or investments that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments, by the program/project being evaluated?

(b) Do you have any other financial investments or interests such as commercial business interests (e.g., sole proprietorships), investment interests (e.g., stock options), or investment relationships (e.g., involving parents or grandchildren) that could be affected, either directly or by a direct effect on the business enterprise or activities underlying the investments, by the program/project being evaluated?

If the answer to all of the above questions under INVESTMENT INTERESTS is either "no" or "not applicable," check here _(NO).

If the answer to any of the above questions under INVESTMENT INTERESTS is "yes," check here _(YES), and briefly describe the circumstances on the last page of this form.

3. **PROPERTY INTERESTS.** Taking into account real estate and other tangible property interests, as well as intellectual property interests (e.g., patents, copyrights) --

(a) Do you or your spouse or minor children own directly or indirectly any such property interests that could be directly affected by the program/project being evaluated?

(b) To the best of your knowledge, do any others with whom you have substantial common financial interests (e.g., employer, business partners, relatives) own directly or indirectly any such property interests that could be directly affected by the program/project being evaluated?

If the answer to all of the above questions under PROPERTY INTERESTS is either "no" or "not applicable," check here _(NO).

If the answer to any of the above questions under PROPERTY INTERESTS is "yes," check here _ (YES), and briefly describe the circumstances on the last page of this form.

4. **OTHER INTERESTS.**

(a) Could your current employment or self-employment (or your spouse's current employment or self-employment) be directly affected by the program/project being evaluated?

(b) To the best of your knowledge, could any financial interests of your (or your spouse's) employer or, if self-employed, your (or your spouse's) significant clients and/or business partners be directly affected by the program/project being evaluated?

(c) If you are an officer, director or trustee of any corporation or other legal entity, could the financial interests of that corporation or legal entity be directly affected by the program/project being evaluated?

(d) If you are a consultant (whether full-time or part-time), could there be a direct effect on any of your current consulting relationships by the program/project being evaluated?

(e) Do you have a consulting relationship with a sponsor, grantee, or contractor of the program/project being reviewed and evaluated that is directly related to the subject matter of the program/project review and evaluation for which this disclosure form is being prepared (e.g., a consulting relationship to provide assistance to the sponsor, grantee, or contractor with respect to the program/project review and evaluation)?

(f) Is a central purpose of the program/project review and evaluation a critical review and evaluation of your own work or that of your employer?

(g) Are you an official or employee of an agency or organization, which is a sponsor of the program/project that is being reviewed and evaluated and/or a sponsor of this program/project review and evaluation SRB activity?

(h) Do you have any existing professional obligations (e.g., as an officer of a scientific or engineering society) that effectively require you to publicly defend a previously established position on an issue that is relevant to the functions to be performed in this SRB activity?

(i) If you have ever been a U.S. Government employee (either civilian or military), to the best of your knowledge are there any federal ethics restrictions that may be applicable to your service in connection with this SRB activity?

If the answer to all of the above questions under OTHER INTERESTS is either "no" or "not applicable," check here _ (NO).

If the answer to any of the above questions under OTHER INTERESTS is "yes," check here _ (YES), and briefly describe the circumstances below.

EXPLANATION OF "YES" RESPONSES (attach additional pages as necessary):

PART III **CERTIFICATION**

If, during my period of service in connection with the activity for which this form is being completed, there is any change in the information I reported, or any new information that I have not reported, which needs to be reported, I shall report it promptly by written or electronic communication to the Review Manager.

_____ _____

YOUR SIGNATURE DATE

Reviewed by: _____ _____

SRB Review Manager Date

NON-DISCLOSURE AGREEMENT

As a participant on a NASA Standing Review Board (SRB), I recognize that I may have access to information that is not available to the public. To the extent NASA shares such nonpublic information with me during the course of SRB activities, I agree as follows:

1. "RESTRICTED INFORMATION," as used herein, means information to which I have access as a member of a NASA SRB that is not available to the public, including, but not limited to, information developed at private expense embodying trade secrets or comprising commercial or financial information that is privileged or confidential; and information determined by NASA to be restricted, such as Sensitive but Unclassified (SBU) information as defined in NASA Procedural Requirement (NPR) 1600.1.

