



 Directive:
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Responsible Office: L/Research and Engineering Directorate Subject: Glenn Research Center (GRC) Project Technical Review Procedure – Revalidated w/Change 1 (08/15/2024)

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Preface

P.1 Purpose

The purpose of this document is to establish the process and requirements at the NASA Glenn Research Center (GRC) for conducting independent technical reviews in accordance with NASA Procedural Requirements (NPR) 7120.5, NASA Space Flight Program and Project Management Requirements, and NPR 7123.1, NASA Systems Engineering Processes and Requirements (See also Glenn Procedural Requirement (GLPR) 7120.5.10, GRC Space Flight Project Management Requirements and Best Practices). The NPR 7120.5 and NPR 7123.1 detail Agency requirements for project management and systems engineering, respectively. NASA/SP-2016-3706, NASA Standing Review Board Handbook, and NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook, provide guidance about life cycle reviews and project maturity. Combined, these documents provide extensive information relating to independent project life cycle reviews for NASA spaceflight and ground system projects.

P.2 Applicability

a. All programs and projects follow the life-cycle reviews unique to their investment area as defined in NASA Policy Directive (NPD) 7120.4, NASA Engineering and Program/Project Management Policy and associated NPRs. The NASA implements space flight projects of various sizes and complexity and requires them all to undergo Life Cycle Reviews. The overall project life cycle includes two categories of reviews: 1) The reviews conducted by the project as defined and maintained in the project plan/ Systems Engineering Management Plan (SEMP); and 2) The independent technical reviews conducted by a Standing Review Board (SRB). The NPR 7120.5 assigns responsibility for the independent reviews performed by SRBs to the Mission Directorates with support from the Centers. The Mission Directorates are responsible for independent reviews of all programs, all Category 1 projects, and Category 2 projects with a life cycle cost greater than or equal to \$250 million; these independent SRB reviews are Agencylevel reviews and are beyond the scope of this GLPR. Category 1 and 2 projects will likely need additional technical review details beyond those identified in this GLPR. This GLPR is applicable to independent reviews of Category 2 projects with a life cycle cost less than \$250 million and Category 3 projects; the SRB function of these independent reviews are conducted by a Center assigned Independent Review Team (IRT) rather than an Agency-level SRB. The Decision Authority may alter these criteria. Additional guidance on using an IRT in place of an SRB for small Category 3, Class D projects with a life-cycle cost of under \$150 million can be found on the Office of the Chief Engineer (OCE) tab in the NASA Online Directives Information System (NODIS) under Other Policy Documents at

http://nodis3.gsfc.nasa.gov/OCE_docs/OCE_25.pdf. For the purposes of this GLPR, references to the term SRB in this GLPR, Agency directives, and Agency handbooks, refer to functions performed by the IRT.

b. The requirements of this GLPR apply to projects or tasks led by GRC, which have been designated NPR 7120.5 compliant by an assigning NASA Mission Directorate, Program Office, or by GRC Center Management. This includes when the flight system effort is contracted (i.e., "buy" approach), when the flight system is a shared responsibility of GRC and a partner, or when the effort is implemented in an "in-house" (i.e., "make" approach) mode. Program-level reviews are beyond the scope of this GLPR. This GLPR can be used for reference for program-level review activities but should refer to associated NPRs for full compliance guidance.

c. For projects where the majority of work is performed by a prime contractor, the various NASA Programmatic and Technical Authorities are still required to meet all applicable NASA requirements relating to technical reviews, including this GLPR, NPR 7123.1, and NPR 7120.5. How this work is distributed among NASA and contractor activities, as well as specific surveillance oversight and insight roles, is to be defined in the NASA project SEMP and included in the request for proposal and contract statement of work (refer to NPR 7123.1 Chapter 4, Systems Engineering Activities on Contracted Projects, for specific requirements). The requirements, or portions thereof, of this GLPR apply to contractors only to the extent specified in the associated contract. When specifying contract applicability, the contract should specify which specific requirements from this directive apply. Requirements directed toward civil servants and contractors should be clearly delineated so that contractors can appropriately identify which requirements apply.

d. This procedure is applicable to project technical reviews requiring independent assessment as defined in NPR 7120.5, or Center IRT reviews as described in NASA/SP-2014-3705 Figure 4-2, including as a minimum, Mission Concept Review (MCR), System Requirements Review (SRR), Mission Definition Review/System Definition Review (MDR/SDR), Preliminary Design Review (PDR), Critical Design Review (CDR), System Integration Review (SIR), and Operational Readiness Review (ORR). This procedure is also applicable to Center independent reviews that assess technical adequacy before shipping and assess in-flight anomalies after the mission, including Systems Acceptance Review (SAR) and Post Flight Assessment Review (PFAR). It may be used for other life-cycle review types as requested by the Convening Authorities.

e. This GLPR may be used or tailored for other NPD 7120.4 investment areas (e.g., NPR 7120.8 projects) or as required by GRC Center Management. Usage or tailoring of this GLPR for NPR 7120.8 projects should be defined in the project's SEMP, or the project plan if the SEMP content is consolidated within that document.

