

PROCESS FOR DEVELOPING NASA TECHNICAL STANDARDS (ENGINEERING)
SPONSORED BY THE NASA CHIEF ENGINEER

INTRODUCTION

NASA Technical Standards (Engineering) consist of standards, specifications, and handbooks that are developed under the sponsorship of the NASA Chief Engineer and managed by the NASA Technical Standards Program (NTSP) Office.

PURPOSE

These NASA Technical Standards are developed to:

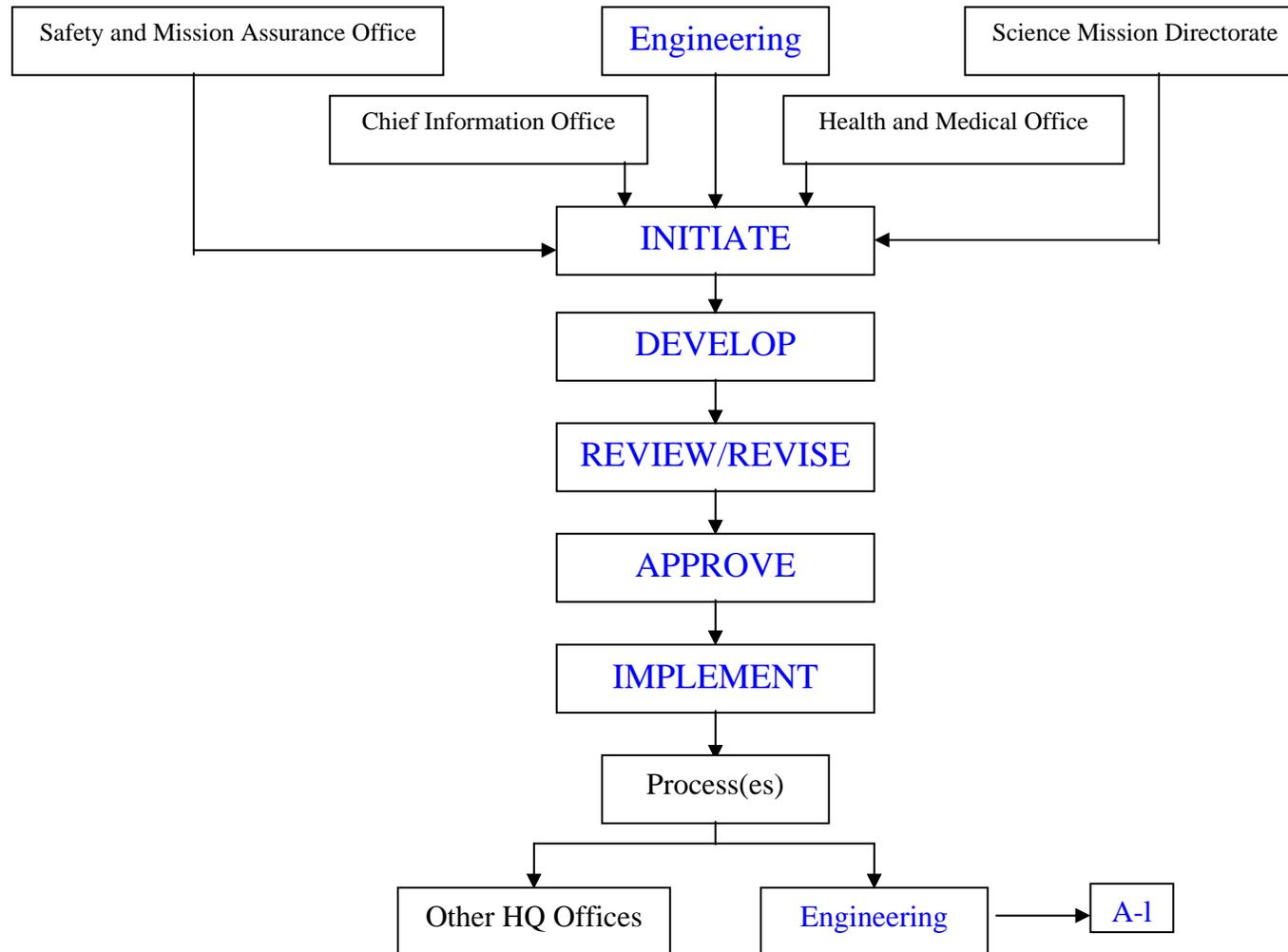
- a. Promote interoperability among NASA programs/projects by developing common NASA Technical Standards.
- b. Capture and preserve engineering lessons learned and best practices.
- c. Facilitate the infusion of technology into all NASA programs/projects.

