



2018 Heliophysics Technology Demonstration and Science Missions of Opportunity Concept Study Report (CSR) Evaluation Plan

Victor Lucas
James Florance
Washito Sasamoto
SOMA, NASA LaRC

[Amended August 13, 2020]

(Additions in bold text, deletions struck through –
see Slides 3, 6a, 10, 12, 14, 18, 24 thru 26a, 31, 34a, 39, 40, 49, and 53)

[Amended November 6, 2020]

(see Slides 15 and 55)

[Amended December 1, 2020]

(see Slides 13–15 and 55)



Signature Page

Heliophysics Technology Demonstration

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

VICTOR LUCAS Digitally signed by VICTOR LUCAS
Date: 2020.02.20 17:57:09 -05'00'

Victor Lucas
Acquisition Manager, Science
Office for Mission Assessments

**ROSHANAK
HAKIMZADEH** Digitally signed by ROSHANAK
HAKIMZADEH
Date: 2020.04.01 15:23:31 -04'00'

Roshanak Hakimzadeh
Program Scientist
Heliophysics Division, SMD

ALAN ZIDE Digitally signed by ALAN ZIDE
Date: 2020.04.01 09:49:27
-04'00'

Alan Zide
Program Executive
Heliophysics Division, SMD

CINDY DANIELS Digitally signed by CINDY
DANIELS
Date: 2020.02.21 09:37:02 -05'00'

Cindy Daniels
Director, Science Office for
Mission Assessments

Nicola Fox Digitally signed by Nicola Fox
Date: 2020.04.01 16:18:32
-04'00'

Nicola Fox
Director
Heliophysics Division, SMD

MICHAEL NEW Digitally signed by MICHAEL NEW
Date: 2020.04.03 17:00:35 -04'00'

Michael New
Deputy Associate Administrator
for Research, SMD



Signature Page

Heliophysics Science (STP Component)

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

JAMES FLORANCE Digitally signed by JAMES
FLORANCE
Date: 2020.08.11 10:00:29 -04'00'

James Florance
Acquisition Manager, Science
Office for Mission Assessments

See digital signature on previous page

Cindy Daniels
Director, Science Office for
Mission Assessments

AMY WINEBARGER Digitally signed by AMY
WINEBARGER
Date: 2020.08.13 08:30:39 -05'00'

~~Dan Moses~~ **Amy Winebarger**
Program Scientist
Heliophysics Division, SMD
[Amended August 13, 2020]

See digital signature on previous page

Nicola Fox
Director
Heliophysics Division, SMD

ALAN ZIDE Digitally signed by ALAN ZIDE
Date: 2020.08.12 17:58:28
-04'00'

Alan Zide
Program Executive
Heliophysics Division, SMD

See digital signature on previous page

Michael New
Deputy Associate Administrator
for Research, SMD



Signature Page

Heliophysics Science (Explorers Component)

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

WASHITO
SASAMOTO

Digitally signed by WASHITO
SASAMOTO
Date: 2020.02.21 10:08:42 -05'00'

Washito Sasamoto
Acquisition Manager, Science
Office for Mission Assessments

Simon Plunkett

Digitally signed by Simon Plunkett
Date: 2020.04.23 12:07:27 -04'00'

Simon Plunkett
Program Scientist
Heliophysics Division, SMD

WILLIS JENKINS

Digitally signed by WILLIS
JENKINS
Date: 2020.05.05 11:00:49 -04'00'

Willis Jenkins
Program Executive
Heliophysics Division, SMD

CINDY DANIELS

Digitally signed by CINDY
DANIELS
Date: 2020.02.24 13:31:41 -05'00'

Cindy Daniels
Director, Science Office for
Mission Assessments

See digital signature on previous page

Nicola Fox
Director
Heliophysics Division, SMD

See digital signature on previous page

Michael New
Deputy Associate Administrator
for Research, SMD



Introduction

- The goal of the Heliophysics Technology Demonstration (TechDemo) Mission of Opportunity is to demonstrate and mature – through spaceflight – technologies that enable new heliophysics science investigations or enhance the ability of heliophysics science investigations to be executed with fewer resources, with a lower risk, and/or with a significantly higher scientific return. Future missions achieving the science advancements enabled by the TechDemo investigation must be expected technically and scientifically during the next 15 years.
- The goal of the Heliophysics Science Mission of Opportunity is to conduct heliophysics investigations designed to address the following science goals:
 - Explore the physical processes in the space environment from the Sun to the Earth and throughout the solar system;
 - Advance our understanding of the connections that link the Sun, the Earth, planetary space environments, and the outer reaches of our solar system; and
 - Develop the knowledge and capability to detect and predict extreme conditions in space to protect life and society and to safeguard human and robotic explorers beyond Earth
- The purpose of this evaluation plan is to define the ground rules, processes, organizations, and schedules to be used in evaluating the Heliophysics Technology Demonstration and Science Concept Study Reports (CSRs).



Introduction (Cont'd)

- TechDemo studies all are a component of the Solar Terrestrial Probes (STP) Program. Science studies are split between the STP Program and the Explorers Program.
- 2 Missions of Opportunity (MO) were selected for TechDemo and 5 MOs were selected for Science (2 STP and 3 Explorers) concept studies, which constitute each investigation's Concept and Technology Development Phase (Phase A) of the Formulation process as outlined in NPR 7120.5E, NASA Spaceflight Program and Project Requirements.
- TechDemo studies will be evaluated per the criteria defined in the *2018 Heliophysics Technology Demonstration and Science Missions of Opportunity Guidelines and Criteria for the Phase A Concept Study* related to Program Element Appendix (PEA) L.
- Science STP and Explorers studies will be evaluated per the criteria defined in the *2018 Heliophysics Technology Demonstration and Science Missions of Opportunity Guidelines and Criteria for the Phase A Concept Study* related to PEA M.



Evaluation Plan Overview

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

[Amended August 13, 2020]	TechDemo (PEA L)	Science-STP (PEA M)	Science-Explorers (PEA M)
Selected Missions	Slide 8	Slide 9	Slide 9
Evaluation Organization	Slide 13	Slide 14	Slide 15
<u>Criterion A: Intrinsic Scientific/Technology Merit</u>	Slide 19	Slide 19	Slide 19
<u>Criterion B: Experiment Scientific/Technology Implementation Merit and Feasibility</u>	Slide 20	Slide 20	Slide 20
Factor B-1	Slide 21	Slide 21	Slide 21
Factor B-2	Slide 22	Slide 22	Slide 22
Factor B-3	Slide 23	Slide 23	Slide 23
Factor B-4	Slide 24	Slide 24	Slide 24
Factor B-5	Slide 24	Slide 24	Slide 24
Factor B-6	Slide 25a	Slide 25a	Slide 25a
Factor B-7	N/A	Slide 25a	Slide 25a
Factor B-8	Slide 25	Slide 25	Slide 25
Factor B-9	Slide 26	Slide 26	Slide 26
<u>Criterion C: TMC Feasibility of the Proposed Investigation Implementation</u>	Slide 27	Slide 27	Slide 27
Factor C-1	Slide 28	Slide 28	Slide 28
Factor C-2	Slide 29	Slide 29	Slide 29
Factor C-3	Slide 30	Slide 30	Slide 30
Factor C-4	Slide 31	Slide 31	Slide 31
Factor C-5	Slide 32	Slide 32	Slide 32
Factor C-6	Slide 33	Slide 33	Slide 33
Factor C-7	Slide 34	Slide 34	Slide 34
Factor C-8	Slide 34	Slide 34	Slide 34



Evaluation Plan Overview

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- The Third Stand Alone Missions of Opportunity Notice (SALMON-3), Program Element Appendix (PEA) L, 2018 Heliophysics Technology Demonstration Mission of Opportunity (MO) was released on August 6, 2018. The first and second amendments to the PEA were released on August 28, 2018 and September 26, 2018, respectively.
- The Third Stand Alone Missions of Opportunity Notice (SALMON-3), Program Element Appendix (PEA) M, 2018 Heliophysics Science Mission of Opportunity (MO) was released on August 7, 2018. The first, second, and third amendments to the PEA were released on August 20, 2018, August 28, 2018 and September 26, 2018, respectively.
- The Science Office for Mission Assessments (SOMA) at NASA Langley Research Center (LaRC) developed this 2018 Heliophysics Technology Demonstration and Science MO CSR Evaluation Plan for the Science Mission Directorate (SMD) at NASA Headquarters.
- This CSR Evaluation Plan has been cleared for public release by SMD.
- The Heliophysics Technology Demonstration and Science Program Scientists are responsible for validating all evaluation processes, responsibility assignments, assumptions, and ground rules for their respective evaluations.



Technology Demonstration Investigations Selected for Concept Studies

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- 2 Missions of Opportunity were selected for Phase A Concept Studies. \$400K was provided for each Concept Study.
 - **Science-Enabling Technologies for Heliophysics (SETH)** – Antti Pulkkinen (PI), NASA Goddard Space Flight Center in Greenbelt, Maryland – SETH would demonstrate two technologies. The first is an optical communications technology for small satellites and CubeSats that is less complex than current systems and could enable a hundredfold increase in deep space data rates, while reducing the burden on NASA's Deep Space Network. The second technology aboard SETH detects solar energetic neutral atoms – fast-moving atoms flowing from the Sun that do not have a charge – as well as an array of waves and other particles that erupt from our Sun.
 - **Solar Cruiser** – Les Johnson (PI), NASA Marshall Space Flight Center in Huntsville, Alabama – Solar Cruiser would demonstrate two technologies. The first is a nearly 18,000-square-foot solar sail that would demonstrate the ability to use solar radiation as a propulsion system. The second technology is a coronagraph instrument that would enable simultaneous measurements of the Sun's magnetic field structure and velocity of coronal mass ejections, or CMEs.