Note: The term "tailoring" as used above refers to waivers or deviations to specific requirements within this GLPR.

f. The term "project" in the context of this document refers to any specific investment having defined requirements. These may range from NPR 7120.5 and NPR 7120.8 defined projects to tasks managed through other NASA Centers. The term project also includes specific institutional initiatives within engineering.

g. For existing projects, the requirements of this document are applicable to the project's current phase as of the effective date of this GLPR and to phases yet to be completed. If prior versions of this GLPR are specified on existing contracts, the prior version remains in effect. Contracting officers should consult with the responsible organization to determine if a change order would be needed or beneficial to existing contracts.

h. In this directive, all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The term "may" denotes a discretionary privilege or permission, "can" denotes statements of possibility or capability, "should" denotes a good practice and is recommended, but not required, "will" denotes expected outcome, and "are/is" denotes descriptive material.

i. In this directive, all document citations are assumed to be the latest version unless otherwise noted.

P.3 Authority

a. NPR 7120.5, NASA Space Flight Program and Project Management Requirements

b. NPR 7123.1, NASA Systems Engineering Processes and Requirements

P.4 Applicable Documents

- a. Glenn Policy Directive (GLPD) 1000.1, GRC Governance and Strategic Management Structure
- b. GLPR 1280.1, Glenn Research Center Quality Manual
- c. GLPR 1410.1, Glenn Directives Management
- d. GLPR 7120.5.10, GRC Space Flight Project Management Requirements and Best Practices
- e. GLPR 7123.36, Engineering Review Board (ERB) Procedure
- f. Glenn Plan (GLP) 1120.1, NASA John H. Glenn Research Center Technical Authority Implementation Plan
- g. NASA/SP-2016-3706, NASA Standing Review Board Handbook

h. NASA/SP-2014-3705, NASA Space Flight Program and Project Management Handbook

P.5 Measurement/Verification

a. The GRC Chief Engineer Office may conduct assessments of projects to verify compliance with this document as needed or as requested by Center management. Compliance will be determined by reviewing the archived artifacts required by this procedure.

b. Independent internal and external audits of this procedure may also be performed as defined in the GLPR 1280.1, Glenn Research Center Quality Manual.

P.6 Cancellation

This procedure revalidates GLPR 7123.35A, Glenn Research Center (GRC) Project Technical Review Procedure, dated October 15, 2019.

Revalidated by:

Digitally signed by LAURENCE LAURENCE SIVIC SIVIC Date: 2024.08.15 13:06:12 -04'00

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Chapter 1. Introduction

1.1 Procedure Introduction

1.1.1 Rationale and Benefit

a. The NPR 7123.1 requires projects to implement an Engineering Technical Authority (ETA) approved Technical Assessment process to monitor progress of the technical effort and provide status information for support of the system design, product realization, and technical management processes. A key aspect of the technical assessment process is the conduct of life cycle and technical reviews (TRs) throughout the project life cycle in accordance with NPR 7123.1, Chapter 5. In addition, NPR 7120.5 requires independent review via a SRB or IRT.

b. A Sample NASA Project Life Cycle is represented in Figure (see NPR 7120.5 for the official life cycles for various project types).

- (1) Figure 1 provides an example of the phased listing of the TRs for projects governed by NPR 7120.5.
- (2) The NPR 7123.1 provides requirements for these TRs.
- (3) Each of the life-cycle reviews, as well as any other technical status reviews, need to be identified and documented so that all stakeholders will know how the project's progress will be assessed. This will typically be captured within the SEMP or in a separate ETA-approved Technical Review Plan (TRP).
- (4) The NPR 7120.5 requires independent review via an Agency-level SRB or Center IRT. When using an IRT, NASA/SP-2016-3706, NASA Standing Review Board Handbook defines guidance and best practice to be used by the SRB or IRT. It is strongly recommended to keep the same board members throughout the lifecycle to facilitate project familiarity. Project reviews requiring SRB or IRT participation are identified with solid/red triangles and include SRR, MDR/SDR, PDR, CDR, SIR, and ORR.
- (5) This procedure is primarily applicable to reviews requiring independent assessment.

c. The project's SEMP defines the applicability and tailoring of this process and the personnel roles and responsibilities within the project.

d. This procedure establishes a GRC method that is compliant with NPR 7123.1 for forming and convening technical reviews for the projects listed in P.2.

[Figure 1 on next page.]



Figure 1. The NASA Project Life Cycle

1.1.2 Procedure Overview

a. The TRs are performed after each level of development to check design maturity, review technical risk, and provide recommendations to the project team, project Decision Authority, and Convening Authorities. In addition, Glenn Policy Directive (GLPD) 1000.1, GRC Governance and Strategic Management Structure, assigns responsibility to the GRC Center Management Council (CMC) for providing project oversight and approval, prior to input to the Agency, unless otherwise delegated and documented in the project plan.

b. The TR process flow consists of several activities, which include technical review planning, development of a TR package, conducting the TR, and closing or completing the TR. Details of these activities are described in Chapter 3.

