

MWI 7100.1
REVISION B-2
EFFECTIVE DATE: May 27, 2015
EXPIRATION DATE: May 27, 2025

MARSHALL WORK INSTRUCTION

DA01

NEW WORK LIFECYCLE PROCESS

With Change 2 (6/18/20)

COMPLIANCE IS MANDATORY
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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Revalidation/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		7/26/2010	
Revision	A	3/18/2011	Clarified 1.0 Purpose. Changed criterion at 6.3.1 from \$50k B&P threshold to \$250k B&P threshold. Added a requirement at 6.17 for proposing organizations to report the reasons when proposals are not selected for award.
Revision	B		Major rewrite, instructions based on the newly created MSFC Decision Gate Process. Title changed from "Proposal Review and Signoff Process" to "New Work Lifecycle Process." Re-formatted to comply with the new required template per MPR 1410.2J & as instructed in MWI 1410.1F.
Change	1	9/18/17	On 9/18/17, at the request of the OPRD, an administrative change was made to reflect new Center organization as implemented January 2017 and update Figure 2: Delegation Authority.
Revalidation	B-1	5/29/2020	Conducted the 5 year review as required by NPR 1400.1. The document is still valid as written.
Change	2	6/18/2020	On 6/18/20, at the request of the OPRD, an administrative change was made to transfer ownership from ST01, Science and Technology Office, to DA01, Office of the Director.

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1. PURPOSE

The purpose of this Marshall Work Instruction (MWI) is to provide instructions for identifying and processing new business opportunities at/for the Center, in accordance with MPD 7100.1. The MWI details the specific Decision Gate processes and Delegated Authority levels needed to complete the Gate A, Gate B, and Gate C Reviews. Typical activities and indicators to meet a particular gate milestone and the expected outcomes are described.

2. APPLICABILITY

2.1 This MWI applies to Center personnel, programs, projects, and activities, including contractors and resident agencies to the extent specified in their respective contracts or agreements. (“Contractors,” for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, or other agreement parties.)

2.2 This MWI applies to the Michoud Assembly Facility.

2.3 This MWI applies the following: all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms: “may” or “can” denote discretionary privilege or permission, “should” denotes a good practice and is recommended, but not required, “will” denotes expected outcome, and “are/is” denotes descriptive material.

2.4 This MWI applies the following: all document citations are assumed to be the latest version unless otherwise noted.

2.5 This MWI applies to partnerships into which MSFC enters under NASA’s Other Transactional Authority (Space Acts, etc.).

2.6 The MWI 7100.1 process does not apply to minor augmentation of existing work assignments during normal course of business annual budget development, unless such work is fundamentally a new content/new work start not within the approved program plan.

2.7 This MWI does not prescribe all phases of proposal development, specifically writing of the proposal itself, internal operation of review teams, and activities past the point of award (e.g., negotiations, execution).

3. AUTHORITY

NPR 1400.1, NASA Directives and Charters Procedural Requirements

MPD 7100.1, MSFC New Work Pursuit Policy

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4. APPLICABLE DOCUMENTS AND FORMS

4.1 NPR 8580.1, NASA National Environmental Policy Act Management Requirements

4.2 MPR 1050.2, Procedure for Executing Agreements with Non-MSFC Entities

4.3 MPR 7120.1, MSFC Engineering and Program/Project Management Requirements

4.4 NRRS 1441.1, NASA Records Retention Schedules

5. INSTRUCTIONS

5.1 The Proposing Organization shall execute the Decision Gate Reviews as described in Appendix E.

5.1.1 The overarching New Work Lifecycle is summarized graphically in Appendix J.

5.1.2 The MSFC Strategic Vectors, which are used to determine alignment of the new work opportunity to the Center goals, are discussed in Appendix G.

5.1.3 The Decision Gate indicators checklists, which are used to objectively determine readiness to proceed to the next gate, are given in Appendix I. An example of how the Decision Gate criteria can be tailored is given in Appendix H.

5.1.4 Outlines for the briefing package to be used at the Decision Gate Review are given in Appendix F.

5.2 The Proposing Organization shall gain concurrence to proceed from the appropriate Decision Authority as described in Appendix E.

6. CANCELLATION

MWI 7100.1.A, Proposal Review and Signoff Process, dated March 18, 2011

Original signed by

Patrick E. Scheuermann
Director

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APPENDIX A.

Definitions

Competitive Analysis (Black Hat Review). A review of competitors' probable strategies and solutions, and used to update win strategy. The proposal team develops strategies and solutions from competitors' perspective. An action plan is developed and implemented based on findings of Black Hat Review. The findings are leveraged in Bid/No Bid decision.

Concept Maturity Level. Classification system for characterizing various levels of a concept's maturity, developed by Jet Propulsion Laboratory (JPL) and modified for use at MSFC.

Gate Review. A key decision point (KDP) that enables senior Center management to review and approve (or disapprove) the pursuit of new work.

MSFC Organization. Any MSFC Office or Directorate designated by a unique 2-letter organization code.

Proposal. A written offer that describes work to be performed. Proposals are most commonly written in response to a solicitation such as an Announcement of Opportunity (AO) or a Request For Proposal (RFP).

Proposal Team. An ad hoc group of individuals, largely from the Proposing Organization, that develops and writes the proposal.

Proposing Organization. The MSFC organization that has chosen to pursue the opportunity with a proposal.

Red Team Review. A review by outside senior scientists, managers, engineers, and business people that occurs approximately two-thirds of the way through the New Work Lifecycle process (between Gates B and C) and should be executed by the proposing organization, with facilitation provided by the Proposal Manager. The specifics of the Red Team Review are tailored to the individual proposal effort, but the following issues are always addressed: (1) coherence, (2) completeness, (3) compliance, (4) consistency, and (5) correctness.

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APPENDIX B.

