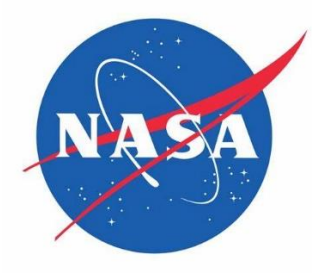

2024 HIGH RISK CORRECTIVE ACTION PLAN

In Response to NASA's Programmatic Performance and Designation on GAO's High Risk List

November 20, 2024

Purpose

This Corrective Action Plan (hereinafter referred to as the "Plan" or the "CAP") encompasses a collection of initiatives and areas of emphasis that the National Aeronautics and Space Administration (the "agency," or "NASA") commits to pursuing as it continues to mature the agency's acquisition management, program and project management, and related surveillance of contractors. The Plan is developed in support of the agency's steadfast commitment to good governance and effective stewardship of the resources entrusted to it. The Plan is prepared and pursued in recognition of the Government Accountability Office's (GAO) designation of NASA's Acquisition Management practices as *high risk* for waste, fraud, abuse, mismanagement, or otherwise needing transformation. The GAO High Risk report interprets acquisition management broadly, including program and project management concerns as well as strategy and decision-making around procurement.

Background

In 1990, GAO listed NASA's contract management on its inaugural High Risk List. In 2009, GAO broadened its high-risk designation of NASA's contract management to acquisition management to encompass the full scope of issues that needed to be resolved – including persistent cost growth and schedule delays, antiquated financial management systems, poor cost estimating, and contract management. During the 34-year span that GAO has identified NASA's contract or acquisition management as high-risk, NASA has invested a tremendous amount of effort to significantly advance its programmatic controls, analytical capabilities, contract management, acquisition strategies, reporting transparency, and cost and schedule performance. In direct response to its high-risk designation, NASA has implemented a series of CAPs (Appendix A) with specific initiatives that address GAO concerns, while also reinforcing NASA's role as a trusted, transparent steward of taxpayer dollars in advancing national priorities. The 2024 CAP represents the agency's ongoing dedication toward fostering a culture of continuous improvement.

Corrective Action Plan Overview

Approach

In January 2024, the NASA Associate Administrator (AA) directed the start of the process to update the High Risk CAP and delegated executive sponsorship of the CAP to the Chief Program Management Officer (CPMO) and the Chief Financial Officer (CFO). The CAP Working Group was reconstituted with new cross-agency membership at the staff/Chief level. The CAP Steering Committee was reconstituted with new cross-Headquarters (HQ) membership, including senior leadership at the Mission Directorate Deputy Associate Administrator level or equivalent. Working Group and Steering Committee membership can be found in the Appendix B of this document. The Steering Committee provided mid-course correction and executive guidance. The Working Group provided regular feedback to develop the initiatives and socialize the efforts within their communities and organizations. The Strategic Insights and Budget Division (SIB) in the Office of the Chief Financial Officer (OCFO) maintains ownership of CAP documentation, facilitates the update process, and serves as the integrator of information. During the update process, OCFO SIB and CPMO engaged with GAO personnel periodically to ensure stakeholder feedback was considered.

Ownership and Responsibilities

The NASA AA assumes ownership of the CAP and delegates process ownership to the CPMO. OCFO SIB is responsible for maintaining CAP documentation, tracking and reporting progress against the CAP on an annual basis, and conducting any process updates for subsequent iterations to the CAP. Lead Executives or Lead Organizations as described within the CAP are responsible for executing the initiatives as written, and reporting progress to either OCFO SIB or other specific forums as described. The Supporting Organizations, where listed, will aid the identified Lead Executives or Organizations in execution of the initiatives as necessary.

Initiatives

The CAP is comprised of a set of initiatives approved by the Agency Program Management Council (APMC) to provide value for agency acquisition management improvements. The initiatives are categorized by the following actionable characteristics:

- *Implement*: Initiatives that NASA has determined should proceed and become part of regular agency business cadence. Any actions taken to support execution of the described initiatives will follow all established agency control and oversight boards, as applicable, to prevent unintended consequences.
- *Pilot*: Initiatives that NASA has determined are likely to provide value in agency acquisition management but will be implemented on a trial basis until the agency assesses and reaffirms continued implementation.
- *Research*: Initiatives that are less conceptually mature but may generate value for agency acquisition management and thus warrant exploration and development.

Each initiative in the CAP includes the following sections:

- *Lead Executive/Organization(s)*: The individual or office responsible for leading the initiative as described, and periodically reporting progress to OCFO SIB for internal and external communications and for coordination purposes.
- *Supporting Organization(s)*: The organization(s) required to support the Lead Executive/Organization(s) in their execution of the initiative. While the organizations listed are necessary and required to support the initiative, the lists are not necessarily exhaustive, as the Lead Executive/Organization may call on other Organizations for support.
- *Initiative Description*: A brief high-level summary of the initiative.
- *Background/Current State*: A description of the status quo and, as necessary, an overview of relevant background information and any policies, procedures, constraints, or other areas influencing the status quo.
- *Expected Benefits*: A review of the expected improvements from the initiative. The timeline for improvements varies across initiatives, but most often benefits are long-term and difficult to identify causation to improved programmatic performance.
- *Recent Accomplishments*: Where applicable, a review of recent progress and accomplishments regarding the described initiative. Some initiatives already have momentum, which will be reflected here. Others, such as research or pilot initiatives, may not have content for this section.
- *Planned Next Steps*: A high-level description of the planned progress for the initiative to occur over a period ranging up to two years.
- *Output and Outcome Metrics*: Where applicable, a list of appropriate methods of measurement to track progress and effectiveness of the initiative.
- *Interdependencies*: Where applicable, a description of key dependencies that necessitate coordination or cognizance in support of initiative success.
- *Impediments and Challenges*: A brief description of possible pitfalls, risks, impediments, and challenges that can be reasonably expected to occur during execution of the initiative.
- *Required Resources*: A preliminary assessment of possible resource requirements for successful execution of the initiative. This does not represent committed resources and does not reflect a refined estimate of resources. Any funds required to execute the initiatives will proceed through the regular budget formulation processes for agency approval.

Areas of Emphasis

NASA will emphasize adherence to current policies and practices, encourage improvements that better position the agency to manage cost and schedule performance, and capture efforts related to acquisition management improvement conducted outside the CAP process. In contrast to the initiatives in the CAP, Areas of Emphasis capture interrelated yet discrete activities that together constitute a demonstrated effort to improve the agency's posture in a particular focus area. These activities include those recently implemented as well as an acknowledgement of planned future work. Areas of Emphasis are primarily differentiated from initiatives in that they are ongoing efforts that do not lend themselves to the structure of a CAP initiative but are nevertheless critical to improving the agency's acquisition management performance.

Severability

The initiatives contained herein are interrelated with respect to their connection to improving agency acquisition management but are not mutually dependent on one another for execution purposes unless otherwise identified. As such, if the agency should determine that any individual initiative be removed from the CAP for any reason, the Plan and remaining initiatives will remain in effect.

Progress Tracking and Reporting

Each initiative in the CAP includes planned next steps and metrics, where applicable. The Lead Organization(s) cited in the CAP will pursue actions as described. Initiatives may identify specific forums for reporting progress or deliverables (e.g., APMC or Baseline Performance Review [BPR]). OCFO SIB will conduct a semiannual checkpoint to measure CAP progress and provide a status update to the CPMO and Deputy CFO for SIB. OCFO SIB will also share and discuss progress with GAO annually, at a minimum, and more often when applicable. Moreover, OCFO SIB will continue to engage in a dialogue with GAO about the production of a semi-annual High Risk Metrics Report, which historically shared aggregate cost and schedule performance metrics, status updates on CAP initiatives, aggregate trending data, and other related high-risk metrics.

Corrective Action Plan Update Schedule

The AA will determine whether a CAP is warranted on a biannual basis following a review of the agency's program and project performance, available resources, and NASA's continued presence on the GAO High Risk List. The AA may also revise the CAP at any time. The update process by which initiatives and/or areas of emphasis are added, revised, or resolved will occur in the approximate period of January to August of even-numbered years, and supports the GAO's timeline for preparation of the biennial publication of the High Risk Report generally at the beginning of a new Congress.

Areas of Emphasis

NASA continues to take seriously its commitment to driving improvements to the areas of acquisition management and program management. The initiatives described in the 2024 CAP are those that NASA has determined should be implemented to become part of the regular agency business cadence; those that show promise to provide value related to acquisition management and implemented as a pilot; and those that are less conceptually mature but warrant researching for potential follow-on activity. Beyond the future work described in the CAP initiatives, NASA has continued to make progress toward improved acquisition and program management outside of the CAP structure. Demonstrations of progress related to acquisition and program management not suited for the CAP Initiative format are described below as Areas of Emphasis.

Acquisition Management

Acquisition Management is a continuous area of emphasis for NASA. This was recently demonstrated by the release of the second agency Chief Acquisition Officer (CAO) intent memorandum in June 2024. The memorandum highlights acquisition opportunities and challenges NASA faces in delivering inspiring missions while communicating progress toward strengthening acquisition. It lays out the NASA CAO's acquisition priorities that were put to the AA, NASA Officials-in-Charge (OIC), and leaders to ensure resource and workforce alignment. Highlights from the CAO memorandum related to Acquisition Management:

- *Continued Acquisition Innovation and Rigor*. The Office of Procurement (OP) established an Enterprise Service and Analysis Division, consisting of two offices, to specifically advise and support the NASA Acquisition Innovation Launchpad (NAIL), which is under the Procurement Strategic Operations Division, as well as the agency overall:
    - The E-Business System Office enhances agency-wide capabilities in e-business systems and data-driven decision-making, providing real-time access to authoritative data through interactive dashboards.
    - The Enterprise Pricing Office serves as a center of excellence for pricing, streamlining contract closeout and cost/pricing policies across NASA, and offers innovative solutions to ensure fair prices throughout the enterprise.
    - NAIL promotes procurement innovation through a design-thinking framework, encouraging stakeholders to develop and implement creative procurement solutions.

- *Improving the Quality and Utility of Acquisition Data*. Emphasize the importance of gathering reliable and consistent data on cost and schedule performance to better inform future acquisition activities. One such example of this effort can be found in the CAP's Firm Fixed Price Data Analysis Initiative.

- *Risk Management*. The June 2024 CAO memorandum highlights many aspects included in the 2024 CAP Initiative to Strengthen Realism in Early Formulation. In addition to the initiative content, the memorandum highlights additional risk management efforts:
    - Strengthening Risk Oversight of our Acquisitions. The Assistant Administrator for Procurement/Deputy CAO, CPMO, and ARMO will work in concert with the Office of the Executive Secretariat (OES) to strengthen our existing governance councils and policies. This includes setting clear expectations for acquisition strategy meetings that risk-informed data and evidence be utilized to support recommendations. Decisional outcomes will be documented and tracked, aligning objectives and associated risk postures prior to execution of acquisition activity and development of the procurement strategy.