2. With respect to RESTRICTED INFORMATION, I agree that I will:

(a) Use, disclose, or reproduce RESTRICTED INFORMATION only to the extent necessary to perform my duties and fulfilling my responsibilities as a member of a NASA SRB;

(b) Safeguard RESTRICTED INFORMATION from unauthorized use, disclosure, or reproduction;

(c) Discuss or reveal RESTRICTED INFORMATION or any information concerning SRB proceedings only to individuals who are participating in the same SRB proceedings, and then only to the extent such information is required in connection with such proceedings on a need-to-know basis;

(d) Return or dispose of RESTRICTED INFORMATION, as NASA may direct, when the RESTRICTED INFORMATION is no longer needed by me for SRB activities.

3. Notwithstanding any restriction on use, disclosure, or reproduction of RESTRICTED INFORMATION provided in this Agreement, I will not be restricted in the use, disclosure, or reproduction of RESTRICTED INFORMATION that is:

(a) Publicly available at the time of disclosure or thereafter becomes publicly available without breach of this Agreement;

(b) Known to, in the possession of, or developed by me independent of carrying out my SRB responsibilities and independent of any disclosure of, or without reference to, RESTRICTED INFORMATION;

(c) Received from a third party having the right to disclose such information without restriction; or

(d) Required to be produced or released by me pursuant to a court order or other legal requirement.

4. If I believe that any of the events or conditions that remove restrictions on the use, disclosure, or reproduction of the RESTRICTED INFORMATION apply, I will promptly notify NASA of such belief prior to acting on such belief, and, in any event, will notify NASA prior to an unrestricted use, disclosure, or reproduction of such information.

5. I understand that failure to abide by these provisions may constitute grounds for termination of my participation in the SRB, administrative action, and/or civil or criminal prosecution.

_____ _____

YOUR SIGNATURE DATE

Appendix E. Acceptable SRB Options for Independent Life-Cycle Reviews

Table E-1. Option determined based on the needs of the P/p and is documented in the Terms of Reference (ToR)

Option	***CS***	***CS2***	***NC***
Description	Civil Service (CS) Consensus Board – No Expert Support	Civil Service Consensus Board with Expert Support	Non-Consensus Mixed Board
SRB Chair	CS	CS	Either CS or non-CS
SRB Review Manager	CS or JPL*	CS or JPL*	CS or JPL
SRB Composition	CS Only	CS Only; Experts provide analyses to SRB	Either CS or non-CS
SRB Product	SRB produces a report and briefings with findings of fact and recommendations; RFAs (or equivalent) from individual members**; Chair briefs report.	SRB produces report and briefings with findings of fact and recommendations; RFAs (or equivalent) from any individual**; reports from individual experts**; Chair briefs SRB report.	Review manager assists the Chair in assembling the report based on inputs and RFAs from all individuals**; Chair briefs personal findings and recommendations.
Minority Report	Minority reports documented in SRB report and in RFAs.	Minority reports documented in SRB report and RFAs.	No minority report.***
SRB Interaction	**Consensus is reached by the Civil Service board members under the civil service consensus (CS) and the civil service with expert support (CS2) SRB configurations. Consultants supporting CS2 boards may interact with the projects or programs on behalf of the SRB members to gather information used to support SRB pre-consensus discussions. All board members can participate in open discussion with the project and within the SRB. Everyone can openly discuss individual points of view.**		
Independence	Normal CS ethics rules apply.	Experts not on SRB. Apply independence standards to experts.	Apply independence standards to experts but allow some impairments, if approved.

* JPL review managers are not members and do not have a vote.
** Reports and RFAs can contain individual recommendations.
*** The minority report requirements do not abridge NASA's Dissenting Opinion process per NPD 1000.0.