Acronyms

AO	Announcement of Opportunity
ATP	Authority to Proceed
B&P	Bid and Proposal
BEO	Beyond Earth Orbit
CD&H	Command and Data Handling
CML	Concept Maturity Level
CSDSG	Center Strategic Development Steering Group
CSR	Concept Study Report
EPR	Estimated Price Report
FFBD	Functional Flow Block Diagram
FSM	Flight Systems Manager
GDS	Ground Data System
HQ	Headquarters
IMS	Integrated Master System
IRAD	Independent Research and Development
JPL	Jet Propulsion Laboratory
KDP	Key Decision Point
LEO	Low-Earth Orbit
MCR	Mission Concept Review
MDR	Mission Definition Review
MOS	Mission Operation System
MOU	Memorandum of Understanding
MPD	Marshall Policy Directive
MSFC	Marshall Space Flight Center
MWI	Marshall Work Instruction
NASA	National Aeronautics and Space Administration

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NEPA	National Environmental Policy Act
NPR	NASA Procedural Requirements
NRRS	NASA Records Retention Schedule
OPRD	Office of Primary Responsibility Designee
OSAC	Office of Strategic Analysis and Communications
PFO	Partnerships and Formulation Office
PI	Principal Investigator
PLRA	Program-Level Requirements Appendix
PM	Program/Project Manager
PMSR	Project Mission and System Review
PSE	Program/Project Systems Engineer
PWG	Partnerships Working Group
R&A	Research and Analysis
RFP	Request for Proposal
ROM	Rough Order of Magnitude
SAA	Space Act Agreement
PAM	Partnership Agreement Maker
SPC	Strategic Planning Council
SRR	Systems Requirements Review
TRL	Technology Readiness Level
V&V	Verification and Validation
WBS	Work Breakdown Structure

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APPENDIX C.

Verification Matrix (Reserved)

None.

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APPENDIX D

Records

Record	Location	Retention Time	Disposition	Remarks
Records files: a) Final edition of <i>accepted</i> proposals b) Gate A, B, and C briefing packages	Proposing organization	Per NRRS 1441.1, Schedule 8, Item 103 or 107 Temporary	Temporary. Evaluate for destruction / deletion at 5 year intervals. Destroy / delete 30 years after program/project termination.	
Records files: a) Final edition of <i>rejected</i> proposals b) Gate A, B, and C briefing packages	Proposing organization	Per NRRS 1441.1, Schedule 8, Item 105 or 109 Temporary	Temporary. Evaluate for destruction / deletion at 2 years, and every 5 years after that. Do not retain longer than life of program / project plus 5 years.	

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APPENDIX E

MSFC New Work Process

E.1 MSFC New Work Lifecycle.

Marshall implements a simplified new work lifecycle process that incorporates and streamlines best practice decision points and maturity indicators used by other Centers, professional proposal development services, and business development training providers. The core process consists of three KDPs:

- a) Gate A confirms the preliminary competitive viability, strategic alignment, and Center interest in pursuing an opportunity. Completion of Gate A authorizes pursuers to negotiate in good faith with potential partners and team members, and to conduct trades to mature the new work concept toward a point solution.
- b) Gate B confirms completion of all trades, including technical, programmatic, teaming, and roles. Completion of Gate B authorizes pursuers to expend significant Center resources on final preparation and documentation of the Center’s bid for the new work.
- c) Gate C reviews the Center’s risk acceptance posture for the new work as proposed and confirms the Center’s willingness to execute under the proposed terms. Completion of Gate C authorizes pursuers to submit final bids for the new work.

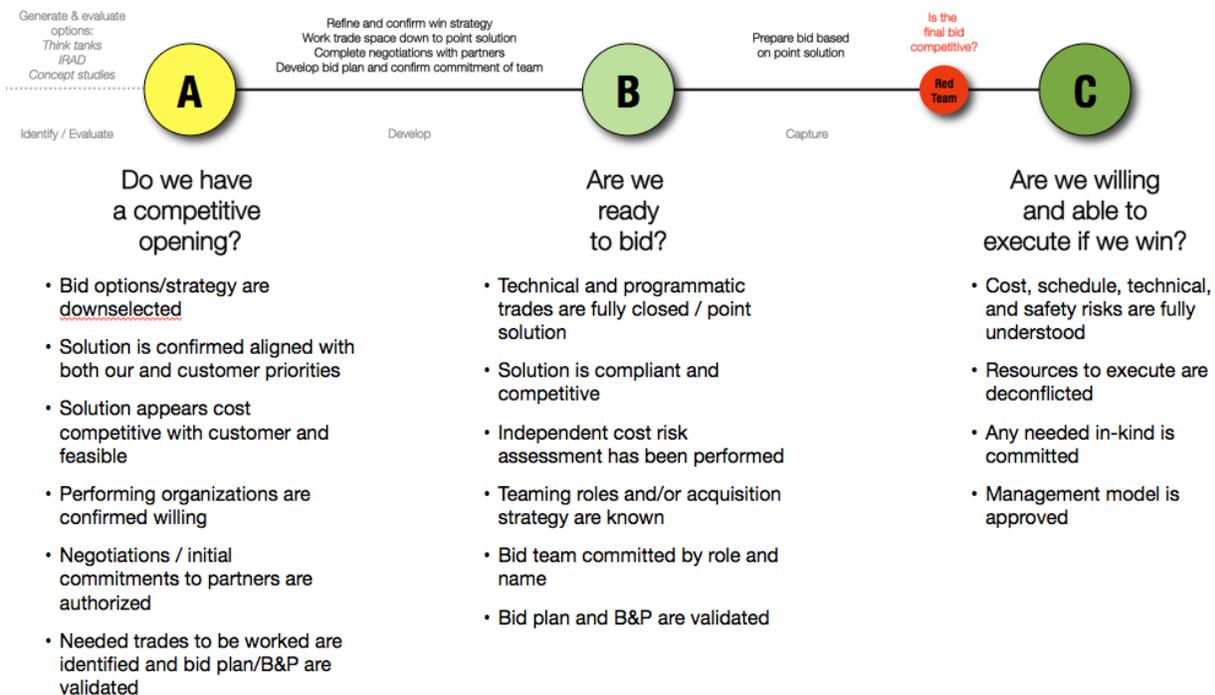


Figure 1. MSFC Decision Gates.

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E.2 Flexibility of MSFC New Work Lifecycle Process.

A critical element of the MSFC New Work Lifecycle Process is its flexibility to be tailored to a variety of new business opportunity types. New work pursuers should coordinate early (prior to Gate A) with the process Office of Primary Responsibility Designee (OPRD). The Partnerships and Formulation Office (PFO) functions as the OPRD and identifies KDPs that map to Gates A, B, and C. The OPRD will discuss appropriate tailoring of the gate criteria with the proposing organization. Typical timing of the gate reviews for an AO from Science Mission Directorate would be Gate A occurring no later than the release of the Draft AO, Gate B no later than Final AO release, and Gate C between Red Team Review and proposal submittal. For other opportunities, timing of the gate reviews should be consistent with the maturity of the concept and what is being asked of the sponsoring organization (i.e., authority to negotiate with partners, Bid and Proposal (B&P) funds, contributions). See Appendix E.4 for specific guidance for each type of new work opportunity.