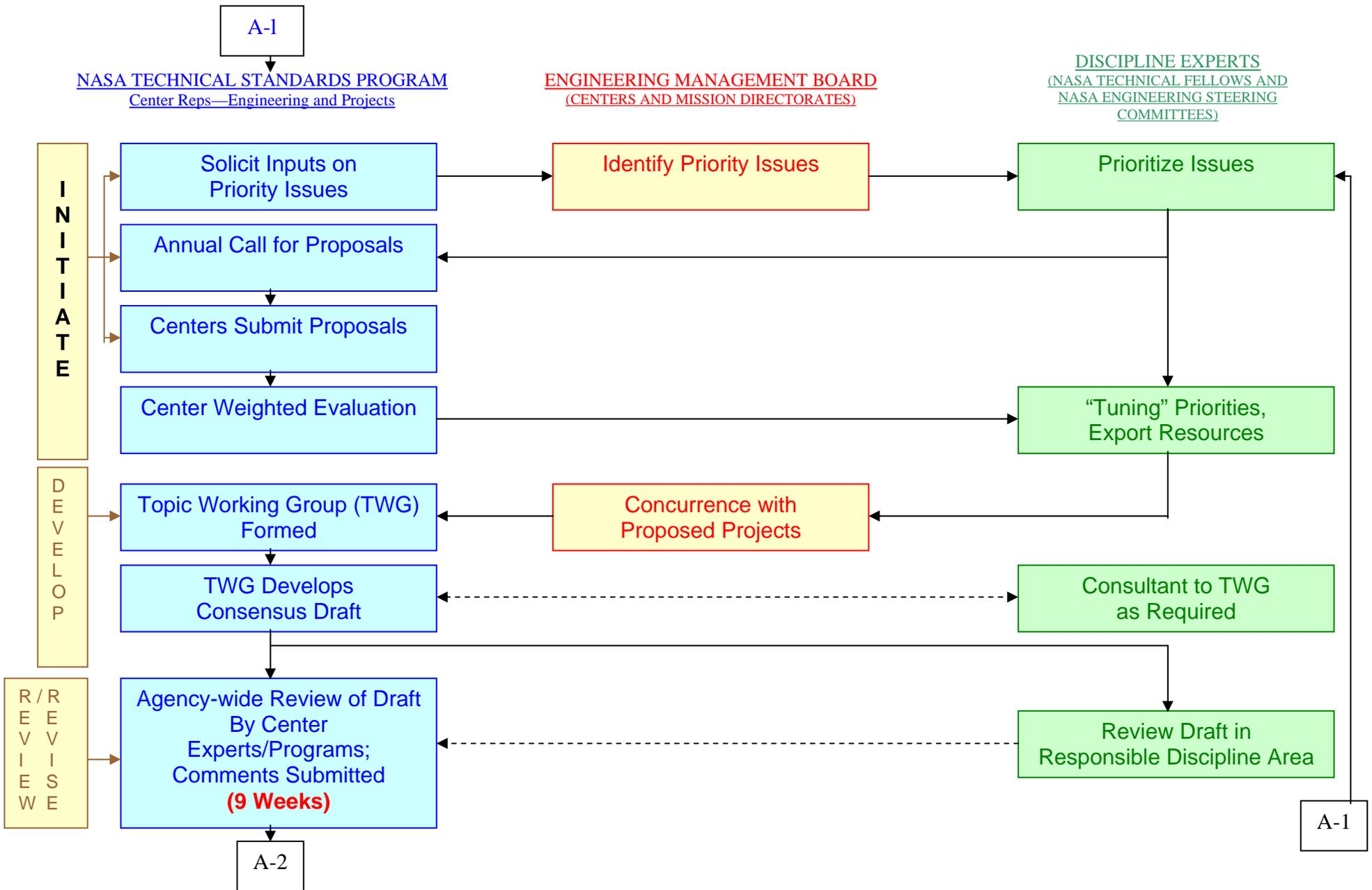
NASA Technical Standards (Engineering) are developed based on engineering lessons learned, as well as proven new technology. Development and testing of new technology are not within the scope of the NTSP.

