



441 G St. N.W.
Washington, DC 20548

April 12, 2019

The Honorable James F. Bridenstine
Administrator
National Aeronautics and Space Administration

Priority Open Recommendations: National Aeronautics and Space Administration

Dear Administrator Bridenstine:

The purpose of this letter is to provide an update on the overall status of National Aeronautics and Space Administration's (NASA) implementation of GAO's recommendations and to call your personal attention to areas where open recommendations should be given high priority.¹ In November 2018, we reported that on a government-wide basis, 77 percent of our recommendations made 4 years ago were implemented.² NASA's recommendation implementation rate was 70 percent. As of February 2019, NASA had 51 open recommendations. Fully implementing these open recommendations could significantly improve NASA's operations.

Since our last priority recommendation letter, dated March 26, 2018, NASA has implemented 10 of our 18 open priority recommendations. In doing so, NASA took actions that will help to better align its strategic sourcing practices with those used by leading commercial companies, including updating guidance and overarching goals and metrics for savings. NASA also took steps to improve controls over select high-impact information systems, including updating security assessment plans for selected systems to ensure they include the test procedures to be performed. As a result of these efforts, NASA is better positioned to leverage its buying power and achieve additional savings through strategic sourcing and improve its security defense over high-impact systems.

We ask for your continued attention to the eight priority recommendations that remain from those we identified in our 2018 letter. Furthermore, we are adding one new recommendation as a priority this year related to developing a contingency plan for access to the International Space Station. This brings the total number of priority recommendations to nine. (See the enclosure for the list of these recommendations.)

The nine priority recommendations fall into the following two major areas listed below, which are derived from GAO's High-Risk List and duplication and cost-savings reporting.

¹Priority recommendations are those that GAO believes warrant priority attention from heads of key departments or agencies. They are highlighted because, upon implementation, they may significantly improve government operations, for example, by realizing large dollar savings; eliminating mismanagement, fraud, and abuse; or making progress toward addressing a high-risk or fragmentation, overlap, or duplication issue.

²GAO, *Performance and Accountability Report: Fiscal Year 2018*, [GAO-19-1SP](#) (Washington, D.C.: Nov. 15, 2018).

Monitoring Program Costs and Execution. NASA's acquisition management is one of the highest risks facing the government. Many of our eight priority recommendations in this area are focused on improving transparency into long term costs and affordability of human spaceflight programs and improving the reliability of data used to inform acquisition decisions.

For example, in July 2016, we recommended that the NASA Administrator direct the Orion program to perform an updated Joint Cost and Schedule Confidence Level analysis, which would include updating cost and schedule estimates in adherence with best practices. NASA partially concurred with the recommendation, stating that the agency reviewed, in detail, the Orion integrated cost/schedule and risk analysis methodology and determined the rigor to be a sufficient basis for the agency commitments. Since then, NASA has stated multiple times that it has no intent to update the analysis. We maintain that NASA should update its analysis that informed its baseline because we found that the cost and schedule estimates underlying those baselines are not reliable as they did not conform to best practices. Further, an updated analysis would be beneficial given numerous conditions and risks have changed since the analysis was completed, including delays to the launch date for the first mission.

Implementing these priority recommendations in this area is critical for NASA to provide assurance that the progress the agency has made toward addressing key acquisition management issues will be sustained on NASA's largest and most complex missions.

Improving Efficiency and Effectiveness. We have identified federal research grants as an area that multiple agencies should better coordinate and manage fragmentation, and address variation in grants' administrative requirements to reduce universities' workload and compliance costs. In June 2016, we recommended to further standardize administrative research requirements, the Secretary of Energy, the NASA Administrator, the Secretary of Health and Human Services, and the Director of the National Science Foundation should coordinate through the Office of Science and Technology Policy's Research Business Models working group to identify additional areas where they can standardize requirements and report on these efforts. This is an area we track as part of our annual effort to identify and report on federal agencies, programs, and initiatives with fragmented, overlapping, or duplicative goals or activities, and ways to reduce costs or enhance revenue.³

In line with our June 2016 recommendation, the Office of Science and Technology Policy's Research Business Models working group, which includes NASA, has begun to identify additional areas for standardizing administrative requirements for federal research grants, such as the policy for what constitutes a financial conflict of interest. Continued coordination among NASA and other research-funding agencies is needed to fully implement this recommendation.

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In March, we issued our biennial update to our high-risk program, which identifies government operations with greater vulnerabilities to fraud, waste, abuse, and mismanagement or the need for transformation to address economy, efficiency, or effectiveness challenges.⁴ Our high-risk

³For more information on our work identifying opportunities to reduce fragmentation, overlap, and duplication, see <https://www.gao.gov/duplication/overview>.

⁴ GAO, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High-Risk Areas*, GAO-19-157SP (Washington, D.C.: Mar. 6, 2019).

program has served to identify and help resolve serious weaknesses in areas that involve substantial resources and provide critical service to the public.