Science Investigations Selected for Concept Studies

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- 5 Missions of Opportunity were selected for Phase A Concept Studies. \$400K was provided for each Concept Study.
 - **Spatial/Spectral Imaging of Heliospheric Lyman Alpha (SIHLA)*** – Larry Paxton (PI), Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland – SIHLA would map the entire sky to determine the shape and underlying mechanisms of the boundary between the heliosphere, the area of our Sun’s magnetic influence, and the interstellar medium, a boundary known as the heliopause.
 - **Global Lyman-alpha Imagers of the Dynamic Exosphere (GLIDE)*** – Lara Waldrop (PI, University of Illinois, Champaign-Urbana – GLIDE would study variability in Earth’s exosphere, the uppermost region of its atmosphere, by tracking far ultraviolet light emitted from hydrogen.
 - **Extreme Ultraviolet High-Throughput Spectroscopic Telescope (EUVST) Epsilon Mission** – Clarence Korendyke (PI), U.S. Naval Research Laboratory in Washington - EUVST would aim to provide an answer to a fundamental question in solar physics: How does the interplay of solar material – a hot plasma – and magnetic fields drive solar activity and eruptions, such as solar flares and coronal mass ejections?
 - **Aeronomy at Earth: Tools for Heliophysics Exploration and Research (AETHER)** – James Clemmons (PI), University of New Hampshire in Durham - AETHER would explore the ionosphere-thermosphere system and its response to geomagnetic storms.
 - **Electrojet Zeeman Imaging Explorer (EZIE)** – Jeng-Hwa Yee (PI), Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland - EZIE would focus on an electric current known as the auroral electrojet, which circles through the atmosphere around 60 to 90 miles above Earth, near the poles.

* SIHLA and GLIDE were selected for the Solar Terrestrial Probe (STP) component and the other three are for the Explorers component



Handling of Proprietary Data

- All CSR related materials will be considered proprietary.
- Only those individuals with a need to know will be allowed to view CSR materials.
- Each non-Civil Servant (CS) or non-Intergovernmental Personnel Act (IPA) Assignee Evaluator will sign a ~~NASA~~ Non-Disclosure Agreement (NDA) which must be on file with NASA Research and Education Support Services (NRESS) or **Evaluations, Assessments, Studies, Services and Support 2 (EASSS 2) Contractor** prior to any CSRs being distributed to that evaluator. **[Amended August 13, 2020]**
 - CS and IPA Evaluators are not required to sign an NDA.
- All Report Materials in hardcopy format will be numbered and controlled, and a record will be kept of who has been supplied with what materials, both electronic and hardcopy.
- Evaluators and Observers will be briefed at a Kickoff telecon on how to handle the CSR material. Evaluators will be briefed that they are not allowed to discuss CSRs with anyone outside the Evaluation Panels ever. Evaluators will be briefed to not contact anyone outside of their Evaluation Panel to gain insight on any CSR related matter without expressly getting authorization from the CSR Evaluation Chair or the Technical, Management, and Cost (TMC) Panel Chair in advance of making the contact.



Handling of Proprietary Data (continued)

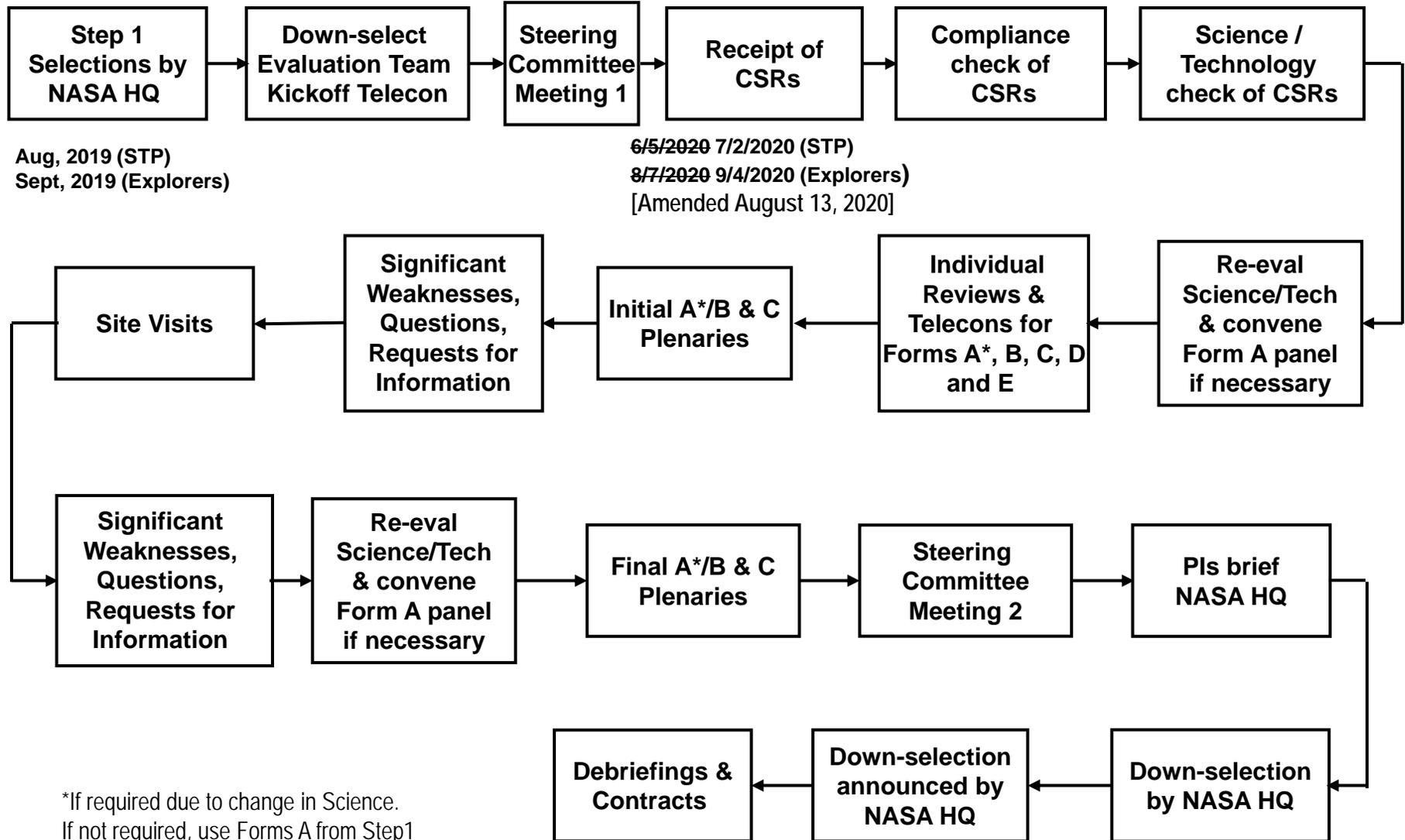
- During the Evaluation, all proprietary information that needs to be exchanged between evaluators will be transferred securely via the Remote Evaluation System (RES) website maintained by SOMA, via the NASA Solicitation and Proposal Integrated Review and Evaluation System (NSPIRES), via the secure ScienceWorks system maintained by SMD, via controlled WebEx, via NASA's Large File Transfer (LFT) capability, or via encrypted email, parcel post, fax, or regular mail. Proprietary information will not be sent via unencrypted email.
- Telecon line information is confidential. The phone numbers and pass codes are posted in a file on the Remote Evaluation Site (RES). Participants will be briefed to ensure they do not provide this information to anyone or distribute this information via email.
- When the evaluation process is complete, CSR materials will be collected. Some copies (for archival purposes) will be maintained by the Program Scientist at NASA HQ, and in the NRESS and SOMA vaults. Also, some CSR material from the down-selected mission(s) will be provided to the managing Program Office. All other CSR materials will be destroyed.
- Evaluators' electronic and paper evaluation materials will be deleted/destroyed when the evaluation process is complete. Archival copies will be maintained in the NASA Science Office for Mission Assessments (SOMA) vault.