Program Management

NASA leaders believe that strong program management is essential for the success of all NASA missions. Since its establishment in early 2022, the CPMO has collaborated with key stakeholders, both within and outside the agency, to effect measurable improvement in program and project performance. Situated within the Office of the Administrator and reporting to the NASA AA, the CPMO team has demonstrated excellent progress in developing the program and project management (PM) community, maintaining PM policy, tailoring policy to align with acquisition approaches and risk posture, and underscoring the importance of applying lessons learned and best practices. Specific examples of CPMO accomplishments include:

- Expanded the membership of and routinely convened the Program and Project Management Board, including the reestablishment of recurring face-to-face sessions, to ensure broad perspective and awareness of PM-related topics and to bring to bear an agency perspective on PM-related challenges.
- Hosted the annual agency-wide PM symposium for two consecutive years to build community and knowledge, bringing together hundreds of individuals in the PM community dispersed across the NASA Centers.
- Collaboratively tailored PM policy for programs and major projects, such as the Commercial Low Earth Orbit Destinations program, Demonstration Rocket for Agile Cislunar Operations Nuclear Thermal Rocket Engine, X-66 Sustainable Flight Demonstrator, Lunar Terrain Vehicle, and Mars Sample Return, among others.
- Implemented administrative updates to NASA Procedural Requirements (NPR) 7120.5 and 7120.8 and supported MDs in applying NASA leadership direction for renewed expectations supporting pre-formulation activity and commercial-oriented acquisition approaches.
- Enabled more focused discussion on strengths and weaknesses of independent assessment (IA) processes implemented by the MDs through newly established community forums such as the Independent Assessment Roundtable and MD Independent Assessment Forum, and guided development of plans to implement tangible advancements as described in the associated initiative in the 2024 High Risk CAP.

CPMO is in the process of establishing a new PM community platform, the NASA PM Network, where program and project managers, aspiring program and project managers, and those who partner and support program and project managers can freely connect, communicate, and collaborate. The PM Network will include a PM mentorship program to aid in knowledge transfer, a catalog of PM discipline research and analysis to capture thought leadership, a PM community map to enable stronger connection across organizational boundaries, and more.

Risk Management

Efforts are underway to strengthen objectives-driven risk management and risk leadership. The Agency Risk Management Officer (ARMO) is working in concert with MDs, Centers, and Offices to increase awareness, understanding, and consideration of risks to their key objectives to support risk-informed decision-making in all phases of the project life cycle. Emphasis on risk-informed commitments made at Key Decision Points and a focus on the risk management community of practice.

NASA 2040

In 2023, NASA launched the NASA 2040 strategic initiative to anticipate the workforce, infrastructure and technology capabilities necessary to meet the mission requirements of tomorrow. NASA 2040 has issued one decision related to Program Management, which coincides with the 2024 CAP issuance. All Category 1 program managers now report directly to a senior leader in a MD instead of the NASA center. The anticipated benefit of the decision is for program managers to have a clear and direct line of authority aligned with the program funding. Potential future decisions could flow out of the 2024 seven workstreams of mission, structure, budget, people, infrastructure, technology, and process as the NASA 2040 initiative continues.

Integrated Baseline Reviews

In 2024, NASA OCFO identified the timeliness and rigor of Integrated Baseline Reviews (IBRs) as a focus area for the agency Earned Value Management (EVM) team as part of the broader CFO priority of reinforcing acquisition rigor and financial controls. OCFO is increasing its focus on adherence to existing regulations and requirements, tracking IBRs, increased training, and proper execution of IBRs.

Program Management Tools

A team led by the OCFO Data Analytics Functional Champion is working to strengthen the data analytics and program management capabilities by optimizing business processes and increasing accuracy, efficiency, and effectiveness, while aligning with NASA's data strategy. The team actively collaborates across the agency to leverage capabilities within standard software tools (e.g., Microsoft Power BI), as well as develop and implement applications data repositories to streamline project management performance monitoring and assessments. These tools, which include NASA Form 533 (NF 533), Business Objects reports, risk databases, and Integrated Master Schedules (IMS), have become increasingly scalable, deployable, and integrated into existing project reporting processes. Combining automation of performance dashboards with effective user and developer training will equip NASA with data analytics skills and tools that streamline and transform business processes with higher accuracy, efficiency, effectiveness, and an enhanced level of analytical rigor.

Examples of the tools being developed and deployed include Smart Project and Reviews with Transformative Analytics (SPARTA), Monthly Schedule Analysis Quick Look, Schedule Architecture Universal Registry Of NASA, the NASA Schedule Analysis Tool (NSAT), and the Schedule Database, which is a CAP initiative. These tools have been developed either in-house or in close collaboration with a support contractor, allowing NASA to create scalable solutions with minimal investment.

NASA will conduct a research pilot and data collection initiative within the broader cost and schedule analysis community. This effort aims to identify best practices with the intent to standardize methodologies and enhance the tools and processes analysts currently use. The anticipated benefits of this research pilot include:

- A consistent understanding of NASA's digital project management performance and assessment capabilities, leading to tools that offer streamlined analysis and reduced time and effort in delivering consistent project management status and assessment information.

- Insights that will inform and train NASA project management and Program Planning and Control (PP&C) professionals on best practices, reducing analysis rework, increasing confidence in analysis, and accelerating data-informed decision-making.
- Comprehensive programmatic dashboards will provide a holistic view of project performance as part of each toolset, enabling better decision-making.
- Improved project outcomes based on accurate and timely project performance data, such as schedule assessment tools for proactive schedule management, dashboards for business meetings offering clear and actionable insights, and funds distribution tools for effective resource management.

In addition to agency PM effort, there are ongoing and future program management efforts happening at the MD level. Examples include, but are not limited to, the following:

Science Mission Directorate (SMD)

- *SMD Program Management Council (PMC) Oversight* – Increasing the rigor of program/project readiness assessments for PMC milestones via thorough pre-briefs that are structured to ensure the appropriate evidence is presented for the evaluation of programs and projects to enable mission success.
- *SMD Flight Program/Project Management Governance Forums* – Enhancing SMD communications among the flight program/project community to encourage/promote knowledge sharing, ensure knowledge transfer, increase awareness of policy updates, and communicate SMD's expectations for flight program/project performance and governance.

Space Operations Mission Directorate (SOMD)

- *Formulation Guidance* – Establishing a SOMD Program/project formulation guide for project managers, members of program/project formulation teams to be able to gain a better understanding of the processes, procedures, and best practices entailed in the establishment of a new program or project. The guide is intended to be a starting point for program and project formulation, leveraging NPR 7120.5F, internal MD governance forums and other agency program management and acquisition best practices.
- *Readiness to Proceed Activities* – Developing pre-briefs as a standard practice to assess readiness for PMC milestones.
- *Agency Best Practices* – Collaborating with CPMO, Office of the Chief Engineer (OCE), and other stakeholders to establish repeatable highly-tailored lifecycle and acquisition strategy approaches for commercial services-based programs and projects, while still implementing agency best practices in PM and acquisition. Examples in formulation include the Commercial Low Earth Orbit Destinations Program and Communication Services Project which are implementing a highly-tailored lifecycle strategy approach to meet the unique technical, cost and schedule requirements.

Aeronautics Research Mission Directorate (ARMD)

- *Directorate Program Management Council (DPMC) Oversight* – ARMD utilizes the DPMC to develop, mature, and monitor research projects. Separate guides for project managers have been developed to distinguish the planning, execution, and oversight process for NPR 7120.5 governed flight projects versus ground-based research and development projects within ARMD. Additional rigor and oversight are applied to high-profile flight projects such the Sustainable Flight Demonstrator (SFD),

the Electrified Powertrain Flight Demonstrator (EPFD), and the Low-Boom Flight Demonstrator (LBFD).

- *Integrated Program Management Council (IPMC) Oversight* – ARMD has established the IPMC to collaborate with Aeronautics Research Centers on the oversight and execution of high-profile flight projects throughout their life cycles. Every month, the SFD, EPFD, and LBFD projects are reviewed by Center Directors and Program Directors to establish execution status and plans. Each project uses the same format each month to review pertinent data on technical, schedule, cost, acquisition and risk postures and plans.

Space Technology Mission Directorate (STMD)

- *Directorate Oversight* – STMD DPMC meetings are held throughout the year, as needed. In addition, STMD conducts monthly Program Reviews on project performance (including project status(es), risks, successes, concerns, etc.), overseen by the STMD Deputy Associate Administrator for Programs (DAAP). In fiscal year (FY) 2024, STMD implemented an integrated risk management board to ensure appropriate elevation of risks from programs/projects to the MD level. The MD DAAP chairs this board, with stakeholders from throughout STMD leadership (e.g., STMD Chief Architect, Program Directors, Chief Engineers, etc.). STMD will continue its integrated risk board moving forward and will identify additional opportunities to integrate the resultant risk data into its other programmatic functions, as well as its directorate-wide governance.
- *Directorate Reorganization* – STMD is currently studying a potential realignment from Technology Readiness Level to a Domain-based capability model. This effort will likely take most of FY 2025 and may ultimately drive reviews and updates to STMD's portfolio plan, governance, and roles and responsibilities.

Probabilistic Programmatic Policy

NASA continues to emphasize probabilistic programmatic analysis throughout a project's lifecycle. This approach, anchored by the Joint Cost and Schedule Confidence Level (JCL) metric, provides valuable insights into a project's programmatic risk posture relative to the Agency Baseline Commitment (ABC). The ABC serves as the benchmark for measuring agency performance during project implementation.

In recent years, NASA has seen an increase in the utilization of firm-fixed-price (FFP) contracts. While the JCL process is well-established for projects with traditional cost-type contracts, ongoing evaluations to integrate FFP contracts into the JCL framework are underway. This evaluation process will encompass the following considerations:

- An assessment of the FFP contractor's risk profile, including past performance in meeting technical and schedule milestones;
- Modeling of potential technical and schedule delays that could impact non-FFP portions of the project; and
- Analysis of multiple FFP providers development timelines in parallel for achieving a common mission milestone.

Complementing the use of JCL, Schedule Risk Analysis (SRA) is emerging as a critical tool for estimating the likelihood of meeting schedule commitments with project partners such as the European Space Agency and

the National Oceanic and Atmospheric Administration. SRAs will play a vital role in future partnership endeavors for assessing adherence to scheduled timelines.

Recognizing the inherent nature of probabilistic analysis as a snapshot in time, NASA continues to encourage the use of this approach beyond designated Key Decision Points. This broader application, when resources and information permit, can enhance project and program manager understanding of their mission.