One of our high-risk areas, NASA acquisition management, centers directly on NASA. Several other government-wide high-risk areas including (1) ensuring cybersecurity of the nation, (2) improving management of IT acquisitions and operations, (3) strategic human capital management, (4) managing federal real property, and (5) government-wide personnel security clearance process, also have direct implications for NASA and its operation. We urge your attention to the NASA and government-wide high-risk issues as they related to NASA. Progress on high-risk issues has been possible through the concerted actions and efforts of Congress, Office of Management and Budget, and the leadership and staff in agencies, including within NASA.⁵

Copies of this report are being sent to the Director of the Office of Management and Budget and appropriate congressional committees including the Committees on Appropriations, Budget, and Homeland Security and Governmental Affairs, United States Senate; and the Committees on Appropriations, Budget, and Oversight and Reform, House of Representatives. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

I appreciate NASA's continued commitment to these important issues. If you have any questions or would like to discuss any of the issues outlined in this letter, please do not hesitate to contact me or Michele Mackin, Managing Director, Contracting and National Security Acquisitions at mackinm@gao.gov or (202) 512-4841. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Our teams will continue to coordinate with your staff on all of the 51 open recommendations, as well as those additional recommendations in the high-risk areas for which NASA has a leading role. Thank you for your attention to these matters.

Sincerely yours,

A handwritten signature in black ink that reads "Gene L. Dodaro". The signature is written in a cursive style with a large, sweeping "D" at the end.

Gene L. Dodaro
Comptroller General
of the United States

Enclosure

cc: The Honorable Mick Mulvaney, Director, OMB

⁵For a full discussion of the NASA Acquisition Management high risk area see pages 222 to 226 of our 2019 high risk report.

Priority Open Recommendations to NASA

Monitoring Program Costs and Execution

NASA: Actions Needed to Improve Transparency and Assess Long-Term Affordability of Human Exploration Programs. [GAO-14-385](#). Washington, D.C.: May 8, 2014.

Recommendation: To provide the Congress with the necessary insight into program affordability, ensure its ability to effectively monitor total program costs and execution, and facilitate investment decisions, the NASA Administrator should direct the Human Exploration and Operations Mission Directorate to establish a separate cost and schedule baseline for work required to support the Space Launch System (SLS) Block I Exploration Mission (EM)-2 and report this information to the Congress through NASA's annual budget submission. If NASA decides to fly the SLS Block I beyond EM-2, establish separate life-cycle cost and schedule baseline estimates for those efforts, to include funding for operations and sustainment, and report this information annually to Congress via the agency's budget submission.

Actions Needed: NASA partially agreed with this recommendation, stating that it defined and documented life-cycle costs for SLS to a first demonstrated capability, consistent with cost estimating best practices and NASA project and program management policy and that it would report costs associated with the second exploration mission via its annual budget submission.

Best practices for cost estimating recognize that NASA's evolutionary development approach for SLS helps reduce risk and provide capabilities more quickly, but reporting costs via the budget alone will not provide information about potential costs over the long term and progress cannot be assessed without a baseline that serves as a means to compare current costs against expected costs. To address this recommendation, NASA needs to establish separate cost and schedule baselines for work required to support SLS for EM-2.

Recommendation: To provide the Congress with the necessary insight into program affordability, ensure its ability to effectively monitor total program costs and execution, and facilitate investment decisions, because NASA intends to use the increased capabilities of the SLS, Orion, and Ground Systems Development and Operations efforts well into the future and has chosen to estimate costs associated with achieving the capabilities, the NASA Administrator should direct the Human Exploration and Operations Mission Directorate to establish separate cost and schedule baselines for each additional capability that encompass all life-cycle costs, to include operations and sustainment. When NASA cannot fully specify costs due to lack of well-defined missions or flight manifests, forecast a cost estimate range—including life-cycle costs—having minimum and maximum boundaries. These baselines or ranges should be reported to Congress annually via the agency's budget submission.

Actions Needed: NASA partially agreed with this recommendation, stating that it had established separate programs for SLS, Orion, and the ground systems and adopted a block upgrade approach for SLS. While NASA's prior establishment of SLS, Orion, and the ground systems as separate programs lends some insight into expected costs and schedule at the broader program level, it does not meet the intent of the recommendation because cost and schedule identified at that level is unlikely to provide the detail necessary to monitor the progress of each block against a baseline. To address this recommendation, NASA needs to

establish separate cost and schedule baselines for each additional SLS, Orion, and Ground Systems Development and Operations capability blocks that encompass all life-cycle costs, to include operations and sustainment.

High-Risk Area: NASA Acquisition Management

Director: Cristina Chaplain, Contracting and National Security Acquisitions

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Space Launch System: Resources Need to Be Matched to Requirements to Decrease Risk and Support Long Term Affordability. [GAO-14-631](#). Washington, D.C.: July 23, 2014.

Recommendation: To provide the Congress with the necessary insight into program planning and affordability, and to decrease the risk of cost and schedule overruns, NASA's Administrator should direct the Human Exploration and Operations Mission Directorate to structure each future increment of SLS capability with a total cost exceeding the \$250 million threshold for designation as a major project as a separate development effort within the SLS program. In doing so, NASA should require each increment to complete both the technical and programmatic reviews required of other major development projects, per the agency's acquisition and system engineering policies.

Actions Needed: NASA agreed with this recommendation. NASA stated that it will conduct appropriate element- and vehicle-level technical design and programmatic reviews and perform rigorous cost and schedule management. To fully implement this recommendation, however, NASA