1.2 Records

a. Each project is required to establish and maintain a repository of project records and products accessible by project staff, Technical Authorities, and other associated stakeholders. Each project *shall* include the following TR artifacts:

(1) Review Plan

- (2) Convening Letter
- (3) Review Package (including presentation materials)

- (4) Action Items
- (5) Meeting Minutes (including attendance records)
- (6) Board Findings Report (including alternative and divergent views of board members or reviewers that disagree with findings or recommendations)
- (7) Review Item Discrepancy (RID)/Request for Action (RFA) Disposition Plan
- (8) A copy of the record(s) that define the formal Decision Authority for the project or any delegations thereof

b. The review plans, data, and results should be maintained and dispositioned as Federal Records.

1.2.1 Inputs

Input for TRs will come from project documentation. In planning a review, the Lead Systems Engineer (LSE) should refer to the Systems Engineering Institutional Authority templates and NPR 7123.1 for the entrance and success criteria for each technical review and develop a listing of what products address the criteria (see sections 2.4 and 3.1.1 for additional information).

1.2.2 Outputs

Outputs from TRs will include Review Item Discrepancy/Request For Action (RID/RFAs), a plan to address them, and a recommendation by the board on whether the success criteria was met and associated board recommendations.

Chapter 2. Responsibilities

2.1 Decision Authority

a. As specified in NPR 7120.5, each project is required to have a Decision Authority who determines whether and how a project proceeds through life-cycle activities. Authority and delegations are defined in NPR 7120.5, Section 2.3.

- (1) For Category 2 and 3 projects, the Decision Authority is the Mission Directorate Associate Administrator (MDAA), who may delegate Decision Authority responsibilities to Mission Directorate staff or to the Center Director. Criteria that define project Categorization (i.e., Category 1, 2 or 3) and Convening Authority designations are defined in NPR 7120.5 section 2.1.4 and its associated Tables 2-1 and 2-2.
- (2) The Center Director may further delegate this responsibility to the Director of the Space Flight Systems Directorate (Code M) or other Center management.
- (3) Decision Authority delegations are documented and approved in the applicable authority document (typically the Program Commitment Agreement or Program Plan).

b. Projects *shall* maintain a record of the formal Decision Authority or delegation of that role in the project records repository.

2.2 Convening Authorities

Convening Authorities are the management officials responsible for convening a project review, establishing and approving the Terms of Reference, including review objectives and success criteria, appointing the board chair, and concurring in board membership (see NASA/SP-2014-3705 section 5.10 and NASA/SP-2016-3706 for guidance on establishing Terms of Reference and board formation). These officials receive the documented results of the review. Convening Authorities for independent TRs (i.e., SRR, SDR/MDR, PDR, CDR, SIR, and ORR) are defined in NPR 7120.5 Table 2-2. In addition to the standard technical reviews, the Convening Authorities can authorize the review board to conduct special reviews as needed. For typical GRC Category 3 projects, Convening Authorities include the:

a. Decision Authority – The Decision Authority comes from the Programmatic Authority chain of a Mission Directorate. This can be the MDAA, but is typically delegated to Mission Directorate staff, GRC Center Management, or GRC Code M management.

b. Technical Authority – The Director of Research and Engineering has delegated Engineering Technical Authority from the Center Director over the TR processes and serves as a Convening Authority representing the Center "Technical Authority" role defined in NPR 7120.5, Table 2-2. This role may be further delegated to an individual with formally delegated Engineering Technical Authority

Note: For additional details on Technical Authority roles, refer to GLP 1120.1, NASA John H. Glenn Research Center Technical Authority Implementation Plan available from the GRC BMS Library at <u>https://knowledgeshare.grc.nasa.gov/bmslibrary</u>.

2.3 Center Management Council (CMC)

a. Per GLPD 1000.1, the CMC's primary responsibility is providing project oversight (cost, schedule, technical, and management) and milestone approval authority prior to input to the Agency, including key decision point, annual performance indicator, risks, and other milestones.

b. Key inputs to the CMC for TRs include the Engineering Management Board, the Space Flight Systems Project Review Board, the Safety and Mission Assurance (SMA) Management Board, and Aeronautics Project Review Board.

c. The project plan and SEMP should describe the level and phasing of CMC involvement in technical review approvals, or delegations thereof, as requested by Center management.

2.4 Systems Engineering Institutional Authority

The GRC Systems Engineering Institutional Authority is performed by the Systems Engineering and Architecture Division (Code LS) and is responsible for developing and maintaining standardized TR processes, requirements, and templates. These should include common tailoring and customization based on project scope and complexity for products such as TRPs, entrance and success criteria, and other associated TR products. The standardized TR processes, requirements, and templates should also define when it is acceptable to combine or eliminate specific review types. Standardized processes may take the form of Glenn Level Procedures or Glenn Work Instructions as defined in GLPR 1410.1. The goal is to provide a common institutional review structure and methodology that institutes continuous improvement by infusing lessons learned into the standardized processes requirements, and templates.

2.5 **Project Manager (PM)**

a. The PM is responsible for the formulation and implementation of a project as described in NPR 7120.5 and NPR 7123.1. This includes responsibility and accountability for the project safety, technical integrity, technical, cost, and schedule performance, and mission success.

b. The PM has responsibility to ensure that all requirements in this procedural document are implemented or tailored with approval.