Moon to Mars Program

Deep Space exploration is an inherently risky endeavor, and NASA projects involve cutting-edge technology and scientific research, which can be complex and challenging to execute. Space missions in low Earth orbit and especially those missions in deep space have long development cycles, spanning several years or even decades. The Artemis Campaign—a foundation for deep space exploration—is unique from other NASA activities given its guiding principle of flexible architecture, which enables NASA to adapt to changing requirements, leverage partnerships, and achieve sustainable and cost-effective human exploration of the Moon and beyond.

The Exploration Systems Development Mission Directorate (ESDMD) is committed to the safety of astronauts, personnel, and equipment as its highest priority, as well as ensuring transparency in the execution of its missions. In 2023, responding to congressional direction, the ESDMD reorganized and established the Moon to Mars (M2M) Program. The M2M Program oversees the agency's efforts to return humans to the Moon and eventually send astronauts to Mars. Within ESDMD, the M2M Program serves as the primary executing organization responsible for end-to-end mission integration, utilization integration, requirements development, hardware production, systems integration, and risk management. The M2M Program plans, develops, and defines mission objectives and requirements. This involves identifying and prioritizing scientific and exploration goals, as well as determining the necessary technical capabilities and resources needed for mission success.

While the 2020 NASA CAP initiative relating to increased transparency of cost and schedule for long term plans for human exploration will be closed in this 2024 CAP since ESDMD/M2M presented multiple baseline commitments[1] to the APMC and were approved to progress into the development phases through the lifecycle review process. The M2M Program *area of emphasis* signifies an ongoing effort to ensure transparent communication regarding project cost, risk, and schedule by offering context to stakeholders through timely updates covering mission status, cost details, and any noteworthy developments impacting risk, facilitating easy comprehension and accessibility for a wide audience. As part of such an enduring commitment, this *area of emphasis* includes an overview of the M2M Program structure and supporting elements that make the Artemis Campaign possible.

In addition to the creation of the M2M Program, the ESDMD established the Strategy and Architecture Office (SAO). One of the primary products of the SAO is the Architecture Definition Document (ADD), which comprehensively outlines the methodology, organization, and decomposition needed to translate the broad objectives outlined in NASA's M2M exploration strategy into implementable programs and projects. Emphasized in this process is the communication of long-term vision, maintenance of traceability to responsible parties, and iterative refinement of the architectural implementation as innovations and solutions emerge. First issued in 2022, the ADD was most recently published in March 2024 and will be updated in

[1] Presented ABCs include: (1) Gateway Initial Capability; (2) Space Launch Systems- Exploration Upper Stage/Block 1B (KDP-C); (3) Human Lander Systems Initial Capability; (4) Exploration Ground Systems Mobile Launcher 2; and (5) the Extravehicular Activity and Mobility Program Extravehicular Activity

coordination with the annual Architecture Concept Review (ACR) led by the SAO. The ACR serves to foster unity within the agency and gather input and buy-in from stakeholders across the organization regarding the human exploration architecture. Its annual frequency allows for the continuous integration of new technologies and partnerships, whether from industry, the U.S. Government, international bodies, or academia.

The M2M Program conducts activities—including executing missions—to accomplish the architecture set out by the SAO to achieve the agency's exploration objectives. Through coordination with the SAO, capabilities derived from the architecture transition from pre-formulation to the M2M Program for formulation and implementation. The M2M Program also partners with other NASA entities (e.g., programs, divisions, offices, centers, etc.) to develop enabling capabilities needed for space exploration. This includes the Flight Operations Directorate (FOD), Payload Mission Operations Division, SMD, STMD, and SOMD, which includes Space Communications and Navigation. M2M Program has support from the FOD/flight crew and the Agency Technical Authorities (Engineering, Safety and Mission Assurance, Health and Medical).

The Deputy Associate Administrator (DAA) for the M2M Program is responsible for both the technical and programmatic performance of its constituent Programs, as well as the necessary integration functions between the Programs in its portfolio. The chain of authority to and from the M2M DAA and the M2M Program is defined as follows:

> *The ESDMD AA has delegated program authority to the DAA for M2M. Program direction flows from the ESDMD AA to the M2M DAA, then to the M2M Program, Orion, Space Launch Systems (SLS), Exploration Ground Systems (EGS), Gateway, Human Landing Systems (HLS), Extravehicular Activity and Human Surface Mobility Program Managers including the Mars Campaign Office. The M2M DAA retains authority for Artemis mission requirements, the total M2M Program budget, the M2M campaign manifest, and developmental and mission risk acceptance. The M2M Program governance model, including roles and responsibilities, documented in the M2M Implementation Plan Baseline, M2M-30001, finalized in May 2024.*

The M2M Program is also responsible for coordinating various aspects of program management. This includes managing schedules and budgets, handling risks, evaluating performance, and overseeing processes. Additionally, it manages resources by integrating Planning, Programming, Budgeting, and Execution (PPBE) processes and overseeing ABCs for M2M Programs.

A range of management and reporting tools are also leveraged to ensure transparency and accountability and the associated risks to the established baseline commitments are well understood. These tools include project-level cost and schedule JCL-informed development commitments (including for major developmental upgrades), independent review at major life cycle reviews (LCRs) and associated key decision points, documented and configuration-controlled mission definition baselines, by-mission schedule risk assessments, life cycle cost estimates in Phase E, five-year rolling estimates consistent with guidance provided in NPR 7120.5F, annual budget requests, agency-led baseline performance reviews, independent reviews by the NASA Advisory Council and Aerospace Safety Advisory Panel, and ongoing audits from the various governmental oversight entities.

In addition, the M2M Program board structure allows for effective coordination, communication, and decision-making across different levels and stakeholders within the M2M Program. It ensures that decisions are made with consideration for both individual program requirements and the overarching goals of the M2M mission. The primary boards are as follows:

> *Integration Control Boards*: Focus on integration issues across different components or subsystems, involving relevant stakeholders to ensure seamless integration.

Program Control Boards: Manage the baseline of the program itself, focusing on technical, schedule, cost, and risk management within the program's scope.

Program Boards (Augmented): Manage the cross-program baseline, involving affected Programs, advisory members from the M2M Program, and Technical Authorities (TAs). This indicates a collaborative approach to decision-making across various programs under the M2M initiative.

M2M Control Board (M2MCB): Manages the baseline of the Moon to Mars initiative, overseeing high-level M2M strategic and implementation decisions and ensuring alignment with the overall mission objectives.

Lastly, the M2M Program allocates significant resources to support agency and external stakeholder inquires and audits. The M2M Program leverages insight gained from such interactions to enhance its own practices and improve overall performance.

Initiatives

[Implement] Schedule Database Capability (Modify)

Lead Executives/Organizations

The Strategic Insights and Budget (SIB) office, under the Office of the Chief Financial Officer (OCFO), has a responsibility to progress the agency's programmatic capabilities, including the Program Planning and Control (PP&C) function of Schedule Management.

Supporting Organizations

Supporting organizations include NASA's Mission Directorates (MDs), Centers, Programs and Projects, as well as the OCFO Data Analytics Functional Champion Team.

Initiative Description

The Schedule Database will enhance the goals of the Schedule Repository 2018 CAP initiative that was completed as part of the 2022 CAP. The initiative will provide a platform to facilitate the collection of schedule information into one database with consistent formats for analysis and reporting of schedule metrics for both current and historical Programs and projects.

Background/Current State

Prior to 2019, schedule data was generally not collected at the agency, MD, or Center level on a routine basis. For example, schedule information collected through alternative platforms like Cost Analysis Data Requirements (CADRe) is collected at the mission-level and includes integrated master schedules (IMSs) at Life Cycle Reviews (LCRs). Thus, there was no centralized repository of detailed Program/project (P/p) schedule information from which other P/p's could draw analogous data for schedule planning, development, and analysis.

Following the completion of the Schedule Repository initiative—which created a centralized library of schedules—the Schedule Database initiative aims to transform data collected through the Schedule Repository effort into actionable schedule information. While the initiative was only partially funded as part of the 2020 and 2022 CAPs and the effort experienced several obstacles due to both funding and technology constraints, some progress was achieved. Currently, the proof-of-concept Schedule Database capability can translate schedule data into metrics and dashboards on sample project schedule files with the added capacity to curate information by a variety of filters for a wide range of use cases. However, the Schedule Database architecture needs further development to support the anticipated capabilities and associated user base. Fortunately, the agency's acquisition of various information technology (IT) platforms and capabilities has expanded recently (i.e., Microsoft [MS] Office 365, MS Teams, Power BI Pro/Premium, Project Web App, etc.). The increased availability of such IT platforms combined with Center engagement and in-kind labor from other interdependent efforts across the agency will support the potential for full implementation of a Schedule Database capability using a model-based approach, without the need for supplementary funding.

Expected Benefits of Implementation

The Schedule Database could ultimately serve as an agency-wide tool to help increase the capacity, capability, and efficacy of NASA's Schedule Management function, including schedule planning, development, and

assessment efforts, as well as progress tracking and performance reporting. It is anticipated that the Schedule Database will be capable of providing the following future benefits:

- A centralized location for the collection and secured accessibility of NASA project schedules. The Schedule Database could serve as the storehouse of schedule data in union with the Schedule Repository requirement, minimizing the manual effort to collect, store, and maintain the system and users. Once a P/p is complete (i.e., delivered or launched), schedule information (IMSs and data/metrics) would be more broadly accessible across NASA. As such, the Schedule Management community would have secured access to historical schedules and data analytics to aid in the planning and development of schedules for future projects. Schedulers would be able to research analogous projects, utilizing the historical data to produce more realistic schedule estimates and preliminary schedules.
- An analytical capability for in-depth investigation of multiple schedules at individual project and portfolio levels. The database capability would allow users to simultaneously analyze and report on multiple schedules using important/relevant metrics at all levels of an organizational hierarchy. This includes multiple schedule iterations representing different time periods for an individual project or project components for individual project analysis, or multiple schedules representing a portfolio of projects for cross-cutting analysis. Thus, schedule analysts would be able to execute analyses in a more efficient manner consistent with both the organizational and the schedule file granularity, which would aid in all levels of management and decision-making.
- A roadmap for the continuous improvement of Schedule Management best practices. The Schedule Database would provide the ability to accumulate general statistics on schedules across projects and at all levels of a hierarchy (e.g., MD, Center, Program etc.). This schedule information would allow for assessments of the agency's definitions of and adherence to best practices, which would help shape future policy (i.e., requirements) and guidance (e.g., handbooks, training, etc.).
- A catalyst for organizational change related to data sharing. Through the deliberate use of recently acquired IT capabilities, the Schedule Database may promote changes in the way projects operate. For example, the Schedule Database would curate data in new ways that allow project managers or other stakeholders to request schedule data or visualizations that are different from what was previously available. In addition, the Schedule Database would foster communication by making it easier to share schedule data and information across organizations and communities that leverage the data for purposes other than project management, such as additional research to inform future best practices.