CSR Evaluation Flow

Heliophysics Tech Demo and Science MO

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

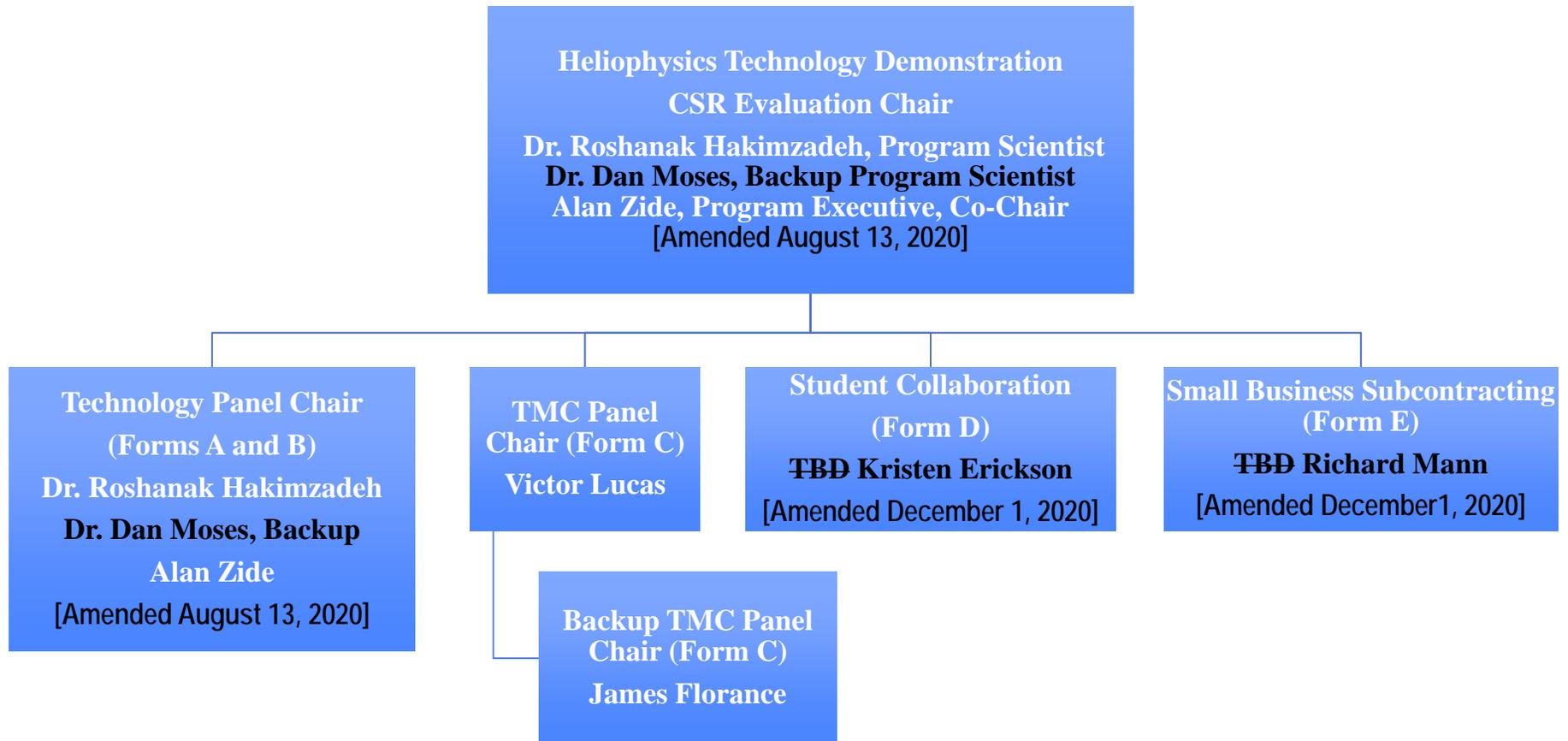




Organization

Heliophysics Technology Demonstration

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

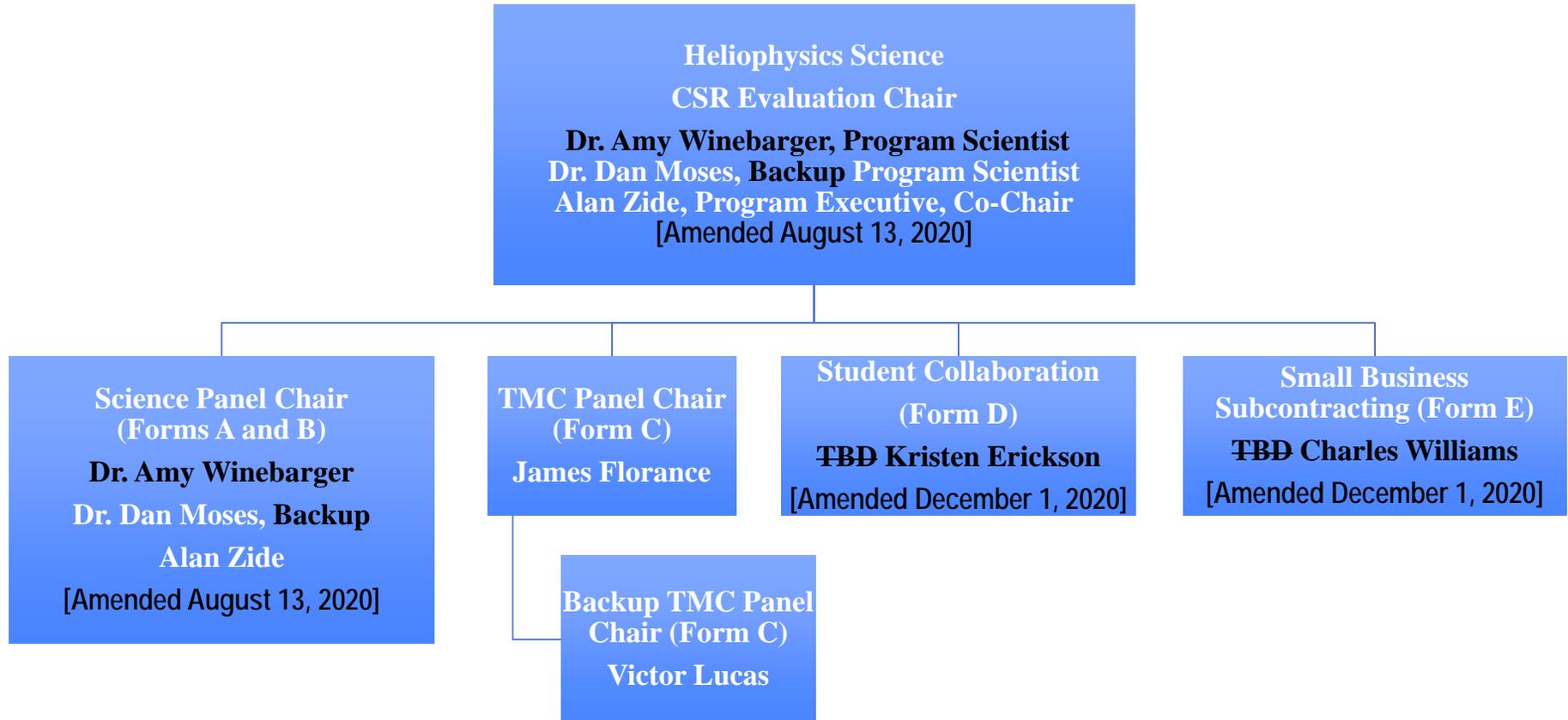




Organization

Heliophysics Science (STP component)

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

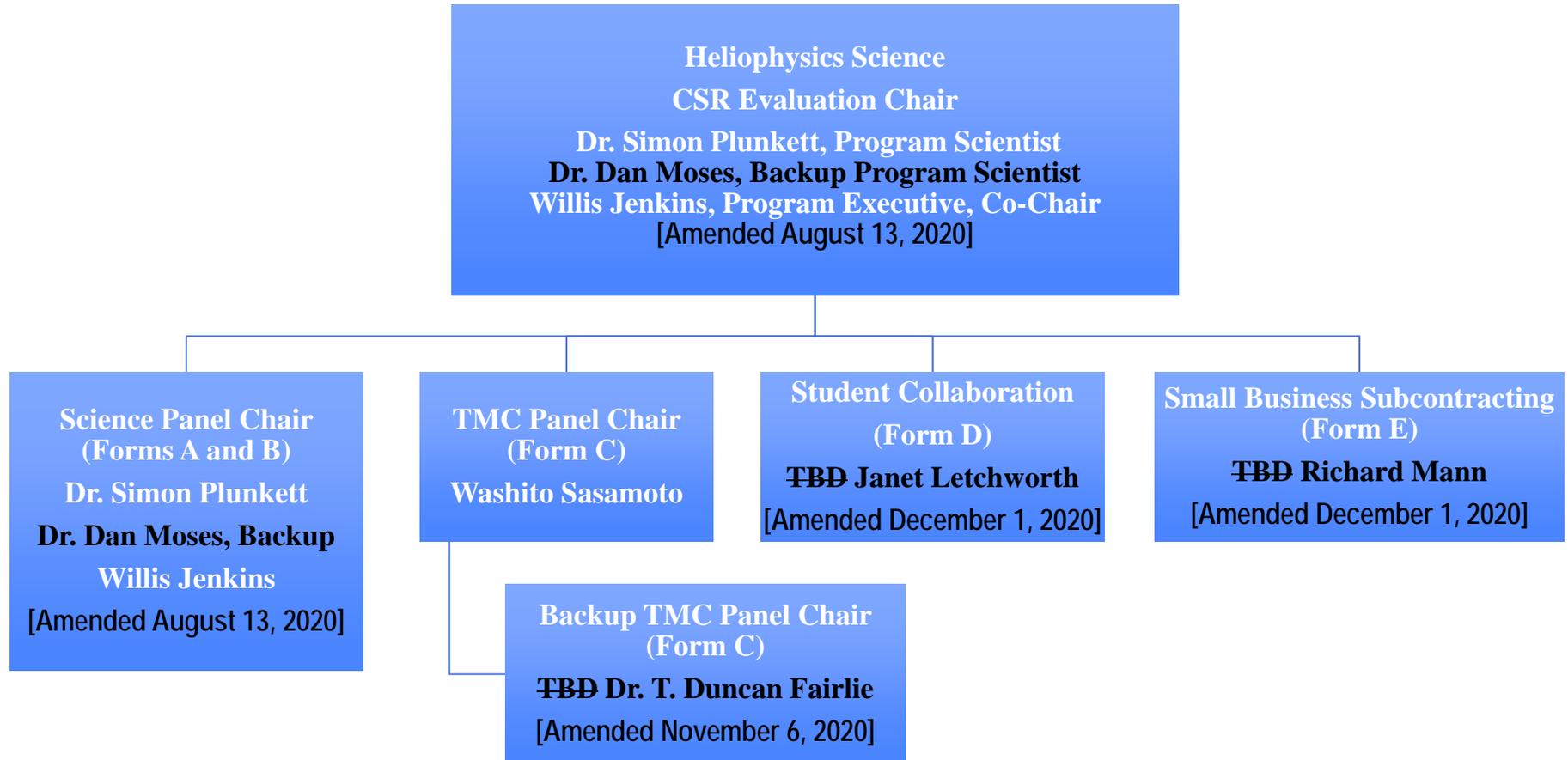




Organization

Heliophysics Science (Explorers Component)