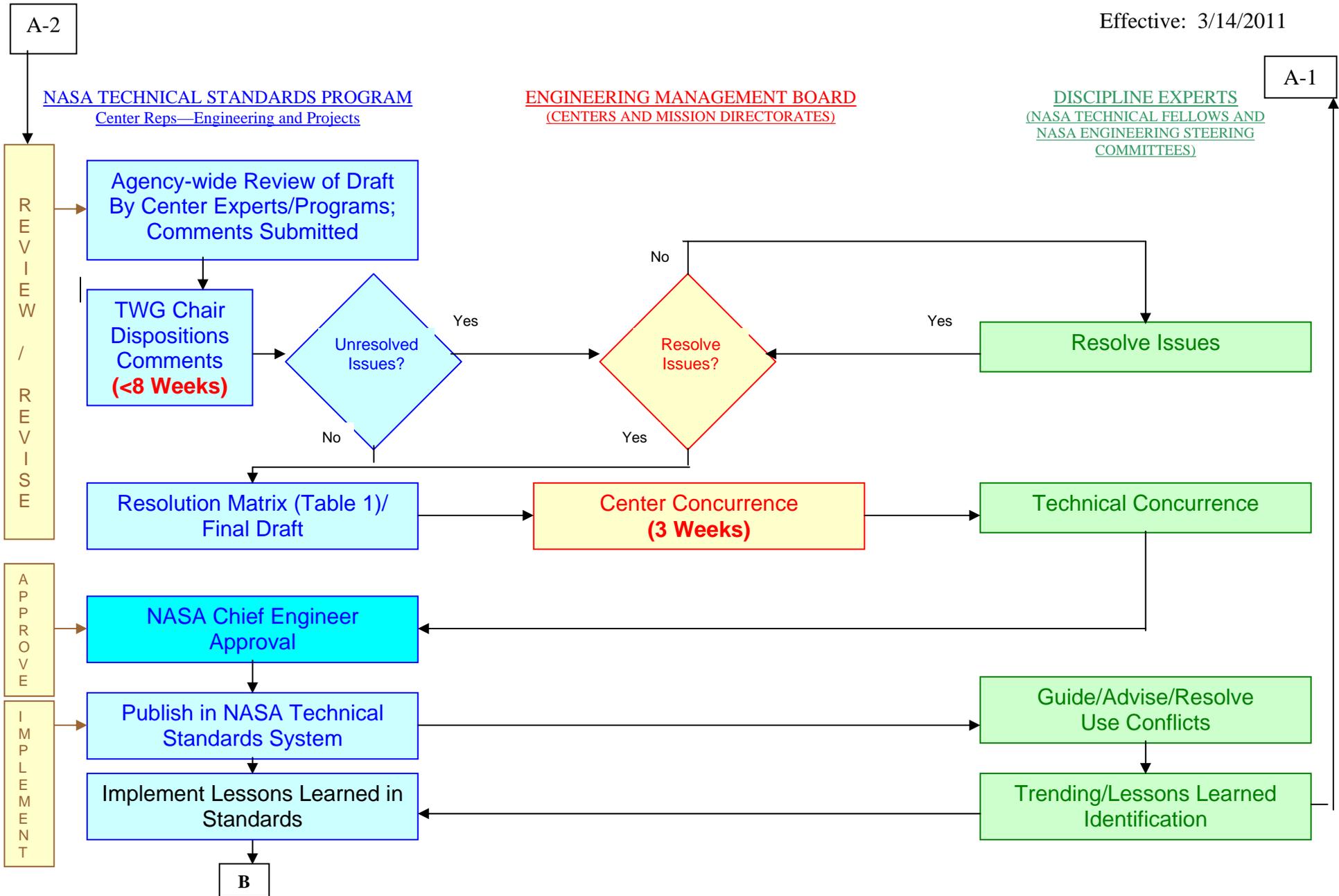
APPROACH

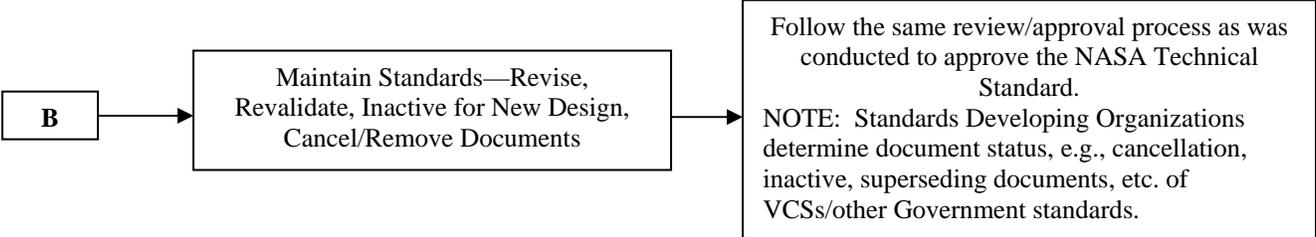
NASA Technical Standards sponsored by the NASA Chief Engineer shall be initiated (proposed), developed, reviewed and revised based on comment disposition, approved, published, and implemented in accordance with this process.

PROCESS FOR DEVELOPING NASA TECHNICAL STANDARDS (ENGINEERING) SPONSORED BY THE NASA CHIEF ENGINEER









DETAILED REQUIREMENTS

1. INITIATION STAGE

1.1 Proposal Submission

1.1.1 The Online Standards Management System (SMS) shall be utilized for initiation of proposals by accessing the Proposal System at <http://standards.nasa.gov>; after registration/logon, click “Standards Management System” from the NASA ACCESS MENU; move your mouse over “Submit a Proposal”; move the mouse down and click on “Submit Proposal for Technical Standard Development.”

Any NASA employee or contractor authorized access to the NASA Technical Standards System may prepare/submit a proposal to develop a NASA Technical Standard (Engineering) upon identification of a need or during the annual call for proposals. Center Engineering Board Member (EMB) member approval is required prior to submitting a proposal; EMB member will receive email acknowledging receipt of your proposal. Providing detailed information, using the guidelines in the proposal, is imperative to ensure adequate evaluation and approval of the proposal.

1.1.2 The NTSP Manager shall:

- a. Request clarification from the proposal author, if needed; proceed to section 1.1.3.
- b. Decline the proposal, identifying reasons to the proposal author; proceed to section 1.1.3.
- c. Send the proposal to the NASA Technical Standards Working Group (NTSWG) members for evaluation, specifying the due date; proceed to section 1.1.4.

NOTE: Copies of emails are sent to the proposal author and submitting Center’s NTSWG member.

1.1.3 The proposal author shall access the proposal (returned to draft status), make modifications, and resubmit the proposal for screening; or delete the draft proposal from the system.

1.1.4 NTSWG members, except the submitting Center’s member, shall conduct the Center’s review by qualified Center experts, evaluate (record) the proposals based on the following criteria, and assign score points of 1 (low) to 10 (high) to weighted criteria (see table 1):