Planned Next Steps

OCFO SIB will pursue implementation of the Schedule Database initiative making maximum use of agency-available resources, including IT infrastructure and workforce. This will include efforts to:

- Coordinate on use-case needs, IT requirements, and potential implementation solutions, with supporting organizations: 1) MDs, 2) Centers, 3) Programs/projects/PP&C subject matter experts, 4) the OCFO Data Analytics Functional Champion Team, and 3) the Digital PM Initiative Team.
- Continue development of current Schedule Database capabilities utilizing in-house resources.
- Initiate and facilitate synergies with other Centers/organizations/functions across the agency to allow for specific use-cases employing the Schedule Database as the platform for the development of integrated, model-of-models capabilities.

Output and Outcome Metrics

Metrics include:

- Adoption of the Schedule Database capabilities for enhanced and/or streamlined HQ/MD/Center/P/p-level reporting.
- Identified future and/or established dependencies on the Schedule Database platform by other organizations' systems, models-of-models, etc. (See *Interdependencies*). Additional use cases might include agency/MD/Center-led initiatives, IA teams, etc.

Interdependencies

There are several different efforts currently in development at the agency, which create *potential* interdependencies:

- Smart Projects And Reviews with Transformative Analytics (SPARTA) – Initiative to pilot a model-based P/p analysis that can automate the deliverables for Monthly Status Reviews, LCRs, etc. Provides an opportunity for SPARTA to establish a dependency of the Schedule Database for schedule information to support their automated review process.
- Digital Transformation/Enterprise Data Platform (DT/EDP) – Initiative to build an agency-wide analytic platform for any type of mission critical data (e.g., technical, programmatic, etc.). Provides an opportunity for the Schedule Database to be both a publisher and a subscriber to DT/EDP's master datasets.
- Organization-Specific Use Cases (MD, Center, P/p, etc.) – Schedule Database can be customized and rapidly adapted to a growing array of organizations with scope focused on the individual organization. Provides an opportunity for different organizations to perform more detailed analysis that is specific to the organization's particular domain.

Impediments and Challenges

The current Schedule Database architecture was built using contractor-provided software, which provided the analytic model and dashboards of the Schedule Database. In order to reduce costs, the Schedule Database initiative team, in coordination with Supporting Organizations, will work towards streamlining the analytic model and dashboards to develop an application that will operate independently from the previously utilized contractor-provided software.

Access to the Schedule Database application may require users to adopt new/alternate MS Project licenses available through Enterprise Service Desk at additional (but low) monthly costs to the users' parent organizations (See Required Resources).

The Schedule Database effort may drive organizational change per the necessary adoption of new/revised best practices and software that will facilitate both basic and enhanced capabilities. For instance, the intake processing of schedule files for database consumption is not a one-size-fits-all approach. This effort may require in-kind labor.

Defining user roles and security filters for all potential use-cases will require a phased approach (e.g., Center-by-Center, MD/P/p-by-MD/P/p, etc.). The Schedule Database team will work with the Supporting Organizations to determine a core set of use cases and associated permissions, for example:

- For all completed (launched/delivered) P/ps, and per the Schedule Repository requirement, it is assumed that all schedule data/files will be made accessible to all users (with appropriate NASA permissions).
- For all in-progress P/ps, rules will need to be defined for specific use cases associated with certain levels of schedule detail.

Required Resources

Due to the availability of in-kind labor across several supporting organizations/teams, there are no identified resources required to be funded by the Lead Executives/Organization of this CAP initiative. Additional software, which are agency-managed subscription services, may be required for specific users of the Schedule Database capability to access the platform. The software would be paid for by the users' respective organizations.

GAO High Risk Criteria:

Leadership Commitment, Capacity, Action Plan, Monitoring, Demonstrated Progress

[Implement] Schedule Capability (Modify)

Lead Executives/Organizations

SIB, under OCFO, along with the Office of the Chief Human Capital Officer (OCHCO) will jointly progress the agency's programmatic capabilities, including the PP&C function of Schedule Management

Supporting Organizations

MDs, Centers, Programs, and Projects

Initiative Description

NASA will continue to emphasize the enhancement of the schedule capability across the agency to improve PP&C processes. At a minimum, this includes "right-sizing" the Schedule Management function to enhance the civil servant component for both in-line work and assessment reach-back capacities related inherently governmental work, such as:

- Center-led and agency-led independent assessments (e.g., Source Evaluation Boards [SEBs], Standing Review Boards [SRBs], Independent Review Teams/Boards [IRTs/IRBs], Performance Evaluation Boards [PEBs], etc.);
- Center proposal developments;
- Technical Monitors on contracts – including the development of schedule requirements for Statements of Work (SOWs) and oversight of schedule-related contract deliverables;
- Center Schedule Management function subject matter expertise reach-back and stewardship – including helping to establish, grow, and maintain competencies in Scheduling and Schedule Assessment (e.g., developing policies/guidance, approaches, tools, knowledge/skills), including the development of formalized training consistent with NASA-specific best practices;
- Center representation in broader PP&C communities;
- Center insight/oversight to guide and collaborate with contractor scheduling workforce to influence quality of schedules and adherence to NASA best practices and lessons learned; and
- Oversight of scheduler staff assignments and ensuring Schedule Management activities are supported (e.g., Schedule Repository, Work Breakdown Structure [WBS] planning, schedule development, schedule assessment/analysis, training, etc.).

The initiative may also promote additional changes, such as solidifying the career path development framework related to the Schedule Management function, as well as the standardization of toolsets and templates for scheduling, schedule assessments, performance trending, analysis (parametric models, SRAs, and JCLs), and reporting.

Background/Current State

In 2020, the PP&C Steering Group identified an action to determine if NASA's Schedule Management capability is sufficiently staffed. Findings from the research effort concluded that PP&C functions need subject matter experts (SMEs) with core skillsets in PP&C disciplines for implementation, review, and advocacy of the discipline. Specifically, findings highlighted that while the bulk of in-line Schedule Management work consists of scheduling and can almost always be appropriately staffed by Work Year

Equivalent (WYE) workforce (i.e., contractor support), a portion of the in-line work and the majority of the assessment work is inherently governmental and therefore more appropriately staffed by Full Time Equivalents (FTEs), (i.e., civil servants). In general, inherently governmental roles and responsibilities within the Schedule Management function include oversight of the capability's implementation at the home Center and helping to staff Center- and agency-led independent reviews. Unfortunately, the research also uncovered that there are very few civil servants performing Schedule Management functions throughout the agency, and an even smaller number of individuals within that set whose day-to-day responsibilities are primarily (>50 percent) related to Schedule Management.

In 2022, the PP&C Steering Group began implementation of the Ensure Schedule Capability CAP initiative to begin working towards a more "right-sized" Schedule Management capability. Progress was made with the hiring of civil servant schedulers at Glenn Research Center (GRC) and Langley Research Center (LaRC). Continuation of the Ensure Schedule Capability initiative as part of the 2024 CAP will be to identify additional opportunities in right-sizing the Schedule Management workforce.

Expected Benefits of Implementation

This initiative may yield significant benefits and improvements to the MDs, P/ps, Centers, and agency including, but not limited to the following:

- Stronger, more integrated agency PP&C workforce/capability with greater insight into agency tool and capability offerings flowing down to P/ps;
- Added discipline into the Schedule Management function/capability as it pertains to P/p performance;
- Greater consistency in schedule analyses, including the application of performance metric trending, thereby producing better schedule estimates and schedule control opportunities;
- Easier access to and better communication with senior management to aid more direct communication about schedule issues and analytical techniques available to provide risk-informed schedule forecasting;
- Reduction of risk to P/ps regarding workforce availability/consistency/retention, subject matter expertise/experience, and conflicts-of-interest;
- Greater potential to share schedule insights and lessons learned across the agency and between P/ps;
- Facilitation of consistency in input, processes, and outputs with the standardization of the minimum set of Schedule Management tools, creating efficiencies in the scheduling process for P/ps;
- Clarity in PP&C/Schedule Management career path; and
- Reinforcement of Schedule Management best practices and skill development through the PP&C Career Path Framework (e.g., training and competency models).

Planned Next Steps

OCFO SIB and the Office of the Chief Human Capital Officer will work with Centers through the workforce planning community to identify opportunities to balance workforce in support of enhancing the Schedule Management capability. This may include transitioning existing positions (vacant billets or uncovered workforce) from a given discipline to Schedule Management or through strategically planned new hires.

Output and Outcome Metrics

Metrics include:

- Each NASA Center has an adequate amount of civil servant workforce with Schedule Management expertise to help support Center-specific, inherently governmental activities, as well as on-going agency-led activities, such as LCRs (e.g., SRBs).
- At a minimum, the Schedule Management Capability will gain four Schedule Management SME FTEs with an anticipated split in responsibilities of 85 percent MD and P/p support and 15 percent agency and Center support.

Interdependencies

There are several efforts currently underway at the agency, which either have a direct dependency or impact on the Enhanced Schedule Capability initiative, such as:

- PP&C Career Framework Development; and
- Workforce Planning/Environmental Scan

Impediments and Challenges

Each Center has its own unique FTE/WYE needs and associated hiring limitations. Prioritizing the hiring and/or transition of workforce opportunities from a current function to a new function will require a comprehensive understanding of the value civil servant Schedule Management SME points of contact can provide across MDs and Centers.

Required Resources

Four FTEs, who would be reskilled from the existing workforce with an anticipated split in responsibilities of 85 percent MD and P/p support and 15 percent Agency and Center support, are considered necessary resources to support inherently governmental roles in the Schedule Management discipline.

GAO High Risk Criteria:

Leadership Commitment, Capacity, Action Plan, Monitoring, Demonstrated Progress

[Implement] Advance the State of Maturity of Independent Assessment (New)

Lead Executives/Organizations

CPMO and MDs

Supporting Organizations

OCFO, Office of the Chief Engineer (OCE), Office of Safety and Mission Assurance (OSMA), and Centers

Initiative Description

Advance the state of maturity of independent assessment (IA) processes supporting major P/ps to better inform decision authorities and key stakeholders, improve efficiencies, and sustain the IA community.

Background

Independent Assessment in Policy

As a key element in NASA's strategic framework for managing space flight programs, Standing Review Boards (SRBs) help ensure appropriate program and project management oversight to increase the likelihood of mission success. Each space flight program and project shall perform LCRs in accordance with NASA Procedural Requirement (NPR) 7123.1, applicable Center practices, and the requirements of NPR 7120.5. These LCRs provide a periodic assessment, technical and programmatic status, and health of the P/p at key points in the life cycle using six criteria:

1. Alignment with and contribution to agency strategic goals;
2. Adequacy of management approach;
3. Adequacy of technical approach;
4. Adequacy of the integrated cost and schedule estimates and funding strategy;
5. Adequacy and availability of resources other than budget; and
6. Adequacy of the risk management approach.