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan





Plan to Avoid Conflicts of Interest (COIs)

- Members of Evaluation Panels are cross checked against the draft list of organizations and individuals provided by the study teams to ensure no individual or organizational COI exists with the planned evaluators. Evaluators are required to raise any potential COIs.
- After the Concept Study Reports (CSRs) are received, all members of the Evaluation Panels will again be cross checked against the final lists of organizations and individuals on each CSR to ensure no individual or organizational COI exists on the list of evaluators.
- In addition, all evaluators will review the final lists of conflicted organizations and individuals and be required to divulge whether they have any financial, professional, or personal potential conflicts of interest and whether they work for a profit making company that directly competes with any profit making proposing organization.
- Any potential COI issue is discussed with the CSR Evaluation Chair and the SMD Deputy Associate Administrator for Research, and documented in the Down-select COI Mitigation Plan.
- All Civil Service evaluators will self-certify their COI status by reviewing a combined listing of individuals and organizations associated with the CSRs. The TMC evaluators must notify the TMC Panel Chair in case there is a potential conflict. The Technology/Science evaluators must notify the Science/Technology Panel Chair in case of a potential conflict.



Plan to Avoid COIs (continued)

- If any evaluators with potential organizational COI must be used, their respective organizations must submit a plan, as required by their contract or SMD waiver, addressing the Conflict of Interest and mitigation plan. This plan will outline how they will firewall the potentially conflicted evaluator(s) during the evaluation process from the conflicted part of their organization.
- If during the evaluation there is any actual conflict of interest noted, the conflicted member(s) will be notified to stop reviewing CSRs immediately and the CSR Evaluation Chair will be notified. Steps will be expeditiously taken to remove any actual or potential bias imposed by the conflicted member(s).
- Community standards for conflicts of interest will be applied to all evaluators as directed in SMD Policy Document SPD-01A, *Handling Conflicts-of-Interest for Peer Reviews*. Standards for financial conflicts of interest as specified in 18 U.S.C. § 208 will be applied to Civil Servant evaluators. The HQ Office of General Counsel will be consulted as necessary.



Evaluation Criteria and Additional Selection Factors

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- The Criteria to Evaluate the Concept Study Reports are documented in the 2018 HELIOPHYSICS TECHNOLOGY DEMONSTRATION AND SCIENCE MISSIONS OF OPPORTUNITY GUIDELINES AND CRITERIA FOR THE PHASE A CONCEPT STUDY at:
<https://soma.larc.nasa.gov/STP/tdmo/tdmo-library.html>
<https://soma.larc.nasa.gov/2018HelioMO/programlibrary.html>
- Evaluation criteria for the Concept Study: approximate significance of each criterion is indicated by the percent weighting.
 - Criterion A: Intrinsic Scientific/Technology Merit of the Proposed Investigation (will not be re-evaluated unless it is determined that the science has changed from that described in the Step 1 proposal) (approximately 25%)
 - Criterion B: Experiment Scientific/Technology Implementation Merit and Feasibility of the Proposed Investigation (approximately 20%)
 - Criterion C: TMC Feasibility of the Proposed Investigation Implementation (approximately 50%)
 - Criteria D and E: Merit of plans for Student Collaboration (SC) and small business subcontracting (approximately 5% combined)
- Additional selection factors
 - NASA budget changes and/or other programmatic factors, including but not limited to **career development opportunities to train the next generation of science, engineering and management leaders**; changes in scientific mandates; national priorities; and budgetary forecasts that were not evident when the PEAs were issued. The PI-Managed Mission Cost, as well as other programmatic factors, may be additional selection factors. **[Amended August 13, 2020]**



Evaluation Criterion A

- **Intrinsic Scientific/Technology Merit of the Proposed Investigation** - The Heliophysics PEA Program Scientists will determine whether any issues that may have emerged in the course of the concept study have effected significant changes to the science/technology objectives or other aspects of the proposed Baseline and Threshold Science/Technology Investigations (see Requirement CS-17 in Part II of the 2018 HELIOPHYSICS TECHNOLOGY DEMONSTRATION AND SCIENCE MISSIONS OF OPPORTUNITY GUIDELINES AND CRITERIA FOR THE PHASE A CONCEPT STUDY) in such a manner as to have impacted the basis for the evaluation of the scientific/technology merit of the investigation as determined by the peer review panel for the Step 1 proposal. If there are no significant changes to the proposed investigation that undermine the basis of this rating, the peer review panel rating for scientific/technology merit of the Step 1 proposal will be the rating for scientific/technology merit of the CSR. If there are significant changes, the Program Scientist will convene a peer review panel to re-evaluate the scientific/technology merit of the objectives in light of these changes. The factors for re-evaluating this criterion will be the same as those used for the Step 1 proposal review (for PEA L, Section 7.1.1; for PEA M, SALMON-3 AO Section 7.2 or PEA Section 7.1).



Evaluation Criterion B

- **Experiment Scientific/Technology Implementation Merit and Feasibility of the Proposed Investigation** - All of the factors defined in Section 7.1.2 of PEA L, and defined in Section 7.2 of the SALMON-3 AO or Section 7.1 of PEA M, also apply to the evaluation of the CSR. Note that details have been added to one of the subfactors of Factor B-1. An additional subfactor has been added to Factor B-2. Due to multiple differences in some Factors for PEA L and PEA M, Factors B-1, B-2, and B-3 are listed twice, once for PEA L and once for PEA M.



Evaluation Criterion B (continued)

- Factor B-1 (PEA L). **Merit of the investigation design for addressing the technology goals and objectives.** This factor includes the degree to which the proposed investigation will address the goals and objectives; the appropriateness of the selected technology and investigation design for addressing the goals and objectives; the degree to which the proposed investigation can provide the necessary data, *including details on data collection strategy and plans* (n.b., italicized details added for the evaluation of the CSR); and the sufficiency of the data gathered to complete the technology investigation and meet its goals and objectives.
- Factor B-1 (PEA M). **Merit of the instruments and mission design for addressing the science goals and objectives.** This factor includes the degree to which the proposed mission will address the goals and objectives; the appropriateness of the selected instruments and mission design for addressing the goals and objectives; the degree to which the proposed instruments and mission can provide the necessary data, *including details on data collection strategy and plans* (n.b., items in italics added for the evaluation of the CSR); and the sufficiency of the data gathered to complete the scientific investigation.



Evaluation Criterion B (continued)

- Factor B-2 (PEA L). **Probability of technical success.** This factor includes the maturity and technical readiness of the technology to be demonstrated or demonstration of a clear path to achieve necessary maturity; the adequacy of the plan to develop the technology to be demonstrated within the proposed cost and schedule; the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks; the likelihood of success in the development of new technology to be demonstrated; the ability of the development team - both institutions and individuals - to successfully implement those plans; and the likelihood of success for both the development and the operation of the technology within the investigation design. *This factor includes assessment of technology readiness, heritage, environmental concerns, accommodation, and complexity of interfaces for the technology/instrument design (n.b., italicized subfactor added for the evaluation of the CSR).*
- Factor B-2 (PEA M). **Probability of technical success.** This factor includes the maturity and technical readiness of the instruments or demonstration of a clear path to achieve necessary maturity; the adequacy of the plan to develop the instruments within the proposed cost and schedule; the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks; the likelihood of success in developing any new technology that represents an untested advance in the state of the art; the ability of the development team – both institutions and individuals – to successfully implement those plans; and the likelihood of success for both the development and the operation of the instruments within the mission design. *This factor includes assessment of technology readiness, heritage, environmental concerns, accommodation, and complexity of interfaces for the instrument design (n.b., italicized subfactor added for the evaluation of the CSR).*



Evaluation Criterion B (continued)

- Factor B-3 (PEA L). **Merit of the data analysis, data availability, and data archiving plan.** This factor includes the merit of plans for data analysis and data archiving to meet the goals and objectives of the investigation; to result in the publication of discoveries in the professional literature; and to preserve data of value to the research and development community. Considerations in this factor include assessment of planning and budget adequacy and evidence of plans for well-documented, high-level data products and software usable to the entire research and development community; assessment of adequate resources for physical interpretation of data; an assessment of the planning and budget adequacy; reporting science or technology results in the professional literature (e.g., refereed journals); and assessment of the proposed plan for the timely release of the data to the public domain for enlarging its impact.
- Factor B-3 (PEA M). **Merit of the data analysis, data availability, and data archiving plan.** This factor includes the merit of plans for data analysis and data archiving to meet the goals and objectives of the investigation; to result in the publication of science discoveries in the professional literature; and to preserve data and analysis of value to the science community. Considerations in this factor include assessment of planning and budget adequacy and evidence of plans for well-documented, high-level data products and software usable to the entire science community; assessment of adequate resources for physical interpretation of data; reporting scientific results in the professional literature (e.g., refereed journals); and assessment of the proposed plan for the timely release of the data to the public domain for enlarging its science impact.