E.2.1 A second element of flexibility exists within the maturity indicators assigned to each gate. These are derived from large flight project criteria and contain room for flexibility in implementation for smaller or different types of opportunities. The indicators are benchmarks for comparison, rather than requirements to be met.

E.2.2 The key to tailoring is advance negotiation with the decision authority as to the content that will (or will not) be presented at the Gate A, B, or C review.

E.2.2.1 Provide tailoring information, in writing, to the OPRD one week prior to the scheduled Gate review.

E.2.2.2 Document the tailoring in a “from/to” table format, with rationale for any variance. An example table is provided in Appendix H.

E.2.2.3 The OPRD should negotiate with the appropriate decision authorities and notify proposers of decisions and requirements for Gate review content.

E.3 Delegation Authority for Gates A, B, and C Decisions.

The delegation authority below is based on MSFC execution responsibility and the full cost of the identified opportunity; and implements the delegation policy as stated in MPD 7100.1.

E.3.1 Decision Authority

E.3.1.1 As seen in Figure 2, for projects under \$3M the responsibility will be with the organization from which the project originated. For example, if the project originated within the Science and Technology Office (STO), then the STO Director will have final approval. A record of gate review outcome should be documented.

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E.3.1.2 For projects less than \$3M, but requiring resources outside the submitting organization, the commitment from the outside supporting organization shall be obtained, documented, and reported to the Associate Director Technical.

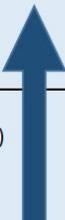
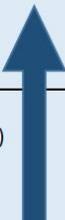
Marshall Executive Responsibility				
Decision Authority	\$30M+	\$10M-30M	\$3M-10M	<\$3M
Center Director	Gate C (Final Commit) 			
Associate Director Technical	Gate B (ATP with Final Bid) Gate A (ATP to Develop) 	Gate C (Final Commit) Gate B (ATP with Final Bid) 	Gate C (Final Commit) 	
Submitting Organization Direct Report	<i>Red Team</i>	Gate A (ATP to Develop) <i>Red Team</i> 	Gate B (ATP with Final Bid) Gate A (ATP to Develop) <i>Red Team</i> 	Gate C (Final Commit) Gate B (ATP with Final Bid) Gate A (ATP to Develop) 

Figure 2. Delegated authority depends on full-cost responsibility.

E.3.1.3 For projects at \$3M to just under \$10M, Gates A and B approvals are required from the originating organization. A record of gate approvals is suggested. Gate C will be held at the Associate Director Technical level. An official record of this gate review will be taken and archived with the CSDSG minutes.

E.3.1.4 Projects that are between \$10M and \$30M will hold a Gate A review within the originating organization. Records of the gate review are suggested. Both Gates B and C will be held at the Associate Director Technical level. An official record of this gate review will be taken and archived within the CSDSG minutes.

E.3.1.5 Any project that is over \$30M will hold Gates A and B reviews at the Associate Director Technical level. Gate C will be held by the Center Director at the Strategic Planning Council (SPC) forum. An official record of the Gates A and B reviews should be taken and archived within the CSDSG minutes. An official record of the Gate C review should be taken and archived with the SPC minutes.

E.3.2 Scheduling of Gate Reviews

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Gate reviews at the CSDSG and SPC level will need to be coordinated with the secretariats of those boards no less than two weeks before the review is needed to take place. A proposal coming out of a gate review from the originating organization should have a memorandum signed by the organizational director stating the proposal was approved and has met all the requirements of the previous gate review. The memorandum should be sent to the secretariat to confirm the project is officially approved and ready for the subsequent gate. Appendix I contains the criteria checklists for gate readiness and success.

E.4 Application to Different Types of Opportunities.

Each identified opportunity may fall into one of three categories – competed, directed, and partnerships – as shown in Appendix J. This MWI does not differentiate between a “lead” or “support” role associated with any of these three types of opportunities. The Decision Gate Criteria may be tailored to address items that are not applicable (or partially applicable) when MSFC is in a supporting role versus a lead role. When in a supporting role, the scope of the MSFC commitment must be clearly defined to support this decision process and will be documented in other project documentation as appropriate.

E.4.1 Competed

Competed opportunities include responses to formal solicitations, whether from NASA or other government agencies (“proposals”). Milestones associated with competed opportunities typically include a draft solicitation, a final solicitation, a Notice of Intent deadline, and a final submission deadline.

E.4.1.1 Gate A decisions should happen early, preferably no later than the draft solicitation, but no earlier than the point at which sufficient information is available on the scope of the anticipated solicitation to conduct a competitiveness assessment.

E.4.1.2 For most competed solicitations, significant pre-work in concept development is typical and pre-Gate A milestones may be appropriate. For proposals, Gate A authorizes good faith negotiations with proposal partners, and since it is often coincident with a draft solicitation, is the point at which concept trade studies should be aggressively initiated to downselect to a point solution for proposal.

E.4.1.3 Gate B should be no later than the final solicitation release date. At Gate B, mission design should be frozen as should all teaming and role agreements. Gate B authorizes teams to expend significant B&P resources to prepare the final proposal.

E.4.1.4 Gate C occurs after a proposal Red Team or equivalent review, but prior to final submission. The focus of the Gate C review is not on proposal competitiveness, but on Center risk acceptance and willingness to execute as bid. Gate C authorizes proposal submission, contingent on collection of appropriate letters of commitment/intent.

E.4.2 Directed

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A directed opportunity from a program or project may be guided at the Agency level or Center level. Directed opportunities may take various forms, including informal white paper requests, unsolicited proposals during budget development, request for a quote from customers, etc. Directed opportunities typically require the most adaptation and customization of decisional gates and pursuing organizations should work closely with the OPRD (STO, PFO Manager) to negotiate an appropriate implementation of the process. In some cases, Gate B may be waivable if a customer has directly funded Marshall to formulate a final quote or bid (i.e., there is no likelihood that we will no-bid depending on Gate B equivalent outcomes).

E.4.2.1 For many directed opportunities, Gate C corresponds to either (a) the Center’s “best and final quote” to perform an activity, or (b) the formal Mission Concept Review (MCR).