Table 1—Evaluation Criteria and Weighting

Weighting	Criteria
25%	Proposal does not duplicate existing government/non-government/NASA standards or standards under development that are adequate to meet NASA's needs.
25%	Technical readiness is adequate to support the preparation of the proposed standard.
25%	There is clear Program and/or discipline support for development of the standard.
15%	Scope and limitations are clear.
10%	Estimated resources and available expertise appear adequate to accomplish proposed project.

Comments relative to the proposal may be submitted by evaluators. The duration of this review is at the discretion of the NTSP Manager. The proposal author will receive an email notification each time an evaluation is submitted to the NTSP Manager. Total scores are presented as averages (annotated) to account for projects not ranked by Centers where appropriate expertise is not available.

1.1.5 The proposal author shall respond to evaluation comments via a link in the email notification. *The evaluator will be notified of the response via email and given opportunity to respond.*

1.1.6 The NTSP Manager shall provide a list of proposed projects (ranked by total average score) for EMB members to identify priority issues. *Those issues will be presented to the NASA Engineering and Safety Center (NESC) for prioritization. The NESC prioritized list will be presented to the NASA Chief Engineer for approval of project development/funding.*

1.1.7 The NASA Chief Engineer shall return the approved list to the NTSP Manager.

1.1.8 The NTSP Manager shall take one of the following actions in the Proposal System:

a. Approve the proposal. *Approval is subject to limitations of available funding. The approval email (record) is the author's authority to proceed with development of the proposed standard as stated in the proposal. Approval is contingent upon the TWG Chair's selection of at least three TWG members from NASA Centers. The Chair is encouraged to include discipline reviewers from industry/academia as well. The document number for the proposed standard is assigned. (To obtain a time charge code for this standards development activity, contact your Center's NTSWG member.) The NTSP Manager has the authority to approve a proposal without NTSWG member evaluation if circumstances demand such action.*