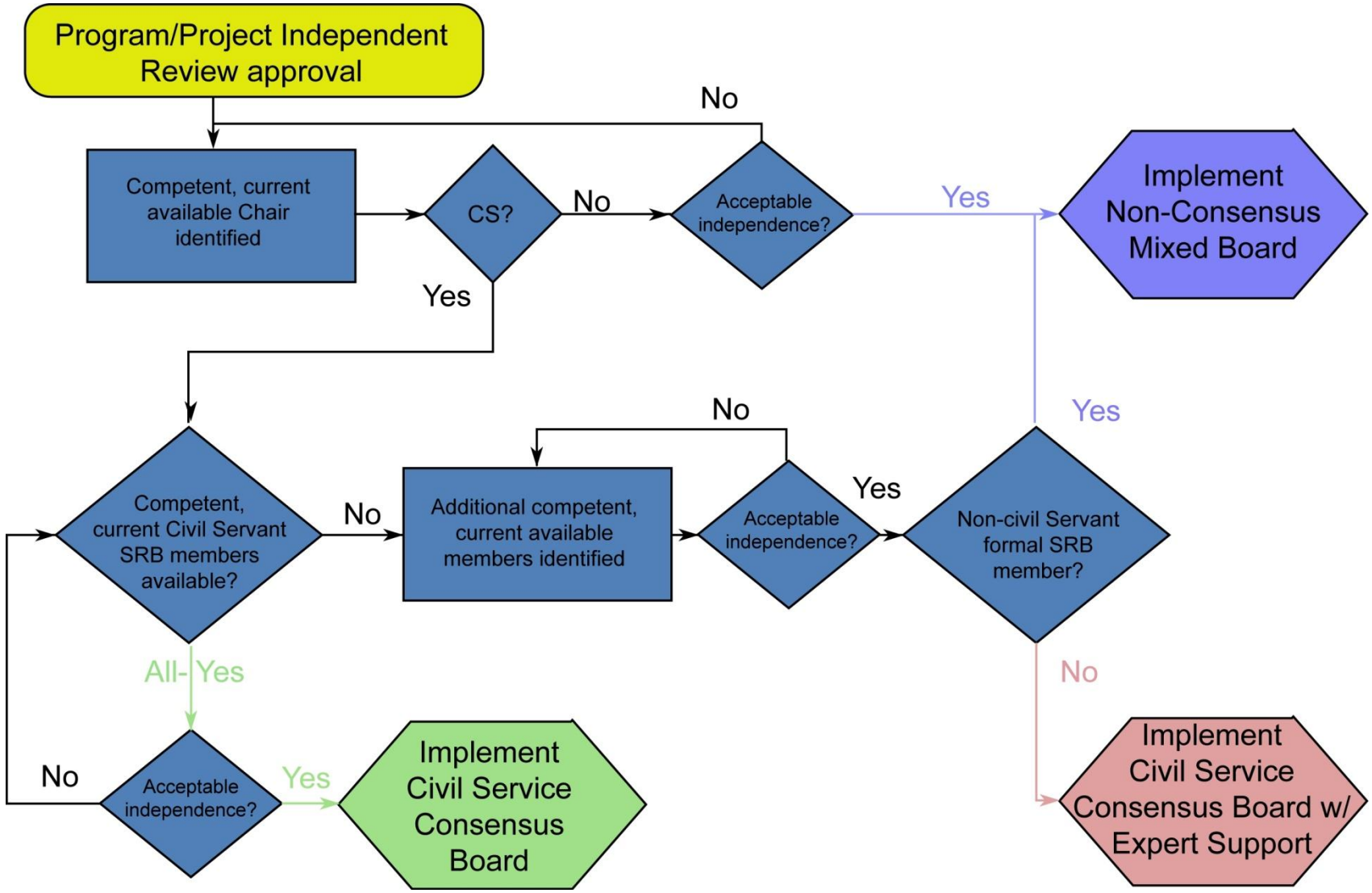

Figure E-1. Program/Project Independent Review Approval Process

Appendix F. Program Implementation Review Guidance

This Appendix describes the recommended best practices{xe "Practices"} for the Program Implementation Review (PIR) required by NPR 7120.5, NASA Space Flight Program and Project Management Requirements. The PIR is an independent life-cycle review that is conducted by the SRB. Each PIR should be tailored to best enhance the probability of mission success for the Program under review.

Program{xe "Programs"} Implementation Review Background

As indicated in NPR 7120.5, Table 2-5, Space Flight Program Reviews, Program Status Reviews (PSRs) are conducted by the Program to examine the Program's continuing relevance to the Agency's Strategic Plan, the progress to date against the approved baseline, the implementation plans for current and upcoming work, budget, schedule, and all risks and their mitigation plans. PIRs are conducted as part of this review to provide Agency management with an independent assessment of the readiness of the Program to continue with implementation. Additional purposes of these reviews are to:

- Identify to Agency management the Program strengths, issues and concerns
- Identify specific areas where improvement is needed and provide recommendations on means to strengthen the Program
- Identify broader Agency issues that have potential impact on present or future Program performance