Evaluation Criterion B (continued)

- Factor B-4. Science/Technology resiliency. This factor includes both developmental and operational resiliency. Developmental resiliency includes the approach to descoping the Baseline Investigation to the Threshold Investigation in the event that development problems force reductions in scope. Operational resiliency includes the ability to withstand adverse circumstances, the capability to degrade gracefully, and the potential to recover from anomalies in flight.
- Factor B-5. Probability of investigation team success. This factor will be evaluated by assessing the experience, expertise, and organizational structure of the investigation team and the experiment design in light of proposed instruments (PEA M) / technology (PEA L). The scientific expertise of the PI will be evaluated but not his/her experience with NASA missions. The role of each Co-Investigator ~~and collaborator~~ (n.b., ~~strikeout indicates words deleted from the SALMON-3 AO~~) will be evaluated for necessary contributions to the proposed investigation; the inclusion of Co-Is ~~or collaborators~~ who do not have a well-defined and appropriate role may be cause for downgrading of the proposal during the CSR evaluation (n.b., collaborator roles will not be evaluated for the CSR evaluation). ~~Comments about the managerial experience of the PI, and whether appropriate mentoring and support tools are in place, will be made to the Selection Official but these comments shall not impact the "Experiment Implementation Merit" rating. *The inclusion of career development opportunities to train the next generation science/technology leaders will also be evaluated* (n.b., italicized subfactor added for the evaluation of the CSR).~~ [Amended August 13, 2020]



Evaluation Criterion B (continued)

~~Factor B-6. Merit of any Science Enhancement Options (SEOs), if proposed.~~
This factor includes assessing the appropriateness of activities selected to enlarge the science impact of the mission; the potential of the selected activities to enlarge the science impact of the mission; and the appropriate costing of the selected activities. The peer review panel will inform NASA whether the evaluation of the proposed SEO(s) impacted the overall rating for scientific/technology implementation merit and feasibility. Lack of an SEO will have no impact on the CSR's overall rating for scientific/technology implementation merit and feasibility.
[Amended August 13, 2020 – see slide 25a for amended Factors B-6 and B-7]

- Factor A-3 of the SALMON-3 AO or the PEA will also be re-evaluated as a factor for Experiment Science/Technology Implementation Merit and Feasibility; it has been renumbered as Factor ~~B-7~~ B-8. [Amended August 13, 2020]
 - Factor B-7B-8. Likelihood of scientific/technology success. This factor includes how well the anticipated measurements support the goals and objectives; the adequacy of the anticipated data to complete the investigation and meet the goals and objectives; and the appropriateness of the mission requirements for guiding development and ensuring success. [Amended August 13, 2020]



Evaluation Criterion B (continued)

- Factor B-6 (PEA L). Merit of any Science Enhancement Options (SEOs), if proposed. This factor includes assessing the appropriateness of the selected activities to enlarge the impact of the mission and the costing of the selected activities. Although evaluated by the same panel as the balance of Implementation Merit factors, this factor will not be considered in the overall criterion rating. [Amended August 13, 2020]
- Factor B-6 (PEA M). Merit of any Science-Exploration-Technology Enhancement Options (SEOs), if proposed. This factor includes assessing the appropriateness of the selected activities to enlarge the impact of the mission and the costing of the selected activities. Although evaluated by the same panel as the balance of Implementation Merit factors, this factor will not be considered in the overall criterion rating. [Amended August 13, 2020]
- Factor B-7 (PEA L). N/A [Amended August 13, 2020]
- Factor B-7 (PEA M). Merit of any PI-developed Technology Demonstration Opportunities (TDOs), if proposed. This factor includes assessing the appropriateness of the TDO to enlarge the impact of the investigation, and/or add value to future investigations, and the potential risk to the investigation objectives posed by the TDO. There will be no penalty for the potential higher technical risk of the TDO itself. Although evaluated by the same panel as the balance of Implementation Merit factors, this factor will not be considered in the overall criterion rating. [Amended August 13, 2020]



Evaluation Criterion B (continued)

- A new evaluation factor that is not described in the SALMON-3 AO or the PEAs, and therefore was not evaluated for Step 1 proposals, will also be included for both PEAs L and M. This Factor ~~B-8B-9~~ below will be evaluated for the CSRs in addition to the factors specified in PEA L Section 7.1.2 and Section 7.2.3 of the SALMON-3 AO or Section 7.1 of PEA M (repeated or updated above as Factors B-1 through ~~B-7B-8~~). **[Amended August 13, 2020]**
 - Factor ~~B-8B-9~~ **Maturity of proposed Level 1 science/technology requirements and Level 2 project requirements.** This factor includes assessment of whether the Level 1 requirements are mature enough to guide the achievement of the objectives of the Baseline Science/Technology Investigation and the Threshold Science/Technology Investigation, and whether the Level 2 requirements are consistent with the Level 1 requirements. The CSR will be evaluated for whether the requirements are stated in unambiguous, objective, quantifiable, and verifiable terms that do not conflict. The CSR will be evaluated for the adequacy, sufficiency, and completeness of the Level 1 and Level 2 requirements, including their utility for evaluating the capability of the instruments and other systems to achieve the mission objectives (for PEA L, replace “instruments” with “technologies”). The stability of the Level 1 science/technology requirements and Level 2 project requirements will be assessed including whether the requirements are ready, upon initiation of Phase B, to be placed under configuration control with little or no expected modifications for the lifecycle of the mission. **[Amended August 13, 2020]**



Evaluation Criterion B (continued)

- The panel evaluating the “Scientific/Technology Implementation Merit and Feasibility” will provide comments about the experience of the PI with NASA missions. The panel will also provide comments to NASA regarding the extent to which the proposed investigation provides career development opportunities to train the next generation of science leaders. While these comments will not be considered in the evaluation, they may be considered during down-selection. [Amended August 13, 2020]



Evaluation Criterion C

- **TMC Feasibility of the Proposed Investigation Implementation** - All of the factors defined in Section 7.2.4 of the SALMON-3 AO and amended as described in Section 7.1.3 of PEA L and Section 7.1 of PEA M apply to the evaluation of the CSR. All of these factors are interpreted as including an assessment as to whether technical, management, and cost feasibility are at least at a Phase A level of maturity.
- Note that the risk management aspects of Factor C-4, Adequacy and robustness of the management approach and schedule, including the capability of the management team, have been removed from Factor C-4 and included in a new evaluation factor, Factor C-6, Adequacy of the risk management plan.



Evaluation Criterion C (continued)

- Factor C-1. Adequacy and robustness of the instrument implementation plan. The maturity and technical readiness of the instrument complement will be assessed, as will the ability of the instruments to meet investigation requirements. This factor includes an assessment of the instrument design, accommodation, interface, heritage, and technology readiness. This factor includes an assessment of the instrument hardware and software designs, heritage, and margins. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of the instrument complement. This factor also includes adequacy of the plans for instrument systems engineering and for dealing with environmental concerns. This factor includes an assessment of plans for the development and use of new instrument technology, plans for advanced engineering developments, and the adequacy of backup plans to mature systems within the proposed cost and schedule when systems having a TRL less than 6 are proposed; for PEA L, proposed systems with technologies to be demonstrated, the assessment is for systems having a TRL less than 5.



Evaluation Criterion C (continued)

- **Factor C-2. Adequacy and robustness of the investigation design and plan for operations.** This factor includes an assessment of the overall investigation design and investigation architecture, the spacecraft design and design margins (including margins for launch mass, delta-V, and propellant), the concept for operations (including communication, navigation/tracking/trajectory analysis, and ground systems and facilities), and the plans for launch services (*for PEA M, including the approach the PI will utilize to make the flight worthiness determination if proposing non-NASA launch services, ensuring the adequacy of the technical work performed by the launch provider*) (*n.b., addition of parenthetical*). This factor includes investigation resiliency – the flexibility to recover from problems during both development and operations – including the technical resource reserves and margins, system and subsystem redundancy, and reductions and other changes that can be implemented without impact to the Baseline Investigation. This factor will be applied only to the extent that it is appropriate for the proposals solicited by the applicable PEA.



Evaluation Criterion C (continued)

- Factor C-3. Adequacy and robustness of the flight systems. This factor includes an assessment of the flight hardware and software designs, heritage, and margins. This factor includes an assessment of the proposer's understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, etc.). This factor includes an assessment of the adequacy of the plans for spacecraft systems engineering, qualification, verification, mission assurance, launch operations, and entry/descent/landing. This factor includes the plans for the development and use of new technology, plans for advanced engineering developments, and the adequacy of backup plans to ensure success of the investigation when systems having a TRL less than 6 are proposed; for PEA L, proposed systems with technologies to be demonstrated, the assessment is for systems having a TRL less than 5. The maturity and technical readiness of the spacecraft, subsystems, and operations systems will be assessed. The adequacy of the plan to mature systems within the proposed cost and schedule, the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks, and the likelihood of success in developing any new technologies will be assessed. This factor will be applied only to the extent that it is appropriate for the proposals solicited by the applicable PEA.