LCRs that occur at the end of each life cycle phase are complete when the governing Program Management Council and Decision Authority complete their assessment at the Key Decision Point and sign the Decision Memorandum.[2]

The maturity and performance of each research and technology program and project governed under NPR 7120.8 are periodically reviewed by an appointed IA team.[3] The IA team membership and formality varies greatly depending upon the size and complexity of the program or project. Small projects may only need to appoint a single member to provide an IA, whereas a large program or project may require a larger team, such as an SRB with more formal processes.[4] If IAs are required at any Key Decision Point (KDP), they are performed immediately preceding or concurrent with the KDP.[5]

[2] NPR 7120.5F § 2.2.4
[3] NPR 7120.8A § 2.6.1.4
[4] NPR 7120.8A § 2.6.1.6
[5] NPR 7120.8A § 3.1.2.2

NPR 7120.5 § 2.2.5 provides requirements for conducting IA at program and project key life cycle reviews and describes the Convening Authorities for SRBs in Table 2-2, reproduced here. The program or project manager generates appropriate documentation per agency and Center policies, as necessary, to demonstrate that the program or project's definition and associated plans are sufficiently mature to execute the follow-on phase(s) with acceptable technical, safety, and programmatic risk.

Table 2-2 Convening Authorities for Standing Review Board

	Decision Authority		Technical Authority		Chief Financial Officer**
	NASA AA	MDAA	NASA CE*	Center Director(s)	
Programs	Approve	Approve	Concur	Approve	Concur
Category 1 Projects	Approve	Approve	Concur	Approve	Concur
Category 2 Projects		Approve	Concur	Approve	Concur
Category 3 Projects		Approve		Approve	Concur
NASA CE = NASA Chief Engineer					
*Concurrence is obtained via coordination with designated Mission Directorate Chief Engineer.					
** Concurrence is obtained via coordination with designated OCFO point of contact (POC) embedded in the Mission Directorate.					

NASA accords special importance to the policies and procedures established to ensure the integrity of the SRB's independent review process and to comply with Federal law. The Conflict of Interest (COI) procedures detailed in the NASA Standing Review Board Handbook shall be strictly adhered to.[6]

The Decision Authority may request the SRB to conduct other reviews or special reviews, which may or may not be conducted by the SRB. Examples of situations that may prompt such reviews include long periods of time between LCRs, between an LCR and when the subsequent KDP is scheduled, and between KDPs; key junctures in the life cycles of major programs, projects, or missions; and key aspects of programs, projects, or missions of particular interest to the agency.

Decentralization of Independent Assessment

Up to October 2015, the IA function was centralized and managed by the Independent Program Assessment Office (IPAO) in the Office of Evaluation (OoE), reporting to the NASA Associate Administrator (NASA AA). IPAO was chartered to enable independent review of programs and project to ensure the highest probability of mission success, and to ensure objectivity, quality, integrity, and consistency with independent LCR processes per NPRs 7120.5 and 7123.1. IPAO worked with SRB Chairs and Convening Authorities, reviewed SRB products to ensure they met agency expectations, provided Review Managers and SRB Programmatic Analysis team members to SRBs, and provided advice and recommendations to the agency on program and project policies, serving as the Book Manager for the agency's SRB Handbook.

The NASA AA issued a memorandum in October 2015 with direction to dissolve IPAO and OoE, and relocate the other functional OoE office, the Cost Analysis Division, to the OCFO. This new direction was intended to better align the agency's IA function toward ensuring mission success as well as enhancing management accountability. Under the new approach, the executing MDs and Center Directors now owned the accountability of establishing IA processes of their programs and projects. MDs in coordination with

[6] NPR 7120.5 § 2.2.5.1

executing Centers became responsible for selecting the SRB Chair and recruiting the agency's expertise to populate the board and provide that to the Decision Authority. OCE was directed to assist in tapping the technical subject matter experts and the OCFO was directed to assist in enabling programmatic expertise. The intent of the approach was to use and leverage talent across the agency (Center to Center; program to program) to assess our missions, thus allowing NASA to share best practices across project experiences through the IA function. Review independence would be maintained by ensuring NASA experts supporting a review come from a different chain of command, are vetted to eliminate COI and are funded through separate sources. As noted by the NASA AA, the realization of this IA realignment depends on trust among the NASA leadership and a shared perspective on accountability.

Current State of Independent Assessment

In 2021, Deputy Administrator Pamela Melroy initiated a Tiger Team to focus on improvements in acquisition and P/p management, recognizing NASA's continued presence on the GAO High Risk List for major NASA acquisitions, multiple Office of Inspector General reports highlighting issues with NASA programmatic practices, continued cost and schedule challenges on NASA major programs, and other stakeholder concerns.

Among other recommendations, such as the establishment of the Chief Program Management Officer (CPMO) position, the tiger team issued a recommendation to improve the functionality and effectiveness of SRBs throughout the program/project life cycle. That recommendation was channeled into an implementation initiative in NASA's 2022 CAP. The initiative focused on earlier engagement of the SRB Convening Authorities for SRB team formulation, the creation of new communication pathways between the CPMO and SRB Chairs to discuss plans going into LCRs and the application of best practices on review content, the development of a community of practice for SRB Chairs and Review Managers, and the assessment of SRB additional engagement points beyond the LCRs nominally conducted by SRBs.

Through NASA's implementation of the 2022 SRB CAP initiative via documentation review, performance assessment, survey feedback, community interviews, community engagement sessions and workshops, and other activities, the CPMO has identified multiple opportunities for improvement in each MD and across the agency—including the importance of advancing IA.

Expected Benefits of Implementation

Independent review informs agency leadership and decision-makers of high-risk areas, produces an objective assessment of plans and progress, provides a credible basis for a decision to proceed into the next phase of the program or project life cycle, and assures both internal and external NASA stakeholders that NASA's basis for proceeding is sound.

The full implementation of this initiative is expected to advance the state of maturity of IA in several different ways:

- Strengthen the network of those in the IA community to enable more frequent dialogue and sharing of challenges, lessons learned, opportunities, and best practices.
- Ensure the continued independence of review boards while retaining necessary technical expertise for effective review.
- Streamline the nomination and approval of review board members. Maintain one or more centralized databases of qualified, interested, and available personnel for review roles. Encourage participation in review roles through incentives and recognition to address skill shortages and bring fresh perspectives.

- Acknowledge and adapt to the varied IA structures across the MDs and Centers while providing more standard approaches where the community sees value. Develop more detailed and project-specific Terms of Reference and success criteria with justified tailoring focused on essential aspects unique to each project.
- Provide clarity on terminology describing the various review processes currently used across the agency and encourage the use of more standardized language to enable cross-agency collaboration and communication.
- Sustain the appropriate depth and breadth of skilled independent insight into programs and projects throughout the life cycle, particularly between the nominal LCRs, to enable effective review and benefit both the program/project under review and the Convening Authorities.

Recent Accomplishments

After the 2022 CAP initiative on SRBs was approved for implementation, CPMO surveyed and engaged with the IA and P/p management community to socialize the initiative, understand the landscape across the MDs, identify challenges and opportunities, and forge new connections and partnerships across the agency.

CPMO established multiple forums intended to enable community building and create opportunities for PM learning and collaboration, including IA. Such forums include the annual Program and Project Management Symposium, the Mission Directorate Independent Assessment Forum, the Independent Assessment Roundtable, periodic one-on-ones between the CPMO and major program SRB Chairs, recurring biweekly/monthly meetings with MD leadership responsible for PM and IA, and a digital presence for sharing information and updates. The significant progress and fulfillment of the steps outlined in the 2022 CAP SRB initiative substantiates the agency's decision to consider the effort complete and redirect its focus on the IA initiative for 2024.

The IA community and MD, Center, and P/p leadership have expressed keen interest in continued learning and improvement and have shared appreciation for the cross-agency coordination the CPMO has led. The decentralized model has led to some expected outcomes, such as diversification of terminology that presents challenges in agency-wide communication but has also led to experimentation and innovation as MDs have implemented IAs tailored to specific mission needs, tailored for unique acquisition approaches and different risk postures. With its cross-MD perspective, CPMO has been in the position to identify and amplify the different approaches MDs have taken, so that others in the community can benefit from learning how things can be done differently and effectively to enable mission success. The CPMO has actively promoted cross-agency collaboration and the communication of lessons learned and best practices to shed light on these innovative approaches.

With the new insights gained over the past two years into the current set of challenges and opportunities, the CPMO believes there is an imperative to implement a renewed IA initiative to overcome persistent and emergent challenges and to realize opportunities.

Planned Next Steps

Since each MD is independently accountable for ownership and implementation of effective review processes in their organizations, CPMO team leverages existing and new partnerships across MDs to evolve or strengthen IA processes.

Actions within CPMO's purview include:

- Update the SRB Handbook from the current Revision C to a new Revision D to reflect the current set of best practices for consideration by the implementing organizations that would account for different risk postures, acquisition approaches, and unique mission needs. Examples of potential updates to the SRB Handbook include:
    - Encourage additional observer or "consultant" role on IA teams to develop IA experience and expand the pool of experienced personnel that can serve on IA teams.
    - Include IA terminology used across the different MDs.
    - Reincorporate Appendix D forms into next revision that are not presently included.
    - Address how emergent commercial-oriented acquisition approaches do or do not affect IA processes.
- Sustain the agency-wide Independent Assessment Roundtable semi-annual forum that brings together SRB Chairs, Co-Chairs, and Review Managers to discuss recent and emergent challenges and opportunities for improvement.
- Sustain the Mission Directorate Independent Assessment Forum that brings together each MD's lead points of contact for IA processes to discuss best practices, lessons learned, planned life cycle review manifests, and cross-agency improvement opportunities.
- Continue to hold meetings between the CPMO and individual SRB Chairs to sustain insight into SRB Chair perspectives on efficacy and efficiency of reviews and to provide the SRB Chair with the most current leadership expectations for a robust review.
- Improve NASA internal transparency by making different examples of IA related documentation (e.g., Terms of Reference [ToR], IA Manifest) more readily available, such as on the CPMO SharePoint page and the NASA PM Network.
- Emphasize ToR as a cornerstone to effective IA processes that achieves agreement across Convening Authorities and encourage application of best practices with respect to ToR development timeline, included content, document dissemination, and Convening Authorities' expectations.
- Establish an actively maintained manifest of planned/anticipated LCRs to enable effective staffing and achieve efficiency gains, with a particular focus on P/ps in early formulation.

The steps planned by each MD are reflective of different needs and goals, are self-identified and owned by the individual MDs, and include:

Aeronautics Research

- Recently implemented a LCR manager position.
- Continue working to right-size number of independent review board members based on lessons learned in the Low Boom Flight Demonstration project, including the number of voting vs non-voting members.