As shown in Figure 2-3 of NPR 7120.5, the program life-cycle has two different implementation paths, depending on program type. Each implementation path has different types of major reviews. For uncoupled and loosely coupled programs, the implementation phase only requires PSRs/ PIRs to assess the Program's performance and authorize its continuation at biennial KDPs. Single-project and tightly coupled programs are more complex. For single-project programs, the implementation phase program reviews shown in Figure 2-3 of NPR 7120.5 are synonymous (not duplicative) with the project reviews in the project life-cycle (see Figure 2-4 in Section 2.3 of NPR 7120.5) through Phase D. Once in operations, these programs have biennial KDPs preceded by attendant PSRs/PIRs. Tightly coupled programs during implementation have program reviews tied to the project reviews to ensure the proper integration of projects into the larger system. Once in operations, tightly coupled programs also have biennial PSRs/PIRs/KDPs to assess the Program's performance and authorize its continuation. The Agency PMC also performs program oversight during implementation by means of Quarterly Status Reports (QSRs) provided by the cognizant MDAA, and biennial PIRs.

PIR Review Criteria

Table F-1 identifies the criteria used for PIRs.

Table F-1. PIR{xe "Reviews, Systems"}{xe "Program/System Requirements Review"}{xe "P/SRR"} Review Criteria{xe "Criteria, Success"}

Program Implementation Review{xe "Reviews, Systems"}{xe "Program/System Requirements Review"} Criteria
1. Alignment with and contributing to Agency needs, goals, and objectives, and the adequacy of requirements flow-down from those{xe "Approval"}.
2. Adequacy of technical approach as defined by NPR 7123.1 entrance and success criteria.
3. Adequacy of the integrated cost and schedule estimate and funding strategy in accordance with NPD 1000.5.
4. Adequacy/availability of resources other than budget.
5. Adequacy of risk management approach and risk identification/mitigation per NPR 8000.4.
6. Adequacy of management approach. {xe "Approval"}

PIR Review Documents

As indicated in Tables 4-1 and 4-2 of NPR 7120.5, the following Program products and control plans are typically reviewed during a Program Implementation Review:

1. Program Products:
    a. Program Commitment Agreement (PCA)
    b. Program Plan
    c. Interagency & International Agreements
    d. Traceability of Program Requirements on Projects to the Agency Strategic Plan

2. Program Plan – Control Plans:
    a. Technical, Schedule and Cost Control Plan
    b. Safety and Mission Assurance Plan
    c. Risk Management Plan
    d. Acquisition Plan
    e. Technology Development Plan
    f. Systems Engineering Management Plan
    g. Review Plan
    h. Mission Operations Plan
    i. Environmental Management Plan
    j. Logistics Plan
    k. Science Data Management Plan
    l. Information and Configuration Management Plan
    m. Security Plan
    n. Export Control Plan
    o. Education and Public Outreach Plan

3. In addition, the following Program products (not listed in Tables 4-1 or 4-2) are also typically reviewed during a PIR:
    a. Project Plans
    b. High-level Program Requirements, including success criteria and verification plan
    c. Integrated Master Schedule and supporting schedules (in native format)
    d. Reports from other review teams and peer reviews
    e. Correlation of WBS to organizational elements
    f. Latest manifest

However, not all of the above Program products and control plans will be applicable to every NASA Program and the nature and extent of these documents varies with Program type and total life-cycle cost. There may be other important Program products that are not included in the list above that would be captured in the Program plan. This Program products and control plans list is provided as advisory guidance to the PIR Team SRB regarding the items that are typically explored during a PIR. Each PIR should be tailored to best enhance the probability of Program success for the Program undergoing review. The tailored review content, as documented in the ToR, should result from a collaborative process that includes the Program, the CAs, and Program stakeholders.

Independent Programmatic Analysis

The Independent Programmatic Analysis consists of an Independent Cost Analysis (ICA) and an Independent Schedule Analysis/Schedule Risk Assessment (ISA/SRA), which are required by NPR 7120.5. The analysis may also include an assessment of the Program JCL when appropriate. The ICA and the ISA are conducted by SRB cost and schedule analysts in concert with the PIR working closely with other SRB members. The SRB may require one or more separate meetings and/or communications with the Program Office business management staff in order to completely review and understand detailed budget and schedule documents and procedures. The cost and schedule analysts will interface and coordinate with other SRB team members to obtain independent validation of cost and schedule data inputs, as well as other technical contents, which include but are not limited to technical parameters,

risks, programmatic data, schedule, and funding. The final outcome of all these analyses will be an integrated programmatic assessment.