Evaluation Criterion C (continued)

- **Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.** This factor includes: the adequacy of the proposed organizational structure and Work Breakdown Structure (WBS); the management approach including project level systems engineering; the roles, qualifications, and experience of the PI, PM, *Project Systems Engineer (PSE)* (*n.b.*, the PSE must be named for the evaluation of the CSR), other named Key Management Team members, and implementing organization, investigation management team, and known partners; the commitment, spaceflight experience (**PI excepted**), and relevant performance of the PI, PM, PSE, other named Key Management Team members, and implementing organization, investigation management team, and known partners against the needs of the investigation; the commitments of partners and contributors; and the team's understanding of the scope of work covering all elements of the investigation, including contributions. ~~The capability of the management team will be evaluated as a whole, as opposed to assessing the capabilities of each of the Key Team Members independently. Comments about the managerial experience of the PI, and whether appropriate mentoring and support tools are in place, will be made to the Selection Official but these comments shall not impact the "Technical, Management, and Cost Feasibility" rating.~~ This factor also includes assessment of elements such as the relationship of the work to the project schedule, the project element interdependencies, the associated schedule margins, and an assessment of the likelihood of *meeting the proposed launch readiness date* (*n.b.*, change from launch date to launch readiness date). Also evaluated under this factor are the proposed project and schedule management tools to be used on the project, *along with the small business subcontracting plan including small disadvantaged businesses* (*n.b.*, italicized subcontracting plan subfactor added for the evaluation of the CSR). ~~*The inclusion of career development opportunities to train the next generation engineering and management leaders will also be evaluated* (*n.b.*, italicized career development opportunities added for the evaluation of the CSR).~~ **[Amended August 13, 2020]**
 - If tailoring of program and project management requirements beyond the pre-approved package of tailoring of requirements for Streamlined Class D is proposed, evaluators will comment on the CSR team's justification for that tailoring, but will not consider it a part of the risk rating.



Evaluation Criterion C (continued)

- Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk. This factor includes elements such as cost, cost risk, cost realism, and cost completeness including assessment of the basis of estimate, the adequacy of the approach, the methods and rationale used to develop the estimated cost, the discussion of cost risks, the allocation of cost reserves by phase, and the team's understanding of the scope of work (covering all elements of the investigation, including contributions *and for PEA M, all elements associated with a non-NASA launch or rideshare provider, such as launch site payload processing and mission unique services*) (*n.b.*, addition of launch-related elements to parenthetical). The adequacy of the cost reserves will be evaluated; and understanding of the cost risks (*including those associated with launch delay and/or launch opportunity uncertainty for PEA M*) will be assessed (*n.b.*, addition of parenthetical). This factor also includes an assessment of the proposed cost relative to estimates generated by the evaluation team using parametric models and analogies. Also evaluated under this factor are the proposed cost management tools to be used on the project.



Evaluation Criterion C (continued)

- The following evaluation factor has been removed as a subset of Factor C-4 described in the SALMON-3 AO and has been revised for the evaluation of the CSR.
 - Factor C-6. Adequacy of the risk management plan. The adequacy of the proposed risk management approach will be assessed, including any risk mitigation plans for new technologies; *any non-NASA launch delay, cancellation, and the risk of mission failure attributed to the launch service for PEA M*; any long-lead items; and the adequacy and availability of any required manufacturing, test, or other facilities (*n.b.*, addition of launch-related elements). The approach to any proposed descoping of investigation capabilities will be assessed against the potential impact to the proposed Baseline Investigation. The plans for managing the risk of contributed critical goods and services will be assessed, including the plans for any international participation, the commitment of partners and contributors, as documented in Letters of Commitment, and the technical adequacy of contingency plans, where they exist, for coping with the failure of a proposed cooperative arrangement or contribution; when no mitigation is possible, this should be explicitly acknowledged. The stability and reliability of proposed partners, and the appropriateness of any proposed contribution, is not assessed as a management risk but will be assessed by SMD as a programmatic risk element of the investigation.



Evaluation Criterion C (continued)

- The following are new evaluation factors that are not described in the SALMON-3 AO or the PEAs and therefore were not evaluated for Step 1 proposals. These will be evaluated for the CSRs in addition to the factors given in Section 7.2.4 of the SALMON-3 AO and Section 7.1.3 of the PEA L and Section 7.1 of PEA M (repeated or updated above as Factors C-1 through C-6).
 - Factor C-7. Ground systems. This factor includes an assessment of the proposed mission operations plans, facilities, hardware and software, processes, and procedures.
 - Factor C-8. Approach and feasibility for completing Phase B. The completeness of Phase B plans and the adequacy of the Phase B approach will be assessed. This assessment will include evaluation of the activities/products, the organizations responsible for those activities/products, and the schedule to accomplish the activities/products.
- For the purposes of the CSR, investigation teams are not required to hold reserves against Government Furnished Equipment (GFE) such as a NASA-PEA-provided launch service. They should assume the Government will deliver as promised on factors such as Launch Vehicle (LV) performance and schedule. The Government is holding separate reserves on its promises.



Evaluation Criterion C (continued)

- The capability of the management team will be evaluated as a whole, as opposed to assessing the capabilities of each of the Key Team Members independently. The panel evaluating the “Technical, Management, and Cost Feasibility” will provide comments about the managerial experience of the PI and whether appropriate mentoring and support tools are in place. The panel will also provide comments to NASA regarding the extent to which the proposed investigation provides career development opportunities to train the next generation of engineering and management leaders. While these comments will not be considered in the evaluation, they may be considered during down-selection. [Amended August 13, 2020]



Evaluation Criterion D

- **Merit of Student Collaboration (SC)** - The following is a new evaluation factor that is not described in the PEAs and therefore was not evaluated for Step 1 proposals. This factor will be evaluated for CSRs.
 - This factor will include an assessment of whether the scope of the SC follows the guidelines in Section 5.5.2 of the PEA and Section 5.6.2 of the SALMON-3 AO. The criteria to be used to evaluate the SC component and a discussion of those criteria are described in the document *Explanatory Guide to the NASA Science Mission Directorate Educational Merit Evaluation Factors for Student Collaboration Elements (Version 1.1 September 2007)*, available in the Program Library.
 - There is no minimum and no maximum allowable cost for a SC. NASA is providing a SC incentive that is defined to be 1% of the PI-Managed Mission Cost. Contributions to the SC are permitted. The proposed NASA cost of the SC, up to the SC incentive, will be outside of the PI-Managed Mission Cost. If the SC costs NASA more than the SC incentive, then the balance of the NASA cost of the SC must be within the PI-Managed Mission Cost. The SC incentive, as an addition to mission's implementation, is not available to solve mission cost overrun issues. SC provides no cost-savings to a NASA mission.



Evaluation Criterion E

- **Merit of the Small Business Subcontracting Plans** - The following is a new evaluation factor that is not described in the PEAs and therefore was not evaluated for Step 1 proposals. This factor will be evaluated for CSRs.
 - This factor will be evaluated on the participation goals and quality and level of work performed by small business concerns overall, as well as that performed by the various categories of small business concerns listed in FAR 52.219-9.



CSR Evaluation Panel Products

- Form A (if necessary) and Form B for all CSRs
 - Grades: Excellent, Very Good, Good, Fair, or Poor
 - Polling is held for the 5 categories above
 - The reported grade reflects the median
- Form C for all CSRs
 - Grades: Low, Low/Medium, Medium, Medium/High, or High
 - Polling is held for the 5 categories above
 - The reported Risk Rating grade reflects the median
- Form D (Student Collaboration)
 - Separable from the main mission: Yes or No
 - Grades: Meritorious or Not Meritorious
- Form E (Small Business Subcontracting Plans)
 - Grades: Acceptable or Needs Work



Grade Definitions - Forms A and B

- Form A and B Grade Definitions
 - **Excellent:** A comprehensive, thorough, and compelling CSR of exceptional merit that fully responds to the objectives of the PEA as documented by numerous and/or significant strengths and having no major weaknesses.
 - **Very Good:** A fully competent CSR of very high merit that fully responds to the objectives of the PEA, whose strengths fully outbalance any weaknesses.
 - **Good:** A competent CSR that represents a credible response to the PEA, having neither significant strengths nor weakness and/or whose strengths and weaknesses essentially balance.
 - **Fair:** A CSR that provides a nominal response to the PEA, but whose weaknesses outweigh any perceived strengths.
 - **Poor:** A seriously flawed CSR having one or more major weaknesses (*e.g.*, an inadequate or flawed plan of research, or lack of focus on the objectives of the PEA).

Evaluators are polled on the grades defined above.



Definitions of Criterion A and B Findings

Major Strength: A facet of the response that is judged to be well above expectations and substantially contributes to the Experiment Science/Technology Implementation Merit and Feasibility of the Investigation.

Minor Strength: A strength that substantiates the Experiment Science/Technology Implementation Merit and Feasibility of the Investigation.

Major Weakness: A deficiency or set of deficiencies taken together that are judged to substantially detract from the Experiment Science/Technology Implementation Merit and Feasibility of the Investigation.

Minor Weakness: A weakness that detracts from the Experiment Science/Technology Implementation Merit and Feasibility of the Investigation.