2.6 **Project Chief Engineer (PCE)**

a. The PCE:

- (1) Serves as the project level ETA.
- (2) Leads and manages engineering activities to ensure the project TRPs and products meet Agency and Center ETA processes, requirements, and standards.
- (3) Ensures plans and products are at the appropriate level of maturity for the given TR.
- (4) Will utilize Discipline Lead Engineers (DLEs) in the assessment of discipline specific plans or products.

b. For smaller projects where no PCE has been designated, a Product Lead Engineer will perform the PCE responsibilities in this GLPR. However, ETA decisional items (e.g., deviations/waivers to Technical Authority (TA) owned requirements or other TA approvals required by applicable directives or standards) must be approved by a formally delegated ETA (e.g., a DLE that is the branch chief of the Product Lead Engineer).

2.7 Chief Safety and Mission Assurance Officer (CSO)

The CSO serves as the project level SMA Technical Authority and ensures that project TRPs and products meet Agency and Center SMA processes and requirements. For smaller projects, this role may be filled by an SMA Lead with SMA TA oversight. For smaller projects where no CSO has been designated, a SMA lead will perform the CSO responsibilities in this GLPR. However, SMA TA decisional items (e.g., deviations/waivers to TA owned requirements or other TA approvals required by applicable directives or standards), must be approved by a formally delegated SMA TA (e.g., a SMA branch chief).

2.8 Technical Team

a. The term "technical team" as used within this document has the same context as defined in NPR 7123.1.

b. The technical team is a multidisciplinary group of individuals with appropriate domain knowledge, experience, competencies, and skills assigned to a specific technical task.

c. The technical team members are assigned by GRC DLEs (Discipline Branch Chiefs) in coordination with the PCE and PM for specific technical disciplines.

d. The technical team performs the detailed engineering and analysis for the project with guidance from their DLEs and GRC engineering procedures. Efforts of the collective technical team associated with this procedure are coordinated by the LSE.

e. Working with the PM, PCE, CSO, and DLEs, the technical team determines planning and products for TRs taking into account factors such as number and complexity of interfaces, operating environments, and risk factors.

2.9 Lead Systems Engineer (LSE)

a. The LSE has the primary responsibility for planning (consistent with standardized Code LS guidance) and execution of the activities associated with TRs.

b. The LSE is responsible for coordinating and gathering input from the technical team to reflect the various institutional technical disciplines. Responsibilities include:

- (1) Develop an ETA-approved TRP in consultation with the technical team, PCE, CSO, and PM based on standardized templates established by Code LS.
- (2) Coordinate the TR logistics.
- (3) Lead the preparation and delivery of TR materials.
- (4) Verify and communicate completion of the TR package to project members prior to the kickoff meeting.
- (5) Coordinate board findings with other processes (i.e., risk management, technical planning, requirements development, etc.) and appropriate responsible project members.
- (6) Submit a final TR package and review artifacts for project archiving.

2.10 Technical Review Board (TRB)

a. The TRB (also referred to as "board" within this document) will function as the independent assessment team and should use the best practices and lessons learned for the conduct of independent assessments as described in NASA/SP-2016-3706, the NASA Standing Review

Board Handbook. Members functioning as the independent assessment team must be independent of the project (i.e., not funded by the project).

Note: Additional information on independence and avoiding conflicts of interest are described in the NASA/SP-2016-3706, Appendix A, available at <u>https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20170000280.pdf</u>. Current Agency independent assessment principals are defined in the "NASA Agency Program Management Council (APMC) Independent Assessment Principles and Approach Decision Memorandum" available (in the NODIS Library, Other Policy Documents Tab, Office of the Chief Engineer) at https://nodis3.gsfc.nasa.gov/OCE_docs/OCE_31.pdf.

b. The term "board" is used within this document to be inclusive of the SRB or IRT depending on size/class.

- (1) For GRC-led Category 2 projects with a life-cycle cost less than \$250 million or Category 3 projects, the independent assessment function is typically conducted by a Center assigned IRT rather than an Agency-level SRB. The IRT may include membership from outside the Center as deemed necessary by the Convening Authorities.
- (2) Large projects that have independently functioning SRBs, should describe those roles in the project SEMP, consistent with the SRB Terms of Reference (see NASA/SP-2014-3705 section 5.10 and NASA/SP-2016-370 section 3).

c. The TRB serves an advisory role to the Convening Authorities. Consequently, the board has no Programmatic or TA over the projects they review.

- (1) The board presents their findings and recommendations for consideration by the Convening Authorities and Center management.
- (2) This procedure assumes all board members are civil servants. If the board contains contractors, there are additional constraints and requirements that must be assessed (refer to NASA/SP-2016-3706).

d. For a given project, it is strongly recommended to maintain the same board members for all TRs. This will maintain continuity of knowledge and allow clear assessment on progress made with respect to previous TR findings.

e. The board provides an expert assessment of the technical approach, risk posture, and progress against the baseline and makes recommendations to improve performance and/or reduce risk as part of their final report. The board is responsible for reviewing products, developing RIDs and RFAs, assessing whether the success criteria has been met, and documenting board findings in a final report to be provided to the Convening Authorities. The board may invite subject matter experts to participate in the review. Any RIDs or RFAs identified by invited subject matter experts must be sponsored by a board member.

f. The board chair serves as final arbitrator of board deliberations if issues arise where consensus cannot be reached among board members. However, all alternative or divergent opinions are to be captured in minutes and reports.