The ICA is a review of six major interrelated areas; requirements, estimating, budgeting, tracking, reporting, and managing:

a. Requirements refers to the process by which the Program identifies the scope of the individual Projects needed to accomplish the overall mission objectives. This includes the requirements flow-down, how well they are defined and how stable they are. This would include any dependencies on other Program requirements both within and outside NASA. A lack of clear requirements leads to a large amount of uncertainty in the resources needed to successfully execute the Program plan. Changes in requirements may change the scope of what the Program's individual project missions are able to accomplish and may also change the necessary resources for mission success including budget and time.

b. Estimating refers to the process by which the scope of the Program and the individual Project's technical and programmatic content are translated into the resource estimates of cost and schedule. This includes an assessment of the cost and schedule estimating methods used along with their basis of estimate. The review includes an assessment of the integrated master schedule including critical path analysis and how effectively the Program is utilizing it. This would include an assessment of any interdependencies among projects within the Program as well as any interdependencies to other Programs both within and outside of NASA.

c. Budgeting refers to the process by which estimates are formalized into a final budget, which must be managed. This includes an assessment of whether the budget is available when needed for Program and the individual projects.

d. Tracking refers to the process by which the cost and schedule progress is collected and compared to the budget. This includes an assessment of the tools, and how well the Program utilizes them. This also includes an assessment of the results and how well the Program has performed to date.

e. Reporting refers to the process by which budgeting and tracking results are distilled and provided to both Project and Program management. This includes who the plans and the status are reported to, what level of detail, and how often.

f. Managing refers to the process by which Program management utilizes reserves to plan for and respond to potential problems with the progress based on tracking results and the identification of technical and programmatic risks. The ICA includes an assessment of the reserve strategy and the current state of the reserves in relation to where projects are in their prospective life-cycles.

The Independent Schedule Analysis/Schedule Risk Assessment

The ISA/SRA will focus primarily on the schedule assessment and adequacy of schedule reserve for the Program and subsidiary Projects. The ISA consists of two parts: the Schedule Assessment (SA) and the Schedule-Risk Analysis (SRA). The first part is a quality assessment of the health of the Program's schedule, as well as the schedule planning and management process. The second part provides the likelihood that the Program, under the influence of risks, can achieve its planned key milestones.

The SA approach consists of evaluating the schedule and schedule planning and management process against accepted standards as defined in the IPAO Schedule Assessment/Schedule Risk Analysis Standard Operations Procedures Instruction (SOPI).

All relevant risks carried by the Program will be mapped to appropriate tasks. The SRB will also identify any additional risks that are necessary to be included in the schedule-risk model. The mappings will be done by the Program Manager and verified by the SRB. A likelihood value and triangular distributions of impact will be

assigned to each of the risks. Monte-Carlo simulations, run using an approved schedule-risk tool, will show the possible risk-based schedule slip.

ICA and ISA analysts will work together closely throughout the entire SRB evaluation period to ensure that cost and schedule analysis results are fully integrated.

The Independent JCL Assessment

The assessment includes a thorough understanding of the methodology, ground rules, and assumptions used to create the Program JCL. This also includes an understanding of the project JCL's necessary to create a Program level JCL. Additionally, this assessment includes an SRB independent evaluation of risks, including any new ones, to be inserted in the Program JCL for adjustment and comparison for any significant impacts.

Information Required to Accomplish the ICA and ISA:

- Program time-phased budget that includes breakdown by program Work Breakdown Structure (WBS)
- WBS and WBS Dictionary
- Budget ground rules and assumptions
- Program Integrated Master Schedule file (MS Project or other format used by the Program), and any supporting project schedules
- Earned value management (EVM) reports
- Risk list and how are liens reflected in budget and schedule including cost and schedule reserves and the basis for the reserves
- Documentation showing cost and schedule performance to date and root causes for any growth
- Staffing history and projected future requirements
- Risk mitigation plans including associated budget and schedule information
- JCL model/process (when appropriate)
- How are Program requirements used in the cost estimating, schedule development and budgeting processes?
- What is the basis of estimate for the cost and schedule estimates behind the latest PPBE projections?
- How does the Program itself independently evaluate and validate the cost and schedules provided by subsidiary projects.
- To what extent have interdependencies between internal lower level Project elements been addressed in these estimates (form a cost and schedule risk point of view)?
- How are cost and schedule reserves estimated, book-kept and managed?
- What has been the Program's past history on cost and schedule growth by individual projects?
- What were the root causes for past cost and schedule growth?
- Is the IMS resource loaded?
- Is the IMS logically linked (as opposed to a static schedule) and fully integrated?
- How are cost and schedule estimates integrated into an overall Program budget?
- Does the Program currently have unresolved cost threats relative to Program's budget baselines and identified risks?