Exploration Systems Development

- Establish a new LCR manager position responsible for major program IA processes in the Moon to Mars (M2M) organization, captured in program office documentation.
- Assess the pros/cons of different approaches (i.e., long-term SRBs vs. short-term Independent Review Teams) to IA in the current operating model, an artifact of the recent organizational consolidation. Determine whether a different approach is warranted and how to implement any changes.
- Assess the potential value that a M2M IA team would bring for cross-program integration efforts that are sufficiently aligned to support and enable Artemis campaign goals, considering any potential independent insight gaps in the currently planned integrated sync point process. Capture any revised approaches in program office documentation.

- Apply greater rigor to LCR planning as part of the annual IA Manifest data call and more consistent approaches to LCR readiness and process.

Science

- Provide more definition on the Independent Review Board approach, including the unique circumstances that may warrant consideration of standing up such a board.
- Increase rigor of programmatic readiness assessments (e.g., programmatic, technology maturity, and risk posture) around LCRs, with a special focus on the Preliminary Design Review to better inform the KDP-C baseline of cost and schedule commitments.
- Update and maintain the Science Mission Directorate (SMD) SRB membership database, including skillsets. Institute kick-off meetings with SRB Chairs and Deputy Chairs to communicate SMD expectations for standing review boards.

Space Operations

- Application of increased rigor of programmatic assessment around Mission Concept Review (MCR) to align with agency best practices.
- Coordinate with CPMO to ensure SRB and Independent Review Team (IRT) members represent a diverse knowledge base and enable assessments to be conducted with a true independent perspective.
- Leverage best practices from previous IAs conducted for commercial services-based Programs such as the Commercial Crew Program to inform current commercial services efforts in formulation such as the Commercial Low Earth Orbit Destinations Program and Communication Services Project.

Space Technology

- STMD is currently studying a potential realignment from Technology Readiness Level to a Domain-based capability model. This effort will likely take most of FY 2025. STMD's near-term focus is to assess, identify, and implement an IA structure and set of processes that sustains the efficacy IA in the organization. During this time STMD will also seek to identify IA best practices currently implemented in STMD and other MDs via established cross-agency IA collaboration forums that could be effectively applied to a domain-oriented STMD structure.
- Maintain IA on current projects in formulation and development. STMD's Strategic Planning & Integration Office is maintaining responsibility for IA to ensure continuity.
- Update STMD IA Guiding Principles documentation to advance processes, particularly with respect to board membership selection efficiency, applicability of board membership skillset to match unique project needs and setting STMD expectations for independent reviews.
- Assess the value of more robust organizational functions for identifying, vetting, and selecting SRB and IRT membership.

Steps planned by the OCE and OCFO Convening Authorities include:

Office of the Chief Financial Officer

OCFO anticipated providing continued support of IAs in a constrained resource environment, which limits its ability to implement additional rigor above current execution levels. Despite this constrained resource environment, OCFO intends to:

- Update the SRB Standard Operating Procedure Instruction with clarified/emergent guidance, considering elements such as acquisition approaches and their implications to IA, programmatic checkpoints, and emphasis of the programmatic analyst role in ToR development.
- Sustain the CFO University course on independent program assessment.
- Provide additional implementation guidance for new leadership expectations for IA at the MCR.

Office of the Chief Engineer

- Support MDs where appropriate in implementing LCRs.
- Update NPR 7123.1 and Systems Engineering handbook to clarify guidance related to MCR as needed.

Output and Outcome Metrics

Metrics include:

- SRB Handbook Rev D published by end of calendar year 2025
- Terms of Reference completed and signed prior to first SRB/IRT LCR
- Post-LCR snapshot reports to the Decision Authority held within reasonable timeframe following the review
- Sustained ability to identify and assign experienced subject matter experts to IA teams as they are established and/or evolve through LCRs

Interdependencies

Each MD is responsible for the implementation of IA within its portfolio. There are multiple interdependencies and value to be gained in coordination at all levels of the agency.

Impediments and Challenges

The predominant challenge to implementation is the lack of available personnel across CPMO and the MDs who can dedicate a sustained focus on this effort due to competing priorities.

The decentralized model for IA responsibilities across the agency presents another hindrance in certain respects. The decentralized model set forth in 2015 led to diversification of IA implementation and necessitates a much greater degree of coordination across the multiple MDs. The decentralized model also creates difficulties in driving toward cohesive agency solutions. The actions captured in this initiative are designed to mitigate and resolve areas where MDs need support to advance the state of maturity of IA.

Required Resources

No resources are required or requested to implement this initiative beyond level of effort from personnel currently assigned to manage IA and related processes. Any systems used to enable IA processes are already in place.

GAO High Risk Criteria:

Leadership Commitment, Capacity, Monitoring, Demonstrated Progress

[Implement] Strengthen Realism in Early Formulation (New)

Lead Executives/Organizations

CPMO and Office of the Executive Secretariat (OES)

Supporting Organizations

Office of Chief Engineer (OCE); Office of Safety and Mission Assurance (OSMA)

Initiative Description

Mitigate optimism and strengthen realism in early formulation by reinforcing the sequence and discipline of pre-formulation milestones for Single-Project Programs, Category 1 and select Category 2 projects.

Background/Current State

In 2023, Deputy Administrator Pamela Melroy initiated an agency Tiger Team to look at the steps NASA can take to strengthen the risk management framework to support MDs, Centers, and P/p managers in managing and communicating risks effectively. As part of this study, a key area of focus was to look at how the agency can strengthen realism in early formulation and provide agency senior management recommendations on how to address early optimism. The study found that optimism exists in pre-formulation regardless of mission category. There is no standard measurement for pre-formulation maturity for Category 1 and 2 missions that do not go through an Announcement of Opportunity competed approach. The study also found that there is a lack of connectivity between pre-formulation Program and Project Management Policy, NPR 7120.5, and Acquisition Policy, NASA Procedural Directive (NPD) 1000.5, activities. This initiative captures the approved recommendations from the Tiger Team to improve realism in early program and project formulation.

Expected Benefits of Implementation

This initiative may yield significant benefits and improvement including, but not limited to:

- Formalize documentation of approval for a project to enter pre-formulation.
- Strengthen MCR execution to identify project's potential optimism and associated risks.
- Strengthen Acquisition Strategy Meeting (ASM) risk conversations and increase acquisition examination by increasing the annual Acquisition Strategy Council (ASC) forecast window.
- Increase the connection between Program and Project and Acquisition Management activities and awareness of the technical and programmatic risks between them.
- Increase risk integration across agency domains.

Recent Accomplishments

- Detailed Agency Risk Management Officer (ARMO) named in November 2023.
- IA of the Commercial LEO Development Program MCR completed in late FY 2024.
- SMD cost and schedule estimation of Category 1 projects prior to KDP-A. This was a recommendation from 2020 Large Mission Study and have been implemented since 2022.

Planned Next Steps

- Create approval for Pre-Formulation via a letter developed by the MD issued to the Program/Project Manager signed by the MD AA stating the Program/Project Manager has approval to start pre-formulation activities and provides further guidance on the activities aligned with the milestones and documentation in the pre-formulation phase. This new approval for Pre-Formulation letter will be referenced in the NASA Implementing Instructions for the Decision Framing Meeting and ASM linked to NPD 1000.5 NASA Policy for Acquisition, in the NASA Online Directives Information System (NODIS) Library. It will also be added to NPR 7120.5 as an appendix template.
- IA of MCRs. In progress at time of CAP issuance, agency requires IA of the Communications Services Project MCR planned for early FY 2025. Updates to NPD 1000.5, NASA Advisory Implementing Instructions (NAIIs), NPR 7120.5F, and/or potential update to guidance documents (e.g., handbooks), or a new policy paper setting expectations of IA at MCR to be completed or issued in FY 2025.
- Update ASM template with risk posture information including and an independent evaluation of project cost estimate. This will be addressed in updates to NAII 1000.1/2 Decision Framing Meeting (DFM), Pre-Acquisition Strategy Meeting (Pre-ASM) Guide, and Acquisition Strategy Meeting (ASM) Guide.
- Establish a permanent ARMO.
    - Detailed Chief Risk Officer named in November 2023.
- MDs brief on potential future acquisitions one to three years out as part of the annual ASC forecast meeting. For acquisitions that are two years out or more, MDs brief on their pre-formulation efforts as well as significant partnerships.

Output and Outcome Metrics

Metrics include:

- Updates to NPD 1000.5 and NPR 7120.5F and associated SRB handbooks to revise MCR requirements.
- Updates to ASM guides and templates.
- Naming of permanent ARMO.
- IA of Single-Project Programs, Category 1 and 2 MCRs and ASMs. Including independent cost estimates, as part of MCRs and ASMs.

Interdependencies

The implementation of this initiative will require coordination and support between the CPMO, MDs, OCFO, OSMA, OES, Centers, decision authorities, and OCE.

Impediments and Challenges

- Support and coordination from the organizations required to implement this initiative.
- Defining and maturing the IA criteria for MCRs.
- Developing cost estimates early in a project's lifecycle when designs are immature and addressing the perception that initial estimates frequently exhibit precision but lack accuracy. This often creates a misleading sense of confidence in early estimates and schedules.

Required Resources

$300k – $500K annual recurring costs across the agency, additional cost of establishing an IA team to support MCRs of Single-Project Programs, Category 1 and select Category 2 projects. The SMD was already performing IA at MCR, establishing their Standing Review Board prior to MCR, this change was made following the SMD internal large mission study recommendation issued in 2020.

GAO High Risk Criteria:

Leadership Commitment, Capacity, Action Plan, and Monitoring.

[Research] Firm Fixed Price Data Analysis (Modify)

Lead Executives/Organizations

Office of Procurement (OP)

Supporting Organizations

OCFO SIB and MDs

Initiative Description

This initiative will examine past and current agency firm fixed price (FFP) acquisitions and their associated outcomes. FFP acquisitions are becoming more common for high value assets (e.g., Gateway Power and Propulsion Element, Human Landing System [HLS], etc.). Increased insight of root causes for FFP contract performance will increase the agency's ability to improve acquisition strategies.

Background/Current State

NASA's strategic decision to increase the utilization of FFP contracts, especially for Human Space Flight projects, has resulted in NASA having reduced insight into contract performance, loss of meaningful data for estimating future analogous projects, and reduced information to inform acquisitions strategies. The 2022 CAP initiative focused on enhancing NASA's ability to collect additional programmatic data on select current FFP contracts to sustain NASA's ability to accurately estimate future analogous projects. Capturing the type of data that drove the generation of the 2022 CAP was deemed inexecutable. The 2024 FFP initiative will involve past and current FFP contract data collection leveraging existing information, root cause analysis of price and schedule growth, and development of taxonomies of growth and schedule factors to inform future ASM and Procurement Strategy Meeting (PSM) forums.