Chapter 3. Procedure

3.1 Review Planning

a. Per NPR 7123.1, the technical team is required to develop and document plans for life cycle and TRs as part of the project planning process. The specific milestone reviews to be conducted are to be defined in the project SEMP, including a TR schedule that conforms to the project plan. Tailoring of review types and customization of criteria are based on project size and complexity and is performed as part of the initial project SEMP development.

b. The Systems Engineering Institutional Authority (Code LS) *shall* develop standardized templates and work instruction technical review plans that identify entrance and success criteria, minimum required products, and product maturity. As these templates are developed, they will be made available from the BMS Library.

- (1) These standardized templates and review plans will be based on project risk classification, consistent with requirements in NPR 7123.1.
- (2) Projects may use these directly as the project TRP or may customize them with ETA approval.



Figure 3-1. Technical Review Plan Activities and Tasks

3.1.1 Establish the TR Entrance and Success Criteria

a. The LSE *shall* develop a list of entrance and success criteria for each TR.

- (1) These criteria should be established in pre-phase A project planning and defined for all planned reviews in the project SEMP.
- (2) As a minimum, criteria for each specific review are to be finalized prior to the preceding review to allow for adequate planning of the work needed between the two reviews. For example, CDR entrance and success criteria are to be finalized prior to the PDR review.

b. The LSE will coordinate with the technical team to determine the applicable entrance and success criteria, based on Code LS standardized templates for the size/complexity of project involved.

c. In the absence of Code LS templates, NPR7123.1 Appendix G, "Life-Cycle and Technical Reviews Entrance and Success Criteria" should be used to define entrance and success criteria for each review.

3.1.2 Develop a Product/Document List for the TR

a. The LSE *shall* prepare a list of products and documents and associated maturities that will be provided to the board, utilizing templates established by Code LS based on project size and complexity.

b. Code LS templates will define the minimum products necessary for compliance with NPR 7123.1 along with the associated maturity level.

- (1) In the absence of Code LS templates, NPR 7123.1, Section 5.2.1 required minimum products, and NPR 7120.5, Appendix I, will be used to define required products and maturity levels for various reviews.
- (2) These products should address all entrance and success criteria defined for each review.

c. The LSE will coordinate among the technical team to define the products and maturities for specific technical disciplines.

d. Guidance and expectations for Small Category 3, Risk Classification D Space Flight projects with a life-cycle cost of under \$150 million are defined in the NASA Associate Administrator memorandum at <u>http://nodis3.gsfc.nasa.gov/OCE_docs/OCE_25.pdf</u> (in the NODIS Library, Other Policy Documents Tab, Office of the Chief Engineer).

3.1.3 Establish a TR Schedule

The PM, in coordination with the PCE, CSO, and Convening Authorities, determines when the project will hold the reviews. The PM will work with the LSE and PCE to establish a detailed TR schedule. The schedule for each specific review should allow for a minimum of 2 weeks from the time the documents are provided to the reviewers and the start of the review.

3.1.4 Identify Chair and Board Members

a. The Convening Authorities will mutually select a board chair (the PM and PCE may provide recommended candidates to the Convening Authorities). NASA/SP-2016-3706 Chapter 3 should be referenced for selection considerations of the chair and board members to ensure independence and avoidance of conflicts of interest.

- (1) The chair shall be someone funded independent of the project.
- (2) The chair should be a recognized expert with relevant technical experience for the respective space flight project reviews.

b. The PM, PCE, CSO, and chair will identify candidate board members for submission to the Convening Authorities. The PCE will work with GRC DLEs to identify engineering technical discipline specific board members; the CSO will work with SMA management to identify SMA members; and the PM will work with Program management to identify programmatic, science, and other related stakeholder representatives.

c. An ETA and SMA TA representative (typically PCE and CSO), as designated by the Technical Authority Convening Authority, shall serve on the board.

d. The Convening Authorities will mutually make the final selection of board members.

3.1.5 Document the Ground Rules and Board Charter for the TR

The Convening Authorities, with input from the PM, PCE, and CSO will define the ground rules for the TR. The ground rules should identify:

a. The purpose and scope of the review.

b. The type of board structure for the TR (less formal panels can be used for small low cost projects).

c. The process for submitting review item discrepancy/request for action (RIDs/RFAs).

d. The process for dispositioning and closing RIDs/RFAs.

3.1.6 Determine Logistics Requirements

The LSE should determine and secure the logistical needs required to support the execution of the TR. This includes items such as space and teleconferencing requirements, tools and training requirements, staff that may be required for logistical support for larger reviews, etc.

3.1.7 Document Technical Review Plan (TRP)

The LSE *shall* document a TRP that details the resource estimates, schedule, participants, products, execution, and closure processes for the specific review being initiated. A standardized TRP template will be maintained by Code LS.