- Have the Program's acquisition strategy and procurement approaches worked efficiently?
- How does the Program track and oversee funding provided to projects? Are EVM-like systems used? How is technical progress measured against funding consumed?
- How does the Program report budget and schedule information up the management chain?
- Is the Program able to re-phase project budgets as needed and appropriate and at what level is the authority given for this?
- Within the 5-year fiscal planning horizon, does the Program have adequate resources for formulation of new projects, the implementation of which are largely beyond the budget horizon?
- Has Program JCL been completed in a previous review? If so, how does it compare to the current JCL and what are the reasons for the differences?

Example Review Agenda

This example review agenda is intended to provide guidance regarding the potential content that could be included to achieve the objectives of the independent PIR. The agenda should be collaboratively tailored by the Program and SRB Chair to most efficiently gather the required information. When feasible, the PIR requirements can be integrated with a PSR to minimize the additional effort required by the Program undergoing review.

PIR Welcome and Introductions
- Program Management Team Introductions
- Review Team (SRB) Member Introductions and Assignment Areas

Program Review Success Criteria
- Scope and Purpose of PIR
- PIR Success Criteria
- Schedule for PIR Completion and Report Out

Program Overview
- Alignment with Agency Vision, Goals and Objectives
- Program Scope and Concept of Operations
- Program Architecture/Organization
  - Internal Organizational Interfaces and Agreements
  - External Organizational Interfaces and Agreements, including dependencies on entities outside of Program's direct control
- Program-Level Requirements and Flow- Up & Down
- Requirements Verification Strategy

Program Management Approach
- Roles and Responsibilities
- Program Performance to Date
- PCA/ Program Plan Status
- 7120.5D Compliance and Waivers
- Performance Management/Measurement Strategy including EVM
- Certificate of Flight Readiness (CoFR) Process for Flight
- Communications Strategy with Stakeholders and Customers
- Education and Public Outreach
- Science Management
- Future Mission Planning
  - Project Formulation
  - Budget Allocation
  - Launch Vehicle Availability/Access to Space
- Program Reserves Management

Program Technical Approach
- Overall Program Technical Approach
- Technical Authority Approach and Implementation
- Safety and Mission Assurance Approach and Implementation
- Health and Medical Approach and Implementation
- Processes Used to Enhance Mission Success (redundancy, reliability, failure analysis, configuration management, etc.)
- Technology Infusion Plans
- Program Operating and Technical Direction, including Margins
- Management of Contractors and associated Subcontractors
- Other Mission Success Strategies

Program Schedule
- Program Schedule Performance to Date
- Schedule Management, including Level of Integrated Master Schedule Utilization
- Critical Path Scheduling
- Schedule Margin and/or Reserve
- Internal Program Schedule Interdependencies
- External Program Schedule Interdependencies

Program Cost and Resources Management
- Acquisition Strategy and Procurement Approach
- Cost and Resource Management Processes
- Past Budget and Cost Growth Performance
- Current Cost Estimates
- Current Budget Baseline
- Budget Phasing Plans to Projects/Elements
- Expected Future Program Budget Performance
- Budget Reserves
- Budget Risks and Unresolved Threats to Baseline
- Required Resources (and Status) Other than Budget
  - Workforce Status and Issues
  - Required NASA Facilities and Institutional Support
- External Resource Requirements

Program Risk Management
- Current Risk Management Plan and Implementation Approach
- Risk Management Performance to Date
- Overview of Current Program Risks and Mitigation Strategies for each major Program element (e.g. Program Management, Technical, Schedule, Cost, etc.)
- Methodology and Timeliness of Communicating Risks and Risk Status to Program Personnel and Stakeholders
- Minimum Mission Success Plan

Program JCL
Summary

PIR Review Products

The SRB will produce a detailed written report and briefing of its proceedings, findings and recommendations with the purpose of enhancing Program success. Dissenting opinions of SRB members will be captured and included in the final report with the exception of a SRB which is a NC board. Positive findings and best practices will be identified, in addition to any issues/recommendations. The report and briefing will provide details of quantitative and qualitative assessments completed by the team. The NASA SRB Handbook contains detailed guidance regarding the expected report and briefing content including the recommended evaluation (rating) system.