E.4.3 Significant Reimbursable

Partnerships into which MSFC enters under NASA’s Other Transactional Authority (Space Acts, etc.) are also subject to MWI 7100.1 and MPR 1050.2. The mapping of decision gates to Marshall’s formal Space Act process is as follows:

- a) Gate A review corresponds to the initial review by the Partnerships Working Group (PWG).
- b) Gate B review corresponds to tabletop review of final proposed agreements prior to submission for Center or HQ concurrence.
- c) Gate C review corresponds to formal concurrence and routing.

E.4.3.1 Most such partnerships fall below the \$3M delegated authority threshold and are handled by the PWG and pursuing organizations. For agreements in excess of these thresholds or for which the PWG recommends escalation, decision authority escalation levels are as in Appendix E.3.

E.5 MSFC Strategic Priorities Alignment.

One of the first steps in vetting an identified opportunity is its alignment with Center goals (Appendix G) and/or Agency goals. Strategic alignment is confirmed at Gate A. The [MSFC Strategic Vectors](#) tier chart, with an explanation of product priority areas, is maintained on ExplorNet.

E.6 Maturity Indicators.

Mission concepts are composed of engineering and management elements, as defined by JPL¹. Concept Maturity Levels (CMLs) measure concept maturity in the same way that Technology Readiness Levels (TRLs) measure technology readiness. MSFC has redefined JPL-created CML indicators to reflect Marshall needs and strategies and to serve as a standard means to communicate concept maturity at gate reviews. Details of each gate are given in the sections that follow. The concept maturity indicators are grouped as they would be evaluated into the following categories: Science, Technical, Management, Cost, and Other.

¹ “What’s in a Mission Concept?” PDF Briefing, NASA JPL, June 2010

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E.6.1 Capture maturity focuses on strategic implications to the Center. A set of indicators was developed by OSAC as a way to measure capture maturity and ensure Center executives can make informed decisions.

E.7 Gate Process Reviews and Checklists.

Simple key decision reviews have been implemented as part of the MSFC New Work Lifecycle process based on extensive benchmarking of other NASA Center practices, industry practices, and consultant recommendations. Gates A, B, and C streamline opportunities into a standard process for new work, while allowing for flexibility. Figure 1 lists the top-level questions to be addressed at each gate, where opportunity owners at Gate A receive authority to develop and negotiate with partners; owners at Gate B receive authority to prepare the bid; owners at the Red Team Review are expected to be able to validate the competitiveness of the bid; and owners at Gate C receive a final commitment from delegated authorities to proceed with the bid submission and accept any outstanding risks. (Appendix A provides a definition of Red Team Review.)

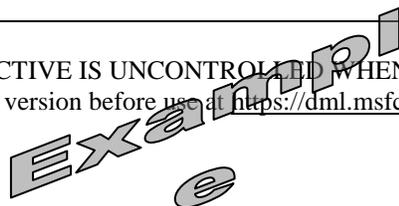
E.7.1 Gate checklists of concept and capture readiness and gate success criteria (Appendix I) are intended to provide the decisional authority with an easy means of reviewing the opportunity. These checklists should be populated by the owner of the identified opportunity prior to the gate review and should be given to the delegation authority at the start of each review. Sanction by the appropriate authority (dependent upon opportunity cost tier) indicates approval to proceed to the next gate review. The gate checklists assume that an opportunity follows the competed new work path. Appendix F provides outlines of typical briefings presented at Gates A, B, and C.

E.7.2 Gate A.

E.7.2.1 Purpose. The purpose of Gate A is to allow the appropriate delegated authority to assess whether a particular new work opportunity should be pursued in the context of other competing opportunities that would require the same resources. Maturity readiness indicators are split into two categories: (1) concept maturity and (2) capture maturity. The implementation of the indicators is detailed in the following sections.

E.7.2.2 Concept Maturity. Gate A concept maturity is demonstrated by completing a checklist that is aligned with concept readiness indicators. The checklist should be populated by the proposal team for submission to the delegated authority prior to the Gate A, and it should be distributed to the review team at the review. The Concept Readiness Indicators Checklist is typically evaluated and presented by the Principal Investigator (PI), Project Manager, and Lead Systems Engineer. An excerpt of the checklist is presented in Figure 3; the comprehensive checklist is located in Appendix I.

Concept Readiness	Competed	Directed	Reimbursable
Science			
Science Objectives and System Requirements			
• Produce draft Science Traceability Matrix	✓		



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Concept Readiness	Competed	Directed	Reimbursable
•Initial Level 1 requirements DEFINED	✓	✓	
•Specifying one Baseline Science investigation	✓	✓	
•Key Performance Parameters listed	✓	✓	
Science Data System			
•Science data system sizing	✓	✓	
Technical			
Mission Development			
•Driving requirements, initial high-level scenarios, timelines and operational modes documented (FFBDs, Trade Trees, etc.)	✓	✓	

Figure 3. Example excerpt from Concept Readiness Checklist.

E.7.2.3 Capture Maturity. Gate A capture maturity is demonstrated by completing a checklist that is aligned with capture readiness indicators. The capture readiness metrics are typically evaluated and presented at the gate review by the Proposal Manager for the new work pursuit. An excerpt of the Capture Readiness Checklist is presented in Figure 4; the comprehensive checklist is located in Appendix I.

Capture Readiness	Competed	Directed	Reimbursable
•Capture strategy (win themes)	✓	✓	
•Compelling mission justification	✓	✓	
•Value proposition for MSFC (strategic alignment, benefit, etc.)	✓	✓	✓
•Capture team identified by name and role	✓	✓	
•Potential partners with strengths/weaknesses	✓	✓	
•Bid and Proposal full-cost estimate through Gate C, phased by month	✓	✓	

Figure 4. Example excerpt from Capture Readiness Checklist.

E.7.2.4 Briefing Package for Gate A Review. See Appendix F for a suggested outline of the Gate A briefing package.

E.7.3 Gate B.

E.7.3.1 Purpose. The purpose of Gate B is to allow the appropriate delegated authority to assess whether the proposed new work has progressed to a point design. A set of maturity indicators that are technically similar to a NASA MCR are used to allow the delegated authority to objectively determine whether the design has progressed to this level of detail.