3.1.8 Project Level Concurrence of the TRP

a. The PM, PCE, and CSO will review and concur with the TRP.

b. For larger projects the PCE may conduct an Engineering Review Board (ERB) per GLPR 7123.36, Engineering Review Board Procedure, to review and gain concurrence of the TRP.

c. As a minimum, the ERB participants are to include the PM, CSO, and a Code LS Systems Engineering Institutional Authority Representative.

d. For smaller projects, the PCE may conduct an out-of-board ERB. Alternatively, if an ERB is not conducted, the PCE will informally solicit input from the PM, CSO, and Code LS Systems Engineering Institutional Authority and document the results in project records.

3.1.9 Convening Authorities Approval of the TRP

The Convening Authorities shall review and approve the TRP.

3.1.10 Add Approved TRP to the Project Records Repository

The LSE will submit the approved TRP to the project records repository and any other controlled material as defined in the project configuration management plan.

3.2 Develop Technical Review Package



Figure 3.2 Technical Review Package Activities and Tasks

3.2.1 Prepare the TR Package

The LSE, with support of the technical team, will develop a TR package as defined in the TRP. The Code LS templates will be used to help determine the information that needs to be incorporated in the TR package.

3.2.2 TR Readiness Assessment

At least 30 calendar days prior to the review start date, the board chair, PM, PCE, and CSO *shall* mutually assess the project's expected readiness for the review and report any disagreements to the Decision Authority for final decision (see NASA/SP-2014-3705 section 5.10.2.2 and NASA/SP-2016-3706 section 4.2 for criteria, guidance, and responsibilities on conducting readiness assessments).

3.2.3 Draft the TR Convening Letter

a. After all parties agree to the TR readiness, the PM, with support from the PCE and CSO, should draft a convening letter that defines the scope, schedule, and important points of contact for the TR at least 6 weeks prior to the review.

b. The draft will be provided to the Convening Authorities for finalization, approval, and distribution.

c. Code LS will maintain templates for TR convening letters.

3.2.4 Finalize Approve and Issue Convening Letter

The Convening Authorities shall issue the convening letter to the TR participants and any program, project, or Center management officials as appropriate at least four weeks prior to the start of the review.



3.3 Conduct Technical Review

Figure 3-3. Conduct Technical Review Activities

3.3.1 Hold Kickoff Meeting

a. A kickoff meeting is recommended to help the board and participants familiarize themselves with the purpose and scope of each TR and should be held at least 30 days before the start of the review.

b. The board chair, with input from the PM, PCE, and CSO, should prepare a kickoff meeting agenda.

c. The PM and technical team will prepare any necessary project material or presentations required for the kickoff meeting.

d. Effective kickoff meetings should address:

- (1) TR purpose, scope, and key dates
- (2) Project structure, overview, and background
- (3) Entrance criteria/success criteria (including any waivers or pre-declared RIDs)
- (4) Status of previous review RIDs/RFAs (if applicable)
- (5) Instructions to the board regarding the submitting and dispositioning of RIDs/RFAs
- (6) Products/documents to be reviewed
- (7) Logistics
- e. The chair conducts the kickoff meeting with board members and participants.

f. Coordination and execution of this meeting is facilitated by the LSE (or board review manager if one is assigned).

g. The PM will typically present project information at the kickoff meeting.

3.3.2 Review Products/Documents and Generate RIDs/RFAs

a. The timing of the review presentations, product reviews and overall review agenda should be negotiated among the chair, PCE, CSO, and PM at least 30 days prior to the review. See NASA/SP-2016-3706 for guidance on preparing and conducting the review (called "site review"). Final data delivery to the board should occur 20 days before starting the site review. Preliminary data should be provided even earlier to allow the board to familiarize themselves with the project (see NASA/SP-2016-3706 section 4.7 for guidance on timing of products).

b. The board may choose to invite subject matter experts to participate in the review and will inform the PM, PCE, and CSO of the invited participants.

c. The project technical discipline leads should present briefings of each technical topic and associated products under review. Conducting these briefings prior to the formal review of the detailed products/documents may help reduce discrepancies by answering initial questions in real time.

d. The board and TR participants will review products/documents and develop discrepancy reports against those items. The project technical team should also participate in the review. RIDs or RFAs can be submitted to a board member to sponsor a finding (RIDs and RFAs must be sponsored by a board member).

3.3.3 Screen RIDs/RFAs

a. The formality of dispositioning, tracking, and closing RIDs and RFAs is defined by the review ground rules as documented in the TRP. RIDs are often used in a more formal way, requiring the board to disposition them and get agreements with the submitter, project, and board members for their disposition and closeout.

b. The board should screen all RIDs and RFAs and provide feedback to the author. The board may choose to:

- (1) Delete RIDs/RFAs that are inconsistent with the ground rules for the review.
- (2) Combine duplicative RIDs/RFAs into one clear and concise item that authors agree to.
- (3) Accept a RID/RFA as is.
- (4) Accept a RID/RFA with modification after discussion with the author.
- (5) Propose a follow-on action for the project to address an RFA.

3.3.4 Develop Resolution Plans

a. The LSE will work with the technical team and PM to develop resolution plans to address the screened RIDs and RFAs from the TR.

b. The LSE will request concurrence from the board chair on the resolution plans.

c. If a disagreement occurs between the board and the project regarding the resolution plan of a RID or RFA, the issue should be elevated to successively higher levels of the governance structure until resolved.

d. If disagreements are not escalated for resolution, the disagreement *shall* be documented in the board report.