Note: Unlike in Step 1, minor findings can influence ~~risk~~ ratings. **Notable minor findings** are those minor findings that do influence ratings and are specifically identified in evaluation forms. [Amended August 13, 2020]



Science/Technology Feasibility Impact

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- The Science Feasibility Impact of Criterion B Major Weaknesses will be considered.
 - Factors B-1 to ~~B-7~~**B-8**: **[Amended August 13, 2020]**
“This weakness is anticipated to have a {small, modest, serious} impact on the ability of the proposed mission to achieve {some, all} of {one, several, all} science objective(s).”
 - Factor ~~B-8~~**B-9**: **[Amended August 13, 2020]**
“This weakness is anticipated to have a {small, modest, serious} impact on the ability to measure progress of the proposed mission in achieving {some, all} of {one, several, all} science objective(s).”
- Goal is to be clear on the severity of a Criterion B Major Weakness.



Risk Ratings Definitions - Form C

The following definitions are indicators of risk. Evaluators must consider these definitions and input available for their consideration (e.g., cost model applicability, uncertainty of the cost models error bars and schedule analyses, uncertainty of the cost threats, mitigating factors such as major strengths, etc.) together with their judgement in determining the appropriate risk for a particular investigation.

Rating	Definition
Low Risk	Resources for technical, management, schedule, and cost are at or above the appropriate levels, with at least one resource significantly above, even after taking into account any problems that have been identified in the Phase A evaluation. No risks with unquantified cost threats* have been identified.
Low/Medium Risk	No problems have been identified in the Phase A evaluation that reduce the technical, management, schedule, and cost resources below the appropriate levels. Any identified risks with unquantified cost threats have a low probability of occurrence.
Medium Risk	Problems have been identified in the Phase A evaluation that reduce one of the resources slightly below the appropriate levels for: technical, management, schedule, or cost. Sound management and effective application of engineering resources will be required to solve the problems. Any identified risks with unquantified cost threats have a probability of occurrence that is not high.
Medium/High Risk	Problems have been identified in the Phase A evaluation that reduce one or more of the resources below the appropriate levels for: technical, management, schedule, and/or cost. The problems identified may not be solvable within the resources proposed, even with the use of sound management and effective application of engineering resources.
High Risk	Problems have been identified in the Phase A evaluation that reduce one or more of the resources significantly below the appropriate levels for: technical, management, schedule, and/or cost. The problems identified are deemed unsolvable within the resources proposed.

***Risks with unquantified cost threats** are defined in the grades above as those major weaknesses whose cost to fix cannot be quantified, but is large. The impacts of these risks are significant because they could lead to not achieving the baseline mission with the resources available.



Criterion C Panel Evaluation Principles

- Basic assumptions for Step 1:
 - Proposing team is the expert on their proposal.
 - Proposing team's task is to provide evidence that the project is Low Risk.
 - Criterion C Panel's task is to try to validate proposing team's assertion of Low Risk.
 - Proposing team given the benefit of the doubt.
- CSR Feasibility and Risk Assessment in Step 2:
 - Tasks are the same as for Step 1, but expectations are higher.
 - Study team's task is to provide evidence that the project has acceptable risk.
 - Criterion C Panel's task is to try to validate study team's assertion of acceptable risk.
 - **The study team is not given the benefit of the doubt in the down-select.**
- All CSRs will be reviewed to identical standards.
 - All CSRs shall receive same evaluation treatment in all areas.
- The Criterion C Panel is made up of evaluators who are subject matter experts in the areas of the CSRs that they evaluate.
- The Criterion C Panel develops findings for each CSR that are based on individual comments and reflect the general agreement of the entire panel.
 - Comments that are *as expected* are not included as findings. Comments that are *above expectations* result in strengths. Comments that are *below expectations* result in weaknesses.



Definitions of Criterion C Findings

Major Strength: A facet of the response that is judged to be well above expectations and can substantially contribute to the ability to meet technical commitments on schedule and within cost.

Major Weakness: A deficiency or set of deficiencies taken together that are judged to substantially affect the ability to meet the proposed technical objectives within the proposed cost and schedule.

Minor Strength: A strength that is substantial enough to be worthy of note and brought to the attention of study team in debriefings.

Minor Weakness: A weakness that is substantial enough to be worthy of note and brought to the attention of study team in debriefings.

Note: Unlike in Step 1, minor findings can influence risk ratings. Notable minor findings are those minor findings that do influence risk ratings and are specifically identified in evaluation forms.



Cost Evaluation

- All information from the entire evaluation process will be considered in the final cost assessment.
- An independent cost verification of the proposed cost for Phases A-D will be performed using three independent cost models.
- The evaluation will assess the cost risk, cost realism, and cost completeness, including the basis of estimate, the adequacy of the approach, the methods and rationale used to develop the estimated cost, the discussion of cost risks, the allocation of cost reserves by phase, and the team's understanding of the scope of work.
- The likelihood and cost impact of significant weaknesses and cost analysis findings will be assessed.
- Cost threat impacts to the proposed unencumbered reserves will be assessed (see Cost Threat Matrix slide 45). The adequacy of the remaining unencumbered reserves will be assessed.
- Draft Forms C and Cost Evaluation Summaries (CESSs) will be completed on all CSRs prior to the Initial Form C Plenary.
- The entire panel will participate in Cost deliberations.
- All significant Cost Findings will be included on the Form C and considered in the TMC Risk Rating.



Cost Threat Matrix (CTM)

- The *likelihood* and *cost impact*, if any, of each weakness is stated as "This finding represents a cost threat assessed to have a Unlikely / Possible / Likely / Very Likely / Almost Certain likelihood of a Very Minimal / Minimal / Limited / Moderate / Significant / Very Significant cost impact being realized during development and / or operations, which results in a reduction from the proposed unencumbered reserves."
- The *likelihood* is the probability range that the *cost impact* will materialize.
- The *cost impact* is the current best estimate of the range of costs to mitigate the realized threat.
- The CTM below defines the adjectives used to describe the *likelihood* and *cost impact*.
- Cost threats that are less than 1% of the Cost Impact are ignored.
- The minimum cost threat threshold for Phase E is set at \$0.25M.
- Each percentage in the CTM is converted to dollars according to the associated PI-Managed Mission Cost, on a CSR-by-CSR basis.

			Cost Impact (CI) % of PI-Managed Mission Cost to complete Phases A/B/C/D, or % of Phase E cost, not including unencumbered cost reserves or contributions					
	Likelihood of Occurrence	Weakness	Very Minimal	Minimal	Limited	Moderate	Significant	Very Significant
			1% ≤ CI ≤ 2.5%	2.5% < CI ≤ 5%	5% < CI ≤ 10%	10% < CI ≤ 15%	15% < CI ≤ 20%	CI > 20%
Likelihood (L, %)	Almost Certain (L > 80%)							
	Very Likely (60% < L ≤ 80%)							
	Likely (40% < L ≤ 60%)							
	Possible (20% < L ≤ 40%)							
	Unlikely (L ≤ 20%)							



Cost Considerations

Evaluators must consider the three elements below and other relevant information (e.g., cost model applicability, uncertainty of the cost models error bars, effect of cost issues that fall below the minimum cost threat threshold, likelihood of cost impacts, mitigating factors such as major strengths, etc.) together with their judgement in determining the appropriate cost resources available for a particular investigation.

Three elements are considered for the determination of the cost resource availability for a proposed investigation; 1) The level of unencumbered reserves after any reduction by TMC identified cost threats; 2) The comparison of proposed cost with the TMC Base Independent Cost Estimate considering the appropriate error bars; and 3) The proposed cost, including reserves, supported by material in the CSR.

Appropriate Cost Reserves is defined as the minimum unencumbered reserves required by the Announcement of Opportunity (AO), or higher as judged by the TMC evaluation panel based on the justification provided by the PI (Principal Investigator). Unencumbered cost reserves higher than the minimum AO requirement may be necessary for some investigations, such as those requiring specific technology maturation.



Grade Definitions - Form D, Student Collaboration (SC)

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- The merit of any Student Collaboration (SC) will be given a Yes/No grade and one of two adjectives: Meritorious, or Not Meritorious
 - **Is the SC separable from the Baseline and Threshold missions?** (Yes/No)
 - **Meritorious:** The student collaboration proposed has achievable education goals and objectives and an implementation/oversight/management approach that will provide students with a rich hands-on education experience.
 - **Not Meritorious:** The student collaboration proposed has not articulated achievable education goals and objectives and/or the implementation/oversight/management approach limits the likelihood of success for student's opportunities for hands-on experience.



Grade Definitions - Form E, Small Business Subcontracting (SBC)

2018 Heliophysics
TechDemo and
Science MO CSR
Evaluation Plan

- The merit of the Small Business Subcontracting Plans will be rated as either Acceptable, or Needs Work
 - **Acceptable:** The subcontracting plan adequately addresses all required elements of a subcontracting plan, and the proposed subcontracting percentage goals and the quality level of the work to be performed by small business concerns is sufficient.
 - **Needs Work:** The subcontracting plan does not address all required elements of a subcontracting plan, or the proposed subcontracting percentage goals and quality of work to be performed by small businesses is not sufficient, and further participation must be negotiated if this mission is selected.