E.7.3.2 Concept Maturity. Gate B concept maturity is demonstrated by completing a checklist that is aligned with concept readiness indicators. The checklist should be populated by the proposal team for submission to the delegated authority prior to the Gate B, and it should be distributed to the review team at the review. The Concept Readiness Indicators Checklist is typically evaluated and presented by the PI, Project Manager, and Lead Systems Engineer. An excerpt of the checklist is presented in Figure 5; the comprehensive checklist is located in Appendix I.

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Concept Readiness	Competed	Directed	Reimbursable
Science			
Science Objectives and System Requirements			
• Science Traceability Matrix (or equivalent) produced	✓		
• Preliminary Level 1 Requirements produced (DIRECTED projects)		✓	
• Specifying one Baseline and one Threshold Science investigation	✓		
Science Data System			
• Science data processing architecture, release and archive approach defined	✓	✓	
Technical			
Mission Development			
• Concept is complete, viable & stable	✓	✓	

Figure 5. Example excerpt from Concept Readiness Checklist.

E.7.3.3 Capture Maturity. Gate B capture maturity is demonstrated by completing a checklist that is aligned with capture readiness indicators. The capture readiness metrics are evaluated and presented at the gate review by the representative for the new work pursuit (typically by the Proposal Manager). An excerpt from the checklist of Capture Readiness Indicators is presented in Figure 6; the comprehensive checklist is located in Appendix I.

Capture Readiness	Competed	Directed	Reimbursable
• Verification of all trades completed and impacts to capture strategy	✓	✓	
• Final capture team identified by name and role, to include partners	✓	✓	✓
• Updated B&P – Include Plan vs. Actual to date (provided by OSAC, if available)	✓	✓	✓
• Updated proposal schedule	✓	✓	✓
• Updated compliance based on draft or actual solicitation	✓		✓
• Any changes to project full-cost estimate impacting delegation authority (including MSFC portion)	✓	✓	✓
• Agreement abstract and tabletop review, if agreement requires HQ concurrence			✓

Figure 6. Example excerpt from Gate B Capture Readiness Checklist.

E.7.3.4 Briefing Package for Gate B Review. See Appendix F for a suggested outline of the Gate B briefing package.

E.7.4 Gate C.

E.7.4.1 Purpose. The purpose of Gate C is to allow the appropriate delegated authority to understand the resource commitments by the Center (financial, workforce, facilities) if the new work is assigned to MSFC. The review also is used to allow the authority to review, document, and accept all known risks related to the new work.

E.7.4.2 Concept Maturity. Gate C concept maturity is demonstrated by completing a checklist that is aligned with concept readiness indicators. The checklist should be populated by the proposal team for submission to the delegated authority prior to the Gate C, and it should be distributed to the review team at the review. The Concept Readiness Indicators Checklist is typically evaluated and presented by the PI, Project Manager, and Lead Systems Engineer. An excerpt of the checklist of Concept Readiness Indicators is presented in Figure 7; the comprehensive list is located in Appendix I.

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Concept Readiness	Competed	Directed	Reimbursable
Science			
Science Objectives and System Requirements			
•Proposed Level 1 requirements documented Level 2 & 3 driving requirements listed	✓	✓	
•Full and minimum success criteria defined	✓	✓	
•Baseline Program-Level Requirement Appendix (PLRA) submitted @ SRP (DIRECTED projects)		✓	
Science Data System			
•Science data management approach defined	✓	✓	
Technical			
Mission Development			
Expand description of mission phases to illustrate critical s/c/ ground functions	✓	✓	

Figure 7. Example excerpt from Gate C Concept Readiness Checklist.

E.7.4.3 Capture Maturity. Gate C capture maturity is demonstrated by completing a checklist that is aligned with capture readiness indicators. The capture readiness metrics are typically evaluated and presented at the gate review by the representative for the new work pursuit in PFO. An excerpt of the Capture Readiness Checklist is presented in Figure 8; the comprehensive checklist is located in Appendix I.

Capture Readiness	Competed	Directed	Reimbursable
•Disposition of red team findings, if any	✓		
•Needed letters of endorsement/commitment	✓		
•Fully documented agreement entered / routed through PAM			✓
•Responsibilities of NASA and Agreement Partner			✓
•Explicit risk/cost to Center if/when proposal is selected			✓

Figure 8. Example excerpt from Gate C Capture Readiness Checklist.

E.7.4.4 Briefing Package for Gate C Review. Please see Appendix F for a suggested outline of the Gate C briefing package.

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APPENDIX F.

Gate Briefing Templates

The following are outlines for the Gate Briefing templates; complete presentation templates are available in the [Proposal Tools folder](#) on the OSAC SharePoint site.

Gate A Outline of Briefing Template:

- Introduction of the Opportunity
- Introduction of the Proposal
- Decision Gate Process Overview
- Gate A Purpose and Methodology
- MSFC Team and Functions
- Reasons for Pursuit
- Win Strategy
- Competitive Analysis (Black Hat Review)
- Draft Requirements & Top Risks
- Draft ConOps
- Proposal Schedule
- B&P Funding Request
- Capture Readiness Assessment
- Concept Readiness Assessment
- Summary and Decision Request

Gate B Outline of Briefing Template:

- Introduction of the Opportunity
- Introduction of the Proposal
- Decision Gate Process Overview
- Gate A Summary
- Gate B Review Decision Points
- Gate B Purpose & Methodology
- Capture Readiness
- Capture Team
- Partner Roles
- Summary of Trades/Remaining Trades
- Proposal Compliance Status
- B&P Cost Estimate Update
- Updated Proposal Schedule
- Center Contributions – Status
- Concept Readiness Stoplight (Indicators)
- Concept Readiness – Summary
- Proposal Support Readiness – Summary
- Parametric Cost Analyses
- Independent Cost Estimate
- Cost Risk Analysis
- Summary of Gate B Open Items/Actions
- Recommendation and Decision Request

Gate C Outline of Briefing Template:

- Introduction of the Opportunity
- Introduction of the Proposal
- Decision Gate Process Overview
- Gate B Summary
- Gate C Review Decision Points
- Gate C Purpose & Methodology
- Capture Readiness
- Capture Team
- Partner Roles
- Summary of Risks
- Proposal Compliance Status
- Final Proposal Schedule
- Center Contributions – Status
- Concept Readiness Stoplight (Indicators)
- Concept Readiness – Summary
- Updated Parametric Cost Analyses
- Updated Independent Confidence Level Assessment
- Summary of Gate C Open Items/Actions
- Recommendation and Decision Request

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APPENDIX G.