3.3.5 Issue Review Board Report

The board chair shall issue a report containing the findings for the TR. The board report should be an assessment of the technical approach, risk posture, and progress against the baseline including an assessment on whether the success criteria was met. Refer to NASA/SP-2014-3705 section 5.10.2.3 and NASA/SP-2016-3706 sections 5.5 through 5.8 on review board briefings and reporting products. The level and extent of briefings and reports should be defined in the Terms of Reference and tailored based on the size of the project.

3.3.6 Issue Project Response

The PM *shall* issue a project response to the board report for submission to the board, the convening authorities, and center management. This response should include concurrence or non-concurrence with the board's findings, associated rationale, and plans for addressing the board findings.

3.3.7 Incorporate Findings in Project Workflow and Document Records

a. At the completion of the TR, the LSE will incorporate all RID/RFA resolution plans into the associated project workflow plans and products. The RID/RFA process must ensure that each RID/RFA is tracked from submission to closure. The LSE is responsible for RID/RFA tracking, closure (with the concurrence of the initiator), and status reporting.

b. The LSE *shall* submit TR artifacts to the project records repository in accordance with the project configuration management plan.

3.4 Completion of the TR

3.4.1 Completion Criteria

a. As defined in NPR 7123.1, section 5.3, reviews are considered complete when the following are accomplished:

- (1) Agreement exists for the disposition of all RIDs and RFAs. The RID/RFA process is a closed-loop process that provides tracking, disposition, and closure of the RID/RFAs. The board chair and the project's representative (e.g., LSE or PM) typically discuss each RID/RFA and reach agreement on its merit for official acceptance as a RID/RFA. The RID/RFA initiator must be in agreement with the completion of the plan or action taken before the RID/RFA is closed. If it is impractical to close a RID/RFA prior to completion of a TR, a plan for closure and closure date must be agreed upon with the RID/RFA Author.
- (2) The board report and minutes are complete and distributed.
- (3) Agreement exists on a plan to address the issues and concerns in the board's report.
- (4) Agreement exists on a plan for addressing the actions identified out of the review.
- (5) Liens against the review results are closed, or an adequate and timely plan exists for their closure.
- (6) Differences of opinion between the project under review and the board have been resolved, or a timely plan exists to resolve the issues.
- (7) A report is given by the board chair to the Convening Authorities and Center Management.
- (8) Appropriate procedures and controls are instituted to ensure that all actions from reviews are followed and verified through implementation to closure.

(9) The Decision Authority signs a decision memo documenting successful completion of the review.

3.4.2 RID/RFA Closure

a. As described in NASA/SP-2016-3706 section 5.4.1.3; the project will provide a written response explaining how the RID/RFA issue will be resolved. After reviewing the resolution, the author of the RID/RFA determines whether the project response is satisfactory. The author must endorse the resolution before the RID/RFA is closed.

b. If a disagreement occurs between the RID/RFA author and project regarding closure of a RID/RFA, the chair attempts to resolve differences with the PM. If an acceptable resolution cannot be negotiated between the chair and the PM, the chair elevates the RID/RFA to the next higher level of authorities. Depending on the issue, it may traverse different decision authorities and may utilize the formal dissent (see NASA PM Handbook section 5.3.3, Appeal Path for Formal Dissent on varying decision authority paths, and GLP 1120.1 on the GRC formal dissent process). On the project side, the higher authority would typically involve the programmatic Decision Authority. On the chair's side, the higher authority would typically involve a Center technical or other institutional authority. Contact the GRC Chief Engineer for help identifying the appropriate individuals. Resolution escalates to successively higher levels of the governance structure until resolved.

Chapter 4. Tailoring and Process Improvement

4.1. Tailoring of this GLPR may be performed based on size, cost, risk, complexity, or other factors of the project under consideration.

4.1.1 Tailoring must be consistent with the minimum life cycle and TRs defined in the associated management NPR and NPR 7123.1.

4.1.2 Tailoring of this GLPR *shall* be specified in the project SEMP and approved by the ETA.

4.1.3 If a SEMP is consolidated into the project plan for small projects where the SEMP content is incorporated in the project plan, tailoring can be defined in that document, provided the tailoring is approved by the ETA.

4.2. All users of this GLPR should assess the activities and resulting products to determine if any improvements are warranted.

4.2.1 Process improvement suggestions should be forwarded to the Business Management System (BMS) Library point of contact for this GLPR for consideration in future updates.

4.2.2 Project lessons learned sessions or other knowledge capture activities may also be used to identify improvements to this procedure.

Appendix A. Definitions

Convening Authorities. The management officials responsible for convening a project review; establishing the Terms of Reference, including review objectives and success criteria; appointing the SRB chair; and concurring in SRB membership. These officials receive the documented results of the review.

Customization. The modification of recommended systems engineering practices that are used to accomplish NPR 7123.1 requirements. Examples of these practices are in the NASA Systems Engineering Handbook, NASA/SP-2016-6105.

Decision Authority (program and project context). The individual authorized by the Agency to make important decisions on programs and projects under their authority.

Deviation. A documented authorization releasing a program or project from meeting a requirement before the requirement is put under configuration control at the level the requirement will be implemented.