- (1) The proposal author shall become the Topic Working Group (TWG) Chair unless unavailable.
- (2) If unavailable, the NTSP Manager shall appoint the TWG Chair.

b. Disapprove the proposal, stating rationale. *Reasons for disapproving the proposal will be included in the email notification (record).*

c. Place the proposal on “Hold.” *A proposal may remain in “Hold” status indefinitely at the discretion of the NTSP Manager.*

1.1.8 Proceed to the Development Stage, section 2.

2. DEVELOPMENT STAGE

2.1 *A Center’s interest in participating in the development of the proposed standard is solicited from the NTSWG members in the email announcing approval of the proposal and/or via email from the NTSP Manager. The NTSWG members shall send the TWG Chair the name, email address, phone number, and NASA Center of those interested in participating in development of the standard.*

2.2 If a Technical Discipline Working Group/Community of Practice for the discipline is already established/chartered, the Technical Discipline Working Group/Community of Practice Chair shall contact the NTSP Manager if support in developing the standard is needed. Additional Center participation is optional in this case.

2.3 The TWG Chair shall:

a. Assign TWG members and enter their information, along with that of the discipline reviewers from industry/academia, on the NTSP website. *NASA Technical Standards System users can view, but only the Chair/Designee can change TWG information. From the “TWG Members” column, the Chair adds new members by clicking “Add New Members” and completes the information. To change an existing member’s information, the Chair clicks the Center acronym, makes changes, and “Saves” the data; or clicks “Delete” to delete the information.*

b. Establish a development schedule for the standard and send it to the NTSP Manager.

c. Provide Progress Reports of the document development status to the Center NTSWG member monthly, or to the NTSP Manager as requested. *The reports may include lessons-learned sources reviewed, status of development, changes in schedule for development, delays, issues, etc.*

2.4 The TWG shall:

a. Comply with U.S. Export Control requirements in accordance with NASA policy and procedures prior to and during development of the standard. **Due diligence shall be exercised by the Exporter of the document, as well as by the recipients of the document!**

b. Review lessons-learned sources for incorporation of technical contents into the draft standard; many sources are available from the NASA Technical Standards System at <http://standards.nasa.gov>.

c. Develop the consensus draft of the standard, specification, or handbook utilizing the templates provided in the NASA Technical Standards System under “NASA Technical Standards Management System” and “Supporting Documents.”

The TWG may utilize the NTSP online tools for draft document development and preliminary review by contacting the NTSP Manager. A preliminary Export Control review of the consensus draft is highly recommended at the earliest practical time.

d. Conduct preliminary reviews of the working draft, as necessary, to facilitate official review and approval. *NASA Technical Fellows serve as consultants during development as required.*

e. Submit the TWG’s draft consensus document to the NTSP Manager, requesting Agencywide review of the draft.

2.6 Proceed to the Review/Revise Stage, section 3.

3. REVIEW/REVISE STAGE

3.1 The NTSP Manager shall:

a. Ensure the draft document is edited/formatted and returned to the TWG Chair for concurrence.

b. Assign an action to the NTSWG members to conduct Center-wide reviews of the draft (designated as Draft 1) relative to the standard’s technical accuracy and adequacy, usually due within 9 weeks (record).

3.2 NTSWG members (includes NESC representative) shall:

a. Be aware of document distribution restrictions (stated in the footer of the template).

b. Conduct technical reviews of each draft document by the Center’s Program/Project Offices and Directorates/Organizations to ensure accuracy and adequate technical review by the Agency. Following review, submit one of the following dispositions (records) for the Center to the NTSP Manager and the TWG Chair:

- (1) Concur.
- (2) Concur with Comments; provide comments with specific change recommendations.
- (3) Nonconcur; provide rationale.

c. Submit to the NTSP Manager the Center disposition and names of specific Program/Project Offices and Directorates/Organizations and persons who reviewed the draft document, along with their comments or a notation that a review occurred but no comments were received, in the Comment Resolution Matrix provided by the NTSP Office.

3.3 The NTSP Manager shall ensure preparation of a consolidated Comment Resolution Matrix comprised of all comments received from the Agency-wide review.