MSFC Strategic Vectors

MSFC business development priorities (shown in Figure 9) serve to implement current top-level business objectives with respect to strategic planning and new work development. The latest version of the [MSFC Strategic Vectors](#) tier chart, with an explanation of product priority areas, is maintained on ExplorNet. Priorities fall into Tier 1, Tier 2, and Tier 3 categories—with Tier 1 being the near-term, Tier 2 the mid-term, and Tier 3 far-term. An implicit/undocumented Tier 4/Other covers “everything else.”

Mission Areas	Tier 1	Tier 2	Tier 3
Traveling To & Through Space	<ul style="list-style-type: none"> Support SLS Payload Utilization Help Define the Human In-Space Transportation Architecture 	<ul style="list-style-type: none"> Support Future SLS Evolvability Support Critical SMD Propulsion Challenges 	<ul style="list-style-type: none"> Use Small Spacecraft for NASA Science and Exploration Missions
Living & Working in Space	<ul style="list-style-type: none"> Support Human Habitation Elements and Develop Life Support Systems for Exploration 	<ul style="list-style-type: none"> Develop In-Space Manufacturing Capabilities for Exploration 	<ul style="list-style-type: none"> Apply Unique Marshall Capabilities Towards Critical Exploration Challenges
Understanding Our World & Beyond	<ul style="list-style-type: none"> Develop Next Generation X-Ray Astrophysics Missions 	<ul style="list-style-type: none"> Advance Current Pipeline of Heliophysics Instruments 	<ul style="list-style-type: none"> Integrate Planetary Science into Exploration Efforts Maintain Earth Applied Science Leadership

Figure 9. MSFC Strategic Vectors.

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APPENDIX H.

Gate Tailorings Matrix Examples

Advance negotiation is necessary with the decision authority of what content will (or will not) be presented at the Gate A, B, or C review. The following table is an example of tailored indicators. As an example, an excerpt of the Gate A Readiness Indicators Checklist in Appendix I was modified to capture and document the changes. (Tailored indicators are highlighted in yellow.). Changes to the criteria (as shown in the example) should be noted when presenting at the Gate reviews. Please note that tailoring should be based on the nature and content of the opportunity, rather than solely on schedule pressure.

Gate A Readiness Indicators		
Concept Readiness	Tailored Indicator	Rationale
Management		
Acquisition and Surveillance		
• Acquisition and partnership strategy (and schedule)	No Change	
• Identification of key make-buy decisions	No Change	
Project Organization, Implementation Mode, and Partnering		
• PI, Science team & key partners identified	No Change	
• Internal organizational options identified	No Change	
• Project structure created	No Change	
Schedules		
• Top-level Gantt chart generated	No Change	
Work Breakdown Structure (WBS)		
• NASA Standard WBS & Dictionary (down to level 2 and level 3 for spacecraft and payload) used with notional make / buy roles	No Change	
Mission Assurance Management		
• Not needed at Gate A	No Change	
Cost		
Cost Estimation and Cost Risk		
• Project cost estimated by analogy	Cost estimated by parametric	MSFC does not have an analogous project
Other		
Launch Approval		
• Not needed at Gate A	N/A	
NEPA Compliance		
• Evaluate Project NEPA requirements (per NPR 8580.1)	No Change	
Export Compliance		
• If detailed technical discussions with foreign partners are contemplated, contact Export Compliance Office	N/A	No foreign partners

Figure 10. Example excerpt of a modified Gate A Readiness Indicators table.

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APPENDIX I
Gate Readiness Indicator Checklists.

Gate A Readiness Indicators			
Capture Readiness	Competed	Directed	Reimbursable
•Capture strategy (win themes)	✓	✓	
•Compelling mission justification	✓	✓	
•Value proposition for MSFC (strategic alignment, benefit, etc.)	✓	✓	✓
•Capture team identified by name and role	✓	✓	
•Potential partners with strengths/weaknesses	✓	✓	
•Bid and Proposal full-cost estimate through Gate C, phased by month	✓	✓	
•Concurrent technical risk reduction full cost estimate, if appropriate	✓	✓	
•Proposal milestone schedule one-pager	✓	✓	✓
•Trade closure plan viability (technical, partnering) and plan to close by Gate B	✓	✓	
•Preliminary compliance of anticipated solicitation based on draft, historical, or similar solicitation	✓		
•Project full-cost rough order of magnitude (ROM) to determine delegation (\$3M/\$10M/\$30M ranges) for MSFC's portion	✓	✓	✓
•Partnership Information Form			✓
•Alignment with Agency and Mission			✓
•Facilities requested and availability during timeframe			✓
•Availability of requested capabilities outside Fed. Government			✓
•Technical expertise needed and availability during timeframe			✓
•Scope of partner involvement in competed solicitation (if any)			✓
•Need for in-kind contribution of NASA resources (if any)			✓
•Project major weakness(es)	✓		

Gate A Readiness Indicators			
Concept Readiness	Competed	Directed	Reimbursable
Science			
Science Objectives and System Requirements			
•Produce draft Science Traceability Matrix	✓		
•Initial Level 1 requirements DEFINED	✓	✓	
•Specifying one Baseline Science investigation	✓	✓	
•Key Performance Parameters listed	✓	✓	
Science Data System			
•Science data system sizing	✓	✓	
Technical			
Mission Development			
•Driving requirements, initial high-level scenarios, timelines and operational modes documented (FFBDs, Trade Trees, etc.)	✓	✓	
•Propellant load and delta-V budget determined	✓	✓	
•Power, telecom, data processing approach defined	✓	✓	
•Alternative set of mission architectures evaluated against science objectives, cost & risk	✓		
•Key mission concept parameters and performance requirements quantified	✓	✓	
Spacecraft System Design			
•System architecture with HIGH-LEVEL mechanical configuration drawings, block diagrams	✓	✓	
Instrument System Design			
•Instrument design with mechanical configuration drawings, block diagrams, Instrument performance requirements traced to level 1 requirements	✓	✓	
Ground System/Mission Operations System Design			