Expected Benefits of Implementation

The initiative is expected to provide insight into the root causes of the agency's past and current performance of FFP spaceflight development contracts and will accomplish several key benefits:

- Enable NASA to better project future risks of risks associated with FFP development acquisition contracts.
- Improve effective negotiations on future FFP contracts by using sound and reliable data. The newly available data by this initiative will improve the source selection evaluation process and contract negotiation activities, all of which will help the OP to achieve fair and reasonable prices.
- Directly addresses NASA Advisory Council's desire for NASA to continually improve its acquisition approach.

Planned Next Steps

The steps below represent the notional plan for the 2024 FFP CAP initiative:

- Collect and review selected FFP spaceflight development base contracts as well as all modifications associated with those contracts. The data collection effort will look at selected development FFP contracts.
- The agency will conduct a root cause analysis based on modifications to base contracts to understand what caused pricing growth. Root cause analysis will include, but not limited to:
    - Contract change traffic on why modifications occurred.
    - When modifications occurred in the project lifecycle, such as:
        - Analyze how pricing increases in accordance with type of modification and when modification occurred.
        - Rationale for the modifications (i.e., scope changes, schedule changes, etc.).
        - Examine Data Requirement Deliverables associated with these contracts to assess potential best practices for capturing data.
        - Time it took to execute modifications (i.e., negotiations, undefinitized contract actions, etc.)
    - A summary of data into proper taxonomies on what drive FFP development contract growth.
- Inform future ASM and PSM forums. Results from the root cause analysis may affect future ASM and PSM strategies relating to the selection, or use, of certain contract types.

Output and Outcome Metrics

- Initiative results will be documented in a report.
- Initiative results will be presented to the Senior Procurement Executive to inform future agency acquisition strategies and best practices.
- Initiative results will be available to future ASMs and PSMs.
- Initiative results will be available to Category 1 and select Category 2 MCR IA teams to inform mission ASM and KDP-A milestones.

Interdependencies

Coordination and support between MDs, Centers, Projects, CPMO, and OCFO. Anticipate that majority of coordination will involve Contracting Officers and Contracting Officers Representatives from projects, Centers, and MDs.

Impediments and Challenges

Quality of the available contract information. Inconsistency with capturing the most accurate data; timeliness, coordination with other stakeholders (i.e., program and project managers); dissemination of data to the broader NASA community.

Required Resources

No additional resources required for this initiative.

GAO High Risk Criteria:

Leadership Commitment, Capacity, Action Plan, Monitoring.

Appendices

Appendix A: Previous Corrective Action Plans & Completed/Closed CAP Initiatives

2022 Corrective Action Plan

In January 2022 NASA leadership directed an update to the 2020 Plan, timed to inform the GAO as they started their assessments for the 2023 High Risk Report. The CAP Working Group was reconstituted with new cross-agency membership at the staff/Chief level. The CAP Steering Committee was reconstituted with new cross-Headquarters (HQ) membership, including senior leadership at the Mission Directorate Deputy Associate Administrator level or equivalent. The 2022 CAP carried over one existing initiatives from the previous 2020 initiatives while also adding five new initiatives. On October 10, 2024, the Agency Program Management Council (APMC) Chair and NASA Associate Administrator (NASA AA), James Free, approved the following actions, including the completion of two 2022 CAP initiatives as well as the closure of one initiative. The status of all six as of October 2024 is as follows:

1. Schedule Database
   Modify: Initiative was not completed due to insufficient funding. Initiative is being rescoped to fit anticipated resource levels. Goal is to maintain momentum on developing capability for future use.

2. Ensure Schedule Capability
   Modify: Initiative was not fully conducted due to insufficient funding. Progress was made to enhance schedule management Full Time Equivalent (FTE) capability. Initiative is rescoped to fit anticipated resource levels and to focus on remaining schedule management FTE needs.

3. Enhance Standing Review Board (SRB) Implementation
   Completed: 2022 CAP initiatives actions completed. Informed by what was learned through the 2022 initiative, the new 2024 initiative implements discrete agency and mission directorate actions to advance the state of maturity of independent assessment.

4. Increase Deep Space Exploration Systems' Transparency of Cost and Schedule (Carry over from 2020 CAP)
   Completed: NASA has achieved its stated 2022 CAP initiative goal with the establishment of the Space Launch System (SLS) Block 1 B (B1B) and Mobile Launcher-2 (ML-2) Agency Baseline Commitments.

5. Firm Fixed Price (FFP) Data Collection
   Modify: 2022 CAP initiative focused on enhancing NASA's ability to collect programmatic data on select current FFP contracts to sustain NASA's ability to accurately estimate future analogous projects. Given resource and data limitations, in 2024, the initiative will involve past and current FFP programmatic data collection leveraging existing information, root cause analysis of cost growth, and development of taxonomies of growth factors to inform future Acquisition Strategy Meeting (ASM) and Procurement Strategy Meeting (PSM) forums.

6. Realistic Proposal Cost Estimating
   Closed: 2022 CAP initiative encouraged bidders to prepare proposals with cost estimates commensurate with historical performance in a format like what is required for an independent estimate, enabling a more informed proposal assessment. Initiative identified that flexibility already within acquisition guidelines.

2020 Corrective Action Plan

Per the approved 2018 CAP, NASA leadership pursued an update to the 2018 Plan in spring/summer 2020, timed to inform the GAO as they started their assessments for the 2021 High Risk Report. The CAP Working Group was reformulated, and the Program Management Improvement and Accountability Act steering group also functioned as the CAP Steering Committee. The 2020 CAP carried over two existing initiatives from the previous 2018 initiatives while also adding four new initiatives. On August 11, 2022, the APMC Chair and NASA AA Robert Cabana approved the closure of five of six 2020 CAP initiatives, as indicated below. The status of all six as of August 2022 is as follows:

1. Enhance EVM Implementation (from 2018 CAP)
   Completed: NASA has achieved its stated goal of improving and strengthening the Earned Value Management (EVM) discipline, working to foster a culture at NASA where EVM is accepted by programs and projects. All applicable projects are submitting EVM data to the EVM central repository. All applicable contracts use the Defense Contract Management Agency for contract Earned Value Management System (EVMS) surveillance or an equally effective method as outlined in the project plan that is consistent with the agency's overall surveillance approach. EVM metrics are reported at the monthly Baseline Performance Review. Routine EVM surveillance has been implemented at the NASA Centers and at the Applied Physics Laboratory, Jet Propulsion Laboratory, and Southwest Research Institute. Moreover, the GAO in early 2022 closed the long-standing priority recommendation related to EVM that was first opened in 2012 in GAO report number GAO-13-22. While the planned steps as described in the 2018 CAP initiative were all completed, the effort to sustain and further mature EVM is ongoing.

2. Program Planning and Control (PP&C) Training Curriculum (from 2018 CAP)
   Completed: NASA has completed the initiative as written. A new course on the subject of "Agency Independent Assessments" will be available for enrollment in 2022. Additional courses continue to be developed to build out the curriculum that is reflective of the agency's best practices and methods, enabling the growth and strengthening of the agency's programmatic capabilities and bridging the gap between the current-state workforce and future-state workforce of highly trained analysts.

3. Implement Schedule Repository
   Completed: NASA has successfully moved its Schedule Repository pilot project to implementation. In lieu of codifying the Schedule Repository requirements into a NASA Procedural Requirements document as described in the initiative, the agency leveraged a June 2019 memo from the Chief Financial Officer to fully implement the initiative with additional guidance provided in an associated FAQ document. NASA streamlined the schedule submission and file collection process via three means: utilizing one interface for schedule submissions, performing data quality checks to provide feedback to submitters on schedule adherence to best practices, and documenting reporting compliance. The Repository now includes 13 quarterly snapshots of project schedules spanning July 2019 through July 2022 and is set to continue collection moving forward. The Schedule Database initiative in the 2022 CAP builds upon the now established Repository.

4. HEOMD ESD/Advanced Exploration Systems (AES) Transparency of Cost and Schedule
   Completed: NASA has improved the Exploration Systems Development Mission Directorate's (ESDMD) transparency of cost and schedule for long term plans for human exploration by making Agency Baseline Commitments for capability upgrades, reporting through the annual budget process, and reporting performance against year-to-year operating plans. Data now exists to monitor risk and

schedule, assess long-term affordability, and enable Congress to make informed budgetary decisions. ESDMD improved quarterly program status and agency Baseline Performance Reviews with a focus on performance-to-plan schedule metrics and schedule risk identification. EVM implementation and reporting has been enhanced with Earned Value (EV) metrics now reported to the agency on a recurring basis. ESDMD has also separated out contract line item numbers (CLINs) to allow for better tracking of cost on all new contracts and during contract actions, shortened the period of Fee Determination to six months, included technical monitor information in fee evaluation, coordinated fee determination at the agency level, updated contract areas of emphasis based in part on previous period of evaluation, and incorporated incentive fee into contracts.

NASA leadership established new Agency Baseline Commitments for the Exploration Ground Systems (EGS) and SLS programs, provided an updated Artemis I launch readiness date to appropriate account for Artemis I costs, and rebaselined the Orion program at its KDP-D, incorporating the Orion docking requirement. Joint Cost and Schedule Confidence Level (JCL) analysis was performed for all rebaseline activity.
ESDMD is on track to fully complete this initiative after implementing plans to establish Agency Baseline Commitments for the Human Landing System projects, Gateway program projects, and major capability upgrades including SLS Block 1B, Mobile Launcher-2. While the commitments have not been set, ESDMD will establish ABCs for these programs when the appropriate KDP is reached, effectively cementing a culture change representing the completion of this 2018 CAP initiative as written.

5. CADRe Cat 3 / Class D Enhancements
   Completed: NASA has enhanced its Cost Analysis Data Requirements (CADRe) capability via implementing enhancements to collect robust technical and programmatic data for smaller Category 3 / Class D missions through expanded data collection efforts to all NASA space flight projects above a $50 million life cycle cost threshold. 18 CADRe's have been captured for 13 Category 3 / Class D projects since the 2020 CAP was issued. This work has significantly increased the available information on smaller missions that will enable NASA to better estimate projects and contribute to NASA's ongoing efforts to improve programmatic performance and be a "smart buyer" of hardware and services. While the CAP initiative has been implemented and completed as written with positive results, it is at serious risk for sustainment due to the current fiscal outlook and associated budget constraints.

6. Risk Assessment and Financial Evaluation of Contractors
   Completed: NASA has enhanced the competitive and sole-selection procurement processes by requiring an evaluation of the financial health, stability, and outlook of organizations under consideration prior to selection and contract award via Procurement Notice 20-05 issued on September 21, 2020. The addition of NASA Federal Acquisition Regulation (FAR) Supplement Subsection 1809.105-1, *Obtaining Information, Pre-Award Financial Capability Assessment*, implements new policy and guidance to strengthen the contractor responsibility determination process by performing a comprehensive financial capability assessment during the pre-award procurement process for NASA's most significant contracts for design and development programs and projects with a life cycle cost of $500 million or more, or otherwise designated by the NASA AA. This effort aligns with the FAR requiring the contracting officer to ensure a prospective contractor must have adequate financial resources to perform the contract.