3.4 The TWG Chair shall:

a. Resolve and disposition comments with the Center reviewers and document them in the resolution matrix (record) in accordance with table 2, usually within an 8-week period.

b. Indicate disposition of each comment received in the resolution matrix.

c. If comment resolution does not result in changes to the document, send the final resolution matrix to the NTSP Manager. Proceed to section 3.5.

d. If comment resolution results in changes to the document:

(1) Incorporate those changes into the NTSP Office-formatted/edited document.

(2) Submit the redlined Draft 2 (in Word format) and the consolidated Comment Resolution Matrix (as shown in table 2) to the NTSP Manager.

(3) Ensure all comments submitted and their dispositions are listed in the resolution matrix. Proceed to section 3.5; otherwise, proceed to section 3.4 e.

e. If comments cannot be resolved by the TWG Chair with the reviewer and NTSWG member, notify the NTSP Manager to promote resolution. If resolution cannot be reached, proceed to the Conflict Resolution Stage, section 4.

3.5 The NTSP Manager shall ensure the final draft is prepared and issue an action (record) to NTSWG members (for EMB concurrence) and Mission Directorate and NESC representatives to review the final draft and the consolidated Comment Resolution Matrix, usually within a 3-week period. A redlined version of the final draft shall also be provided if feasible.

3.6 The NTSWG member shall:

a. Obtain formal concurrence from the Center's EMB member, documented via formal memorandum or email from the EMB member (records) if the NTSWG member agrees with the final draft/resolution matrix, and send it to the NTSP Manager.

b. Notify the NTSP Manager immediately if there is not Center agreement with the final draft and resolution matrix.

3.7 The Mission Directorate representatives shall send their concurrence/comments to the NTSP Manager.

3.8 The NESC representative shall send their concurrence/comments to the NTSP Manager.

3.9 The TWG Chair shall obtain export control/distribution authorization from an export control authority for the final document (record), verify that the distribution statement in the document's footer is correct, and send the authorization to the NTSP Manager.

3.10 The NTSP Manager shall:

a. If issues cannot be resolved:

- (1) Notify NTSWG members to stop obtaining formal EMB, Mission Directorate representative, and NESC concurrence until the issues are resolved; promote issue resolution, or
- (2) Proceed to Conflict Resolution Stage, section 4, if unresolvable.

b. If issue resolution results in changes to the standard, notify NTSWG members of issue resolution, provide final (and redlined if feasible) document and revised consolidated Comment Resolution Matrix, request NTSWG members to obtain EMB concurrence, and return to 3.6 a. *Confirmation from the NTSWG or EMB member that the existing EMB member concurrence stands is acceptable.*

c. Transmit the final document, the final consolidated Comment Resolution Matrix, export control/distribution authorization, formal EMB concurrence from 10 Centers/JPL, and any supporting data (records) to the NASA Chief Engineer's Office.

3.11 The NASA Chief Engineer's Office shall obtain Mission Directorate representative concurrence if not received by the NTSP Manager, resolve conflicts/issues resulting from this review when necessary, ensure the final document includes any changes, and ensures that this review documentation (record) is added to the approval package.

3.12 Proceed to the Approval Stage, section 5.

4. CONFLICT RESOLUTION STAGE

4.1 The NTSWG and TWG Chairs shall present to NESC representative(s) and the EMB conflicts and issues that cannot be resolved between the NTSWG and TWG. The following information shall be included:

a. The issue(s) resulting in the nonconcurrence.

b. The approach used by the TWG Chair to resolve the issue(s) and the outcome of that approach.

c. The reason(s) the issue(s) remains unresolved, with pros and cons listed, and the recommendation of the TWG Chair.

4.2 The EMB members and the NASA Chief Engineer shall resolve conflicts and issues with support from the NESCS.

4.3 If changes to the document result, the TWG Chair shall prepare the final document and consolidated Comment Resolution Matrix and send them to the NTSP Manager.

4.4 EMB members shall submit formal Center concurrence (record) to the NTSP Manager. *Confirmation from the NTSWG or EMB member that the existing EMB member concurrence stands is acceptable.*

4.5 The TWG Chair shall obtain export control/distribution authorization from an export control authority for the final document (record), send it to the NTSP Manager, and verify that the Distribution Statement on the document is correct.