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Gate A Readiness Indicators			
Concept Readiness	Competed	Directed	Reimbursable
•Major flight / ground trades identified	✓	✓	
Technical Risk Assessment and Management			
•Risk drivers listed	✓	✓	
Technology			
•Technology options characterized Baseline options selected & justified	✓	✓	
•Explain rationale for TRL (See TRL table)	✓	✓	
•Fallback options for all new technologies identified	✓		
Inheritance			
•Major inherited assembly items tentatively selected	✓		
Master Equipment List			
•Not needed at Gate A			
Technical Margins			
•Institutional margin policies followed	✓	✓	
•Identify high-risk areas that need significant margin	✓	✓	
System Engineering			
•All trade studies identified with high-level closure plans	✓	✓	
Launch Services			
•Preliminary launch vehicle & backup documented	✓	✓	
Planetary Protection			
•Not needed at Gate A			
Verification and Validation			
•Identify any major or unique V&V activities that will require substantial investment / scheduling	✓	✓	
•Number of CD&H functions identified	✓	✓	
Management			
Acquisition and Surveillance			
•Acquisition and partnership strategy (and schedule)	✓	✓	✓
•Identification of key make-buy decisions	✓	✓	
Project Organization, Implementation Mode, and Partnering			
•PI, Science team & key partners identified	✓	✓	✓
•Internal organizational options identified	✓	✓	
•Project structure created	✓	✓	
Schedules			
•Top-level Gantt chart generated	✓	✓	
Work Breakdown Structure (WBS)			
•NASA Standard WBS & Dictionary (down to level 2 and level 3 for spacecraft and payload) used with notional make / buy roles	✓	✓	
Mission Assurance Management			
•Not needed at Gate A			
Cost			
Cost Estimation and Cost Risk			
•Parametric Cost Estimate	✓	✓	
Other			
Launch Approval			
• Not needed at Gate A			
NEPA Compliance			
•Evaluate Project NEPA requirements (per NPR 8580.1)	✓	✓	
Export Compliance			
•If detailed technical discussions with foreign partners are contemplated, contact Export Compliance Office	✓	✓	

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Gate A Success Criteria			
	Competed	Directed	Reimbursable
• Bid options/strategy have been down selected	✓		
• Solution is confirmed aligned with our priorities	✓	✓	✓
• Solution is confirmed aligned with customer priorities	✓	✓	✓
• Solution appears cost competitive with customer	✓	✓	✓
• Solution appears feasible	✓	✓	✓
• Performing organizations are confirmed willing (including proposal team)	✓	✓	✓
• Negotiations/initial commitments to partners have been authorized	✓	✓	✓
• Identified trades and closure plan to be completed by Gate B	✓	✓	✓
• Bid plan (and schedule) / B&P resource request validated	✓		✓

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Gate B Readiness Indicators			
Capture Readiness	Competed	Directed	Reimbursable
•Verification of all trades completed and impacts to capture strategy	✓	✓	
•Final capture team identified by name and role, to include partners	✓	✓	✓
•Updated B&P – Include Plan vs. Actual to date (provided by OSAC, if available)	✓	✓	✓
•Updated proposal schedule	✓	✓	✓
•Updated compliance based on draft or actual solicitation	✓		✓
•Any changes to project full-cost estimate impacting delegation authority (including MSFC portion)	✓	✓	✓
•Agreement abstract and tabletop review, if agreement requires HQ concurrence			✓
•Responsibilities of NASA and Agreement Partner			✓
•Performance Milestones, including expiration date			✓
•Clearly defined financial commitments			✓
•Other commitments (facilities, equipment, personnel)			✓
•Allocation of liability between NASA and the Partner			✓
•Allocation of Intellectual Property Rights			✓
•Termination rights and obligations			✓

Gate B Readiness Indicators			
Concept Readiness	Competed	Directed	Reimbursable
Science			
Science Objectives and System Requirements			
•Science Traceability Matrix (or equivalent) produced	✓		
•Preliminary Level 1 Requirements produced (DIRECTED projects)		✓	
•Specifying one Baseline and one Threshold Science investigation	✓		
Science Data System			
•Science data processing architecture, release and archive approach defined	✓	✓	
Technical			
Mission Development			
•Concept is complete, viable & stable	✓	✓	
•Mission phases documented to level for illustrating how science objectives will be met	✓	✓	
•Mission traceability matrix created	✓	✓	
•Resource utilization consistent with scenarios and ops modes	✓	✓	
•A mission categorization and risk classification determined	✓	✓	
•Descope & backup options identified	✓	✓	
Spacecraft System Design			
•Subsystem designs to enable external evaluation & costing documented	✓	✓	
•System architecture descope options compiled	✓		
Instrument System Design			
•Instrument designs sufficient to enable external evaluation & costing developed (competed projects)	✓		
•Initial Instrument accommodations noted	✓	✓	
•Plans for maturing technology, long-lead items, and prototyping engineering developments in place	✓	✓	
•Instrument descope options compiled (Earth Science & Astrophysics concepts)	✓		
Ground System/Mission Operations System Design			
•Major MOS responsibilities, block diagrams, facilities & I/Fs with science community defined	✓	✓	
•MOS / GDS architecture based on ops scenarios described	✓	✓	
Technical Risk Assessment and Management			
•Risks and mitigation plans incorporated into the baseline	✓	✓	
•Strategies for control, allocation & release of technical margins & cost reserves determined	✓	✓	
•5 x 5 matrix with relevant risk drivers (include selected mitigation / development options) used	✓	✓	
Technology			
•A technology evaluation for each baseline option (Include maturation approach for new technologies) completed	✓	✓	
Inheritance			
•For design driving assemblies and components, confirm availability, status and document	✓		