Criteria B & C Panel Evaluation Processes

- Evaluation panel members review assigned CSRs and perform an individual review before discussing findings with other members of the panel.
- The SOMA Remote Evaluation System (RES) will be used for:
 - Entering individual evaluation panel member's comments for Criteria B & C.
 - Developing draft and final Forms B & C for each CSR.
 - A repository for all final Forms for the evaluation (Forms B, C, D, and E).
- Only Form C Evaluators who have participated in the Form C Initial Plenary and the Form C Final Plenary may participate in polling on Form C. Note that several Form B evaluators will also be designated as Form C evaluators by the CSR Evaluation Chair.
 - Participation is defined as in person or via telecon.
 - ~~Specialist Evaluators* are not polled.~~ **[Amended August 13, 2020]**
- Only Form B Evaluators who have participated in the Form B Initial Plenary, and the Form B Final Plenary may participate in polling on Form B. Note that several Form C evaluators will also be designated as Form B evaluators by the CSR Evaluation Chair.
 - Participation is defined as in person or via telecon.

* Specialist Evaluators (to provide special technical expertise to Criterion B/C/D/E Panels) and External/Mail-In Evaluators (to provide special science/technology expertise to the Criterion B Panel) may be utilized, respectively, based on the specific technology and science that is proposed.



B & C Panel Evaluation Processes (continued)

- Consistency Review for Form C findings and Form B findings.
 - Form C consistency
 - A Form C Consistency Group will review all Form Cs and questions at the Initial Plenary, and all Form Cs at the Final Plenary.
 - Form C Evaluators will review all CSRs. Specialist Evaluators may review a subset of CSRs.
 - Form B consistency
 - Form B Consistency Checker(s) will review all Form Bs and questions at the Initial Plenary, and all Form Bs at the Final Plenary.
 - Form B and Form C consistency
 - At least one Form B Evaluator for each CSR will participate in the Form C discussions for each mission at the plenary meetings
 - Some Form C instrument experts will participate in Form B discussions.
 - Consistency of findings between Forms B and C will be reviewed and adjudicated at the Initial and Final Plenaries.



Initial Plenary

- The Initial Plenary is used to identify significant issues related to Criterion B and Criterion C based on the initial evaluation of the CSR. Initial Form Bs and Cs are reviewed.
- The Goal of the Initial Plenary is:
 1. Identify the Major Weakness, Minor Weaknesses, Major Strengths and Minor Strengths of each CSR.
 2. If necessary, develop questions and/or requests for information in addition to the Significant Weaknesses to give each study team an opportunity to clarify any misunderstanding.
- The main topic areas are the implementation issues in Criterion B and Criterion C.
- No polling on grades occurs at the Initial Plenary (Criterion B and Criterion C).
- The Significant Weaknesses, Questions, and Requests for Information List will be sent to each Study Team 6 days prior to its Site Visit.
- Criterion D (Student Collaboration) and Criterion E (Small Business Subcontracting) are reviewed as required by Criterion-specific panels prior to the Initial Plenary. Site Visit questions are prepared and provided no later than the Initial Plenary to the CSR Evaluation Chair.



Significant Weaknesses, Questions, and Requests for Information List (SQRL)

- Significant Weaknesses, Questions, and Requests for Information List (SQRL)
 - A SQRL developed at the Initial Plenary will be sent to each Study Team 6 days prior to its Site Visit.
 - The SQRL is preliminary and may change based on Site Visit information and further discussion by Evaluation Panels.
 - Questions may also be sent to the study team or verbalized during the Site Visit.
 - Questions must be of significance to a Form A, B, C, D, or E rating.
- The CSR Evaluation Chair will approve the SQRL developed at the Initial Plenary. Three types of responses to a SQRL are planned. These types may be combined for a given SW, Question, or RFI.
 - Written response prior to Site Visit: SWs, Questions, or RFIs provided to the Study team that must be addressed in writing prior to the Site Visit. The nature of some SWs, Questions, or RFIs require data that must be reviewed prior to the Site Visit.
 - Written response at Site Visit: SWs, Questions, or RFIs that require documentation, but not extensive review.
 - Oral presentation at Site Visit: SWs, Questions, or RFIs that must be addressed the day of the Site Visit by way of presentation.
- Evaluation Team members may ask questions during the Site Visit to ensure they understand the response to a SW, Question, or RFI, or to clarify any significant issues.



Site Visits

- **Virtual** Site Visits with Oral Briefings will be used to clarify implementation details and commitments. The Study Team may address weaknesses identified in the Concept Study, and provide updates on the Concept Study developed after ~~since~~ submission of the Concept Study Report. **[Amended August 13, 2020]**
- Any additional information provided to NASA by the investigation team at the Site Visit, in response to the NASA-identified weaknesses and questions, or in response to NASA requests for additional information, will be treated as updates and clarifications to the CSR.
- Site Visits ~~will be virtual locations~~ and dates are negotiated with the PI. **[Amended August 13, 2020]**
- Briefings at each Site Visit will be limited to **10 presentation 7 hours over 2 days**, with ~~1 additional hour for a site tour~~, 15 additional minutes for SC, ~~1 hour for lunch~~, and **multiple 15-minute breaks over the two days in the morning and afternoon**. Suggest a schedule of ~~8:30~~ **11 a.m. – 6:15:30 p.m. ET on the first day and 11 a.m. – 3:30 p.m. on the second day.** **[Amended August 13, 2020]**
- All Site Visit presentations/briefings should be in a plenary session with all Evaluation Team members attending – no splinter sessions – unless authorized by the CSR Evaluation Chair or TMC Panel Chair.
- A written Significant Weaknesses, Questions, and Requests for Information List (SQRL) will be submitted to the PI 6 days before the Site Visit. All teams will have the same lead time.
- As part of the Site Visit process, NASA may send additional SQRLs to Study Teams the day after their respective Site Visits, and possibly during the Final Plenaries, if necessary to resolve any issue or clear up potential misunderstandings. Responses will typically be due within 4 days for post-Site Visit SQRLs, and within 24 hours for the Final Plenary SQRLs.
- All information provided by the Study Team is relevant to the evaluation. Information contained in the CSR, information presented during the Site Visit; and information provided in response to SQRLs will all be considered during the evaluation.



Final Plenary Products

- Finalize all evaluation Forms based on the information in the CSRs, as well as updates and clarifications to the CSRs and clarifications.
- Both Major and Minor Strengths and Weakness will be considered in the Grade for all Forms.
 - Form B
 - Polling will be held twice on the Form B grade. The final polling is recorded and reported. For the final polling, the individual grades are recorded and the median grade is calculated and recorded as the final polling. A median score that falls between two grades will be reported as the combination of those two grades (e.g., 10 Good votes and 10 Fair votes = Good/Fair grade)
 - If there is a divergence of opinion, there may be additional rounds of discussion and polling.
 - Significant Weaknesses, Questions, and/or Requests for Information generated during the Final Plenary may result in additional rounds at or after the Final Plenary.
 - Form C
 - Form C will be reviewed three times. Polling will be held twice on the Form C risk rating. The final polling is recorded and reported. For the final polling, the individual grades are recorded, the median calculated and the final grade recorded which reflects the Form C risk rating of the median of the polling. A median score that falls between two risk ratings will be “rounded” to the higher risk rating.
 - If there is a divergence of opinion, there may be additional rounds of discussion and polling.
 - Significant Weaknesses, Questions, and/or RFIs generated during the Final Plenary may result in additional rounds at or after the Final Plenary.
 - Form D, Student Collaboration
 - Representatives from the SC Panel will consider the Merit of proposed Student Collaborations.
 - Form E, Small Business Subcontracting
 - LaRC Small Business Office will evaluate this factor.



Observers and Transition Briefing

- CSs, IPAs, and Contractors with downstream implementation responsibilities may attend panel meetings and Site Visits as Observers.
- All invited observers must be approved by both the SMD Program Officer and Deputy Associate Administrator for Research.
 - Observers must comply with SMD Policy Document SPD-17, *Statement of Policy on Observers at Panel Reviews of Proposals*. This policy will be provided to all approved observers.
- Approved Observers include (this list will be updated as Observers are approved):
 - The ~~above~~ **below** listed **individuals from Explorers and STP Program Offices and SMD Program Offices** are invited due to their positions in organizations which will oversee implementation of the down-selected mission(s). Their participation as Observers will provide early knowledge of any potential implementation challenges for the down-selected mission(s). **[Amended November 6, 2020]**
 - | <u>Position</u> | <u>Explorers Program Office:</u> | <u>Solar Terrestrial Probe Program Office:</u> |
|-----------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------|
| – Program Manager | Nick Chrissotimes | Nick Chrissotimes [Amended December 1, 2020] |
| – Deputy Program Manager | Gregory Frazier | Michael Delmont |
| – Business Manager | Christine Hinkle | Pietro Campanella Lourdes Wisniewski [Amended November 6, 2020] |
| – Deputy for Strategic Missions IMAP Budget Support | | Mark Goans Ben Shoster [Amended November 6, 2020] |
| – IMAP Mission Manager | | Andrew Peddie Gary Letchworth [Amended November 6, 2020] |
| – SMD Program Executive | | Alicia Mendoza-Hill [Amended November 6, 2020] |
| – SMD Program Executive | | Doug Lenhardt [Amended November 6, 2020] |
| – SMD Program Executive | | David Cheney [Amended November 6, 2020] |
| – SMD Program Scientist | Dr. Amy Winebarger [Amended December 1, 2020] | |
- After down-selection is announced, Transition Briefings will be provided by a subset of the Evaluation Team to CSs, IPAs, and Contractors in the Program Offices and at NASA HQ who have implementation responsibilities.