4.6 Proceed to the Approval Stage, section 5.

5. APPROVAL STAGE

5.1 The NTSP Manager shall transmit the document approval package consisting of the final NASA Technical Standard (Engineering), final consolidated Comment Resolution Matrix, approved export control/distribution authorization, EMB concurrence from 10 Centers/JPL, HQ Mission Directorate representatives' concurrence, the discipline's NASA Technical Fellow's concurrence, and any supporting data to the NASA Chief Engineer.

5.2 The NASA Chief Engineer shall review the document package for technical accuracy and adequacy and perform one of the following:

- a. Provide comments; proceed to section 5.3 a.
- b. Approve the document and return the approved package to the NTSP Manager; proceed to sections 5.3 c, d, and e.
- c. Disapprove the document and return the document package with rationale for disapproval to the NTSP Manager; proceed to section 5.3 b.

5.3 The NTSP Manager shall, as applicable:

- a. Incorporate changes from the NASA Chief Engineer; prepare the final document and consolidated Comment Resolution Matrix; coordinate re-approval of the export control/distribution authorization, if warranted; and send the final NASA Technical Standard to the NASA Chief Engineer; return to 5.2.

- b. Notify the TWG Chair, NTSWG and EMB members, and Mission Director and NESCS representatives that the document was disapproved (with rationale) and file the disapproved package (record), thus ending the process.

c. Publish the approved document and file the document approval package (record).

d. Enter the document information in the Standards Update Notification System (SUNS) and publish the electronic version of the approved NASA Engineering Standard in the NASA Technical Standards System (record). Any Application Notes required to publish this standard shall also be submitted at this time.

e. Provide access to the approved NASA Technical Standard based upon the approved export control/distribution authorization for the final document that is on file. Controlled documents shall not be linked to the NASA Technical Standard System index; however, contact information for obtaining the Standard shall be provided.

5.4 If a NASA Technical Standard resides on another server and is linked to the NASA Technical Standards System for accessibility, the Office of Primary Responsibility (OPR) shall be responsible for maintaining the record of export control/distribution authorization.

5.5 The NTSP Office shall distribute an Agencywide announcement (record) regarding the document's approval and its availability in the NASA Technical Standards System.

5.6 The Office of Primary Responsibility Designee shall maintain the published NASA Engineering Standard, including revision, revalidation, cancellation when no longer needed, and change of a standard's status to inactive for new design.

6. IMPLEMENTATION STAGE

6.1 NASA Technical Fellows shall:

a. Guide, advise, and resolve use conflicts relative to NASA Technical Standards as needed.

b. Identify trending and lessons learned.

6.2 The NTSP Manager shall ensure that lessons learned are linked to applicable standards for implementation consideration by TWGs during revision of the NASA Technical Standard.

Original Signed By

03/14/2011

Robert T Crumbley, Manager
NASA Technical Standards Program

Date

TABLE 2. Example Resolution Matrix

EXAMPLE

RESOLUTION MATRIX for Draft No.
Document No., Document Title

Date:

Prepared By:

Comment No.	Date Comment Received	Center	Comment Source(s)	Comment Section	Center Disposition	Comments		TWG Chair/OPR Designee	
								Comment Disposition	Comment Disposition Rationale, if Not Accepted
						From:	To:		
1	10/01/2004	MSFC	Jane Doe/Phone Number/ Jane.Doe@nasa.gov		Concur w/ Comments				
2	09/28/2004		H. Green, /Phone Number/ XYZ Project	4.1.2		Strength. Requirements for structural strength test factors, restrictive conditions concerning testing of non-metallic structures...	Strength. Requirements for structural strength test factors and justification, . . .		
3	10/9/2004	GSFC	John Doe/Phone Number John.Doe@nasa.gov		<u>Nonconcur</u>	Justification/ Rationale			

RESOLUTION MATRIX for Draft No. 1
 Document No., Document Title

Date:

Prepared By:

Comment No.	Date Comment Received	Center	Comment Source(s)	Comment Section	Center Disposition	Comments		TWG Chair/OPR Designee	
								Comment Disposition	Comment Disposition Rationale, if Not Accepted
4	10/03/2004	GSFC	J. Black, ABC Program	5.2.5		Nonconcur: The reference of 60 p/s cites requirements that are high and exceed the mission requirements for payloads.	--	Not Accepted	The requirement of 60 p/s was verified by numerous tests conducted by an independent contractor. Comment satisfactorily resolved with Joe Black on 10/05/2004.
EXAMPLE									