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Gate B Readiness Indicators			
Concept Readiness	Competed	Directed	Reimbursable
Master Equipment List			
•MEL documented to assembly level (e.g., antenna, propellant tank, star tracker, etc.) and consistent with heritage	✓	✓	
Technical Margins			
•Use institutional margins where applicable	✓	✓	
System Engineering			
•Architecture finalized	✓	✓	
•System Engineering approach documented	✓	✓	
•Additional system trades and approach for closure identified	✓	✓	
Launch Services			
•Recommended launch vehicle requirements & capabilities established, including non-standard services	✓	✓	
•Launch services has been contacted	✓	✓	
Planetary Protection			
•Identify need for Planetary Protection requirements	✓	✓	
Verification and Validation			
•V&V approach and schedule defined for Level 1 requirements	✓	✓	
Management			
Acquisition and Surveillance			
•DRAFT Partner MOU completed (AO projects)	✓		
•Identify long-lead procurements	✓	✓	
•Strawman list of subsystem sources for each item in MEL	✓		
Project Organization, Implementation Mode, and Partnering			
•Project Personnel (PM, PSE, FSM and / or Instrument Mgr) named	✓	✓	✓
•Foreign partners & other NASA centers identified Roles & responsibilities of key partners defined	✓	✓	✓
•Draft org chart developed	✓	✓	
•Proposed contributions & cooperative agreements listed	✓		
•Project Formulation Authorization document ready to sign (DIRECTED projects)		✓	
Schedules			
Gantt Chart to 1-month resolution with key deliverables, system reviews, technology developments, instruments, models & simulators, long lead procurements, I&T and critical path developed - Funded schedule reserves added to schedule	✓	✓	
Work Breakdown Structure (WBS)			
•Tailored WBS and dictionary approved by Center MPR 7120.1 Authority	✓	✓	
Mission Assurance Management			
•Mission assurance approach tailored to mission risk class	✓	✓	
Cost			
Cost Estimation and Cost Risk			
•Updated parametric cost estimate	✓	✓	
•Independent Confidence Level Assessment	✓	✓	
Other			
Launch Approval			
•NASA's designated launch approval organization notified about proposed concept if using NASA-provided launch service	✓	✓	
NEPA Compliance			
•NEPA requirements documented and NASA's designated NEPA organization notified about proposed concept	✓	✓	
Export Compliance			
•If detailed technical discussions w/foreign partners are contemplated, contact Export Compliance Office	✓	✓	

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Gate B Success Criteria			
	Competed	Directed	Reimbursable
• Technical and programmatic trades fully closed	✓	✓	
• Solution is compliant and competitive	✓	✓	✓
• Independent cost risk assessment performed	✓	✓	✓
• Teaming roles and/or acquisition strategy are known	✓	✓	✓
• Bid team committed by role and name	✓		✓
• Bid plan (and schedule) / B&P resource request approved	✓		✓

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Gate C Readiness Indicators			
Capture Readiness	Competed	Directed	Reimbursable
•Disposition of red team findings, if any	✓		
•Needed letters of endorsement/commitment	✓		
•Fully documented agreement entered / routed through PAM			✓
•Responsibilities of NASA and Agreement Partner			✓
•Explicit risk/cost to Center if/when proposal is selected			✓
•ADD a "Special box" for summarizing the risks the Center is signing up for. This can be developed by the Capture Manager (who is Center-hatted at this point).	✓	✓	✓
•Performance Milestones, including expiration date			✓
•Clearly defined financial commitments			✓
•Other commitments (facilities, equipment, personnel)			✓
•Allocation of liability between NASA and the Partner			✓
•Allocation of Intellectual Property Rights			✓
•Termination rights and obligations			✓

Gate C Readiness Indicators			
Concept Readiness	Competed	Directed	Reimbursable
Science			
Science Objectives and System Requirements			
•Proposed Level 1 requirements documented Level 2 & 3 driving requirements listed	✓	✓	
•Full and minimum success criteria defined	✓	✓	
•Baseline PLRA submitted @ SRR (DIRECTED projects)		✓	
Science Data System			
•Science data management approach defined	✓	✓	
Technical			
Mission Development			
Expand description of mission phases to illustrate critical s/c/ ground functions	✓	✓	
Delta-V & maneuver strategy (for s/c projects), communications approach & ground station needs determined	✓	✓	
Spacecraft System Design			
Major architectural trades complete and incorporated	✓	✓	
All key LV, s/c, and payload I/F qualitatively defined	✓	✓	
Instrument System Design			
Major payload trades complete and incorporated	✓	✓	
Final instrument designs & accommodations specified	✓	✓	
Ground System/Mission Operations System Design			
MOS diagrams with proposed inheritance compiled	✓	✓	
Major flight / ground trades complete	✓	✓	
Operational roles, responsibilities & data flow elaborated	✓	✓	
Technical Risk Assessment and Management			
Risks reassessed	✓	✓	
Risk list expanded to include second tier subsystem and / or instrument risks	✓	✓	
Technology			
Identify residual risk related to technology maturation	✓	✓	
Inheritance			
Reconfirm availability and applicability of inherited items	✓	✓	
Check for parts obsolescence and pedigree	✓	✓	
Master Equipment List			
MEL selectively expanded to component level for minor modifications to heritage assemblies or for components needed in extreme environments	✓	✓	
Technical Margins			
Use institutional margins where applicable	✓	✓	
System Engineering			
System trades complete	✓	✓	

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Gate C Readiness Indicators			
Concept Readiness	Competed	Directed	Reimbursable
Identify subsystem trades for Phase A	✓	✓	
Launch Services			
Confirm launch vehicle assumptions	✓	✓	
Planetary Protection			
Identify need for Planetary Protection requirements	✓	✓	
Verification and Validation			
V&V schedule integrated with IMS	✓	✓	
Management			
Acquisition and Surveillance			
Project procurement requirements package prepared (DIRECTED projects)		✓	
Project Organization, Implementation Mode, and Partnering			
PM, PSE, and FSM in place	✓	✓	
Remaining Core Project Team identified	✓	✓	
Agreements from "Doing" organizations written	✓	✓	
Schedules			
Top-level Gantt Chart (with critical path and funded schedule reserve) updated	✓	✓	
Work Breakdown Structure (WBS)			
Tailored WBS and dictionary approved by Center MPR 7120 Authority	✓	✓	
Mission Assurance Management			
Mission assurance plan expanded	✓	✓	
Cost			
Cost Estimation and Cost Risk			
Develop a fully supportable cost estimate (i.e., BOEs and cost and pricing data at the lowest required WBS level) for Phase B	✓	✓	
Updated parametric cost estimate	✓	✓	
Updated Independent Confidence Level Assessment	✓	✓	
Other			
Launch Approval			
Launch approval requirements identified and drafted	✓	✓	
NEPA Compliance			
NEPA requirements reassessed	✓	✓	
Export Compliance			
Export authorization in place if needed for detailed technical discussions	✓	✓	

Gate C Success Criteria			
	Competed	Directed	Reimbursable
• Project costing understood and complete	✓		
• Project schedule understood and complete	✓	✓	✓
• Project technical content understood and complete	✓	✓	✓
• Safety risks fully understood	✓	✓	✓
• Resources to execute are deconflicted	✓	✓	✓
• Any needed in-kind contribution is committed	✓		✓
• Project Management model is approved	✓	✓	✓

APPENDIX J – MSFC NEW WORK LIFECYCLE