2018 Corrective Action Plan

In September 2018, agency senior leadership determined that a new CAP was necessary to continue driving improvements in NASA's program and project management policies and processes. NASA's AA and the Chief Financial Officer (CFO) jointly issued a memorandum to this effect on September 6, 2018, which can be found as an Appendix to the 2018 CAP. The memo required that a new Plan be in place by the end of the 2018 calendar year, and established a working group comprised of relevant experts from across the agency to develop the initiatives. It also called for the creation of a Steering Committee to provide guidance to the working group at key milestones in the development process. Finally, top-level direction for the new Plan would reside with the NASA AA (in coordination with the CFO), with official approvals routed through the APMC.

On September 19, 2018, the working group held a kick-off and met or communicated daily throughout the development of the Plan. The working group considered a variety of inputs during the formulation of each of the individual initiatives that comprise the Plan. These inputs include, but are not limited to, previous GAO High Risk Reports, GAO's 2018 Priority Recommendations Letter, reports issued by GAO during its annual programmatic reviews of NASA's major projects, as well as internal analyses conducted by the agency. Direction from NASA senior leadership, the advice of subject matter experts drawn from across NASA, and feedback from GAO were also considered. Agency-wide stakeholder review was conducted via the APMC community during November 2018, and the final document was approved at the APMC meeting on December 6, 2018.

The 2018 CAP represented an entirely new Plan identifying NASA leadership priorities aimed at improving the programmatic performance of NASA's acquisition management, recognizing that NASA was facing continued struggles in its management of large acquisition programs and that an opportunity existed to make improvements. The Plan was comprised of seven initiatives to implement, one initiative to pilot, and one initiative to research:

- Initiatives to Implement
    - Enhance EVM Implementation
    - PP&C Training Curriculum
    - Create Technology Readiness Assessment Best Practices Document
    - Include Original Agency Baseline Commitment (ABC) for Performance-Driven Rebaselined Projects
    - Update Probabilistic Programmatic Policy
    - Enhance Annual Strategic Review Process
    - Improve Human Exploration and Operations Mission Directorate (HEOMD) Portfolio Insight and Status
- Initiative to Pilot
    - Create a Schedule Repository
- Initiative to Research
    - Enhance Implementation Indicators for Trends and Projections

The 2018 CAP also included three Areas of Emphasis around the subjects of improving governance of strategic acquisitions, improving risk assessment and concept definition in the early formulation phase, and contractually incentivizing high performance. Leadership wanted to emphasize adherence to current policies

and practices in these areas to encourage improvements that better position the agency to manage cost and schedule performance.

Significant progress was accomplished between the start of the 2018 CAP in December 2018, and the approved 2020 CAP in July 2020. Six initiatives were completed, one was closed and rewritten, and two remained in process at the end of the period. Enhancing EVM implementation and implementing the PP&C training curriculum were intended to be longer-term initiatives. The HEOMD (HEOMD divided into SOMD and ESDMD in 2021) initiative was closed and rewritten to better align the changes to GAO's associated priority recommendations, and to clarify tracking and closure requirements. The remaining initiatives all successfully completed their plans of action as outlined.

2007 Corrective Action Plan

NASA sees excellence in program and project management as a core capability and critical if the agency is to successfully develop and operate technologies and systems for the human exploration of deep space; execute robust programs of robotic missions to monitor the Sun and Earth, explore the planets of our solar system, and observe the universe beyond; and continue to make aviation safer, more efficient, and more environmentally friendly. To that end, the agency continually assesses how to manage projects and prepare people to lead. As a result, NASA's project management and oversight practices have seen significant improvement since the agency was first added to GAO's High Risk List in 1990.

GAO originally designated NASA's acquisition management as a "high-risk" area in its inaugural High Risk List released in 1990, citing what was at the time considered a history of persistent cost growth and schedule delays in many the agency's major products. In 2007, NASA established a CAP consisting of five broad focus areas and seven tactical initiatives that provided an agency-wide coordinated approach to improve NASA's program and project management activities. The initiatives included in the 2007 Plan were all successfully closed by the end of 2012, and GAO has acknowledged that considerable progress toward strengthening and integrating NASA's acquisition management functions resulted from those efforts. Both the 2015 and 2017 High Risk Reports credited NASA with fully meeting three of the five criteria for removal from the High Risk List (leadership commitment, action plan, and monitoring), as well as partially meeting the remaining two criteria (capacity and demonstrated progress).

A key milestone in the maturity of NASA's programmatic discipline was the CAP developed in 2007. The 2007 plan contained seven initiatives to address potential shortcomings in NASA's acquisition management practices. Those initiatives were: (1) Program/Project Requirements and Implementation Practices; (2) Agency Strategic Acquisition Approach; (3) Contractor Cost Performance Monitoring; (4) Project Management Training and Development; (5) Improve Life-Cycle Cost/Schedule Management Processes; (6) Integrated Enterprise Management Program Process Improvement; and (7) Procurement Processes and Policies. Six of these seven initiatives were operationalized by 2012 through the introduction of new requirements, policies, procedures, training, and other tools to improve how we manage our major acquisitions and ensure our workforce has the necessary associated tools. In 2014, NASA declared that the one outstanding initiative, Contractor Cost Performance Monitoring, was closed. This initiative was originally designed to improve the availability of contractor data to support performance monitoring of programs and projects. The initiative would have been accomplished through enhanced business systems and changes to the contractor cost reporting process. NASA performed analyses at that time to identify gaps in the existing key business systems and concepts and courses of action that could be implemented to address those gaps. As a result of this analysis, NASA and GAO agreed to replace the original objective, and instead instituted several

process improvements designed to achieve greater insight into project performance, including contractor cost performance.

These operationalized initiatives have yielded the desired results for NASA's small and medium-class missions, though the agency recognized that there was still work to be done. Specifically, that NASA needed to do better managing larger, more complex projects, which typically involve the development of a significant number of new technologies, greater risk, and early estimation challenges. The 2018 CAP described below was designed to build upon the successful legacy of its 2007 predecessor, ensuring that NASA continues to enhance its programmatic rigor while pushing forward with the activities that will be necessary to initiate a bold new era of discovery.

Appendix B: 2024 CAP Steering Committee and Working Group Membership

Steering Committee	
David Mitchell	CPMO/Executive Champion
J. Craig McArthur	OCFO SIB/Performance Improvement Officer and Director
G. Michael Green	STMD/DAA for Management
Tonya McNair	SOMD DAA for Management
Lee Noble	ARMD/IASP Director
Ned Penley	ESDMD DAA for Management
Mary Skow	OSMA Agency Risk Management Officer
Wanda Peters & Peg Luce	SMD/DAA for Programs
Karla Smith-Jackson	OP/Deputy CAO and AA for Procurement
Working Group	
Justin Hornback	CPMO/CAP Team Co-lead
Elyssa Malin	OCFO SIB/CAP Team Co-lead
Kevin Gilligan	CPMO/Strategic Initiatives Manager
Jenny Russell	OCFO SIB/SPaR Branch Chief
Tanye Coleman	SMD/Portfolio Performance Management Lead
Fay Collier	ARMD/IASP/Associate Director for Flight Safety
Mary Duncan	MSFC/OSAC PP&C Office Manager
Vickie Gutierrez	JSC/Strategic Business Integration Office Manager
Charley Hunt	OCFO/Senior Technical Leader for Programmatic Analysis
Alicia McPhail	SOMD/Program Strategic Integration Supervisor
Andre Sheppard	OP/Director, Procurement Strategic Operations Division
Matthew Ritsko	GSFC/OCFO/Chief for Resource Management
Christine Solga	ESDMD/ALR Detailee
Robin Smith	LaRC/Deputy CFO PP&C
Arthur Maples	STMD/Strategic Planning and Integration Office

Appendix C: Acronyms List

AA – Associate Administrator
ABC – Agency Baseline Commitment
ACR – Architecture Concept Review
ADD – Architectural Definition Document
AES – Advanced Exploration Systems
ALR – Audit Liaison Representative
APMC – Agency Program Management Council
ARMD – Aeronautics Research Mission Directorate
ARMO – Agency Risk Management Officer
ASC – Acquisition Strategy Council
ASM – Acquisition Strategy Meeting
BI – Business Intelligence
BPR – Baseline Performance Review
CAO – Chief Acquisition Officer
CAP – Corrective Action Plan
CFO – Chief Financial Officer
COI – Conflict of Interest
CPMO – Chief Program Management Officer
DAA – Deputy Associate Administrator
DPMC – Directorate Program Management Council
DT – Digital Transformation
EDP – Enterprise Data Platform
EGS – Exploration Ground Systems
ESD – Exploration Systems Development
ESDMD – Exploration Systems Development Mission Directorate
EVM – Earned Value Management
EVMS – Earned Value Management System
FAR – Federal Acquisition Regulation
FFP – Firm Fixed Price
FTE – Full Time Equivalent
FY – Fiscal Year
GAO – Government Accountability Office
GRC – Glenn Research Center
GSFC – Goddard Space Flight Center
HEOMD – Human Exploration and Operations Mission Directorate
HLS – Human Landing System
HQ – Headquarters
IA – Independent Assessment
IASP – Integrated Aviation Systems Program
IMS – Integrated Master Schedule
IPAO – Independent Program Assessment Office
IRT – Independent Review Team
JCL – Joint Cost and Schedule Confidence Level
JSC – Johnson Space Center
KDP – Key Decision Point
LaRC – Langley Research Center
LCR – Life Cycle Review
LEO – Low Earth orbit
MCR – Mission Concept Review
MD – Mission Directorate
ML-2 – Mobile Launcher 2
MS – Microsoft
MSFC – Marshall Space Flight Center
NAII – NASA Advisory Implementing Instructions
NAIL – NASA Acquisition Innovation Launchpad
NASA – National Aeronautics and Space Administration
NPD – NASA Procedural Directive
NPR – NASA Procedural Requirement
OCE – Office of the Chief Engineer
OCFO – Office of the Chief Financial Officer
OES – Office of the Executive Secretariat
OIC – Officials-in-Charge
OP – Office of Procurement
OSAC – Office of Strategic Analysis and Communications
OSMA – Office of Safety and Mission Assurance
PMC – Program Management Council
PP&C – Program Planning and Control
PPBE – Planning, Programming, Budgeting, Execution
PSM – Procurement Strategy Meeting
SAO – Strategy and Architecture Office
SIB – Strategic Insights and Budget
SLS – Space Launch System
SMD – Science Mission Directorate
SME – Subject Matter Expert
SOMD – Space Operations Mission Directorate
SPARTA – Smart Projects and Reviews with Transformative Analytics
SRA – Schedule Risk Analysis
SRB – Standing Review Board
STMD – Space Technology Mission Directorate
WBS – Work Breakdown Structure
WYE – Work Year Equivalent