Institutional Authority. Institutional Authority encompasses all those organizations and authorities not in the Programmatic Authority. This includes Engineering, Safety and Mission Assurance, and Health and Medical organizations; Mission Support organizations; and Center Directors. Individuals in these organizations are the official voices for their respective areas and set, oversee, and ensure conformance to applicable institutional requirements. Institutional Authorities are responsible for "institutional requirements." They focus on how NASA does business and are independent of any particular program or project.

Request for Action/Review Item Discrepancy. The most common names for the comment forms that reviewers submit during life-cycle reviews that capture their comments, concerns, and/or issues about the product or documentation. Often, RIDs are used in a more formal way, requiring boards to disposition them and having to get agreements with the submitter, project, and board members for their disposition and closeout. RFAs are often treated more informally, almost as suggestions that may or may not be reacted to.

Tailoring. The process used to seek relief from specific GLPR or NPR requirements according to the waiver and deviation process of the associated procedural requirements document.

Task. A task generally produces a component, which is a portion of a work product. A task can typically be assigned to one individual or team leader and is the recommended level of detail by which a project work plan should be planned and tracked. In addition, each task includes a technique with one or more steps describing how to complete the task.

Technical Authority. Part of NASA's system of checks and balances that provides independent oversight of programs and projects in support of safety and mission success through the selection of individuals at delegated levels of authority. These individuals are the Technical Authorities. Technical Authority delegations are formal and traceable to the Administrator. Individuals with Technical Authority are funded independently of a program or project.

Technical Review Plan. A detailed plan that contains all the information, ground rules, and names of responsible persons for each individual review.

Technical Team. The Technical Team is a multidisciplinary group of individuals with appropriate domain knowledge, experience, competencies, and skills assigned to a specific technical task. The technical team members are typically assigned by GRC Discipline Lead Engineers (Discipline Branch Chiefs) in coordination with the PCE and PM for specific technical disciplines to develop the technical engineering plans and work products.

Waiver. A documented authorization releasing a program or project from meeting a requirement after the requirement is put under configuration control at the level the requirement will be implemented.

Appendix B. Acronyms

BMS	Business Management System
CDR	Critical Design Review
CMC	Center Management Council
CSO	Chief Safety and Mission Assurance Officer
DLE	Discipline Lead Engineer
ERB	Engineering Review Board
ETA	Engineering Technical Authority
FRR	Flight Readiness Review
GLPD	Glenn Policy Directive
GLPR	Glenn Procedural Requirement
GRC	Glenn Research Center
IRT	Independent Review Team
LSE	Lead Systems Engineer
MCR	Mission Concept Review
MDAA	Mission Directorate Associate Administrator
MDR	Mission Definition Review
NODIS	NASA Online Directives Information System
NPD	NASA Policy Directive
NPR	NASA Procedural Requirement
OCE	Office of the Chief Engineer
ORR	Operational Readiness Review
PCE	Project Chief Engineer
PDR	Preliminary Design Review
PFAR	Post-Flight Assessment Review
PM	Program or Project Manager
RFA	Request for Action
RID	Review Item Discrepancy
SAR	System Acceptance Review
SDR	System Definition Review
SEMP	Systems Engineering Management Plan
SIR	System Integration Review
SMA	Safety and Mission Assurance
SRB	Standing Review Board
SRR	System Requirement Review
TA	Technical Authority
TR	Technical Review
TRB	Technical Review Board
TRP	Technical Review Plan

Change History

Change	Date	Description/Comments
Basic	7/20/09	This is a new directive in accordance with the technical assessment process of NPR 7123.1
Change 1	3/18/10	Changed text in Appendix D.22 (pg.2 of template)
Change 2	4/11/12	Change responsible office from DT/Chief Engineer Office to D/Engineering Directorate. Added distribution statement on page 6.
Change 3	5/13/14	Change responsible office from D/Engineering Directorate to Code L/Research and Engineering Directorate. Extended expiration date from 7/20/14 to 7/20/15 in accordance with GLID 1410.7.
Change 4	5/10/15	Waiver 1410.1-4 was approved on 6/01/2015 for a second extension. Changed the expiration date from July 20, 2015 to July 20, 2016.
Change 5	4/21/16	A second extension granted per GLW 1410.1-15 – changed the expiration date from July 20, 2016– July 20, 2017.
Change 6	5/2/2017	A third extension granted per GLW 1410.1-19 – changed the expiration date from July 20, 2017– July 20, 2018.
A	10/15/2019	Substantive changes. This revision includes updates to align with a number of Agency policy and handbook updates since its introduction in 2009, including alignment with roles of Decision and Convening Authorities and independent review teams. Templates in the appendices have been removed and will be restructured and maintained by Code LS independent of this GLPR or obtained directly from Agency documentation. The compliance matrix appendix was deleted, as it was not utilized in practice. Chapters 2 and 3 rewritten and requirements redefined. 2.7 Updated Chief Safety Officer to Chief Safety and Mission Assurance Officer. Chapter 5, Process Improvement was incorporated into Chapter 4.
Change 1	08/15/2024	Revalidate with administrative changes.3.4.2b Changed dissenting opinion to formal dissent.