The following products are presented in the report:

1. Individual strengths and weaknesses
   - Strengths
   - Issues (highest level – includes a recommendation)
   - Concerns (lower level – may not be verbally reported to the PMC)
2. Global rating of Program status as defined in the SRB Handbook
3. Any Mission Directorate review specific success criteria (optional)
4. Request for Action (RFA) resolution status
5. Overall recommendation for Program to continue implementation as planned, or recommended adjustments to Program's current plan

A verbal report will be briefed to the Program manager and Program TA after the first SRB caucus period, at the end of the onsite review. A written report and summary briefing are to be completed within 30 days after a PIR or as agreed to in the ToR. When the report and summary briefing are completed, the SRB Chair will brief the results to the Program Manager and the applicable (integrated) Center Management Council (CMC). The results will also be briefed to the Mission Directorate PMC and to the Agency PMC leading up to a KDP and NASA AA decision to continue. PMC protocol has been successful with point-counter-point style briefings on each issue/recommendation and response between the SRB Chair and the Program Manager.

Appendix G. Standard Engagement Timeline

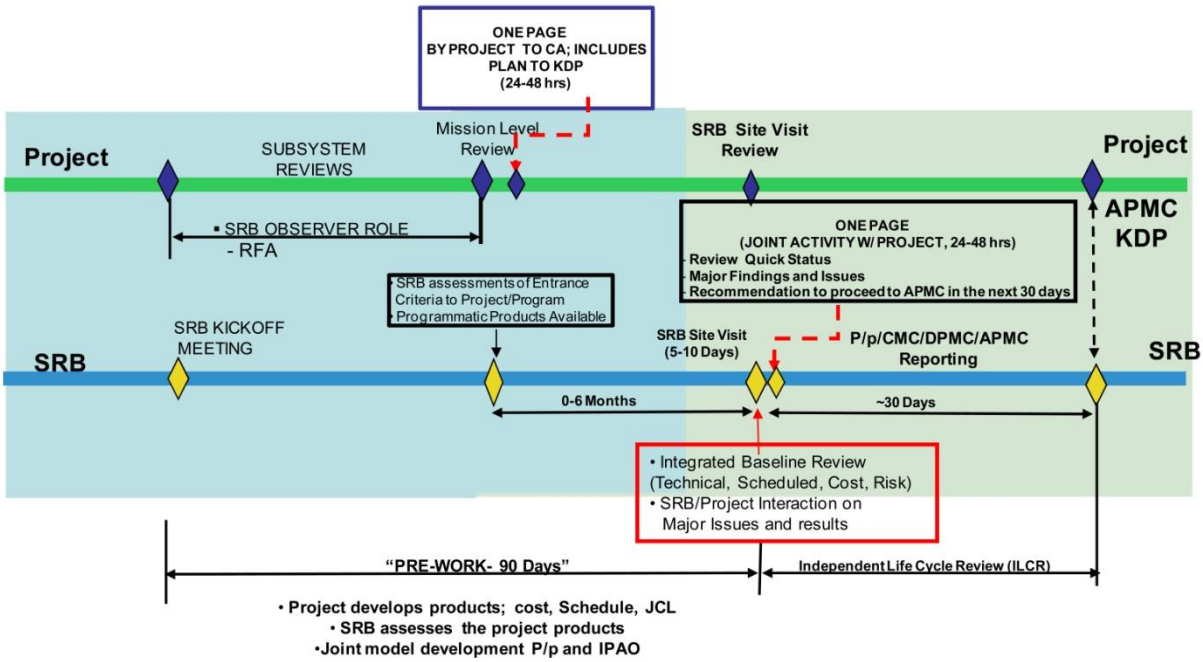

Figure G-1. Standard Engagement Timeline[11]

[11] The explanation/description of the Standard Engagement Timeline is in the NID. The Timeline is referred to across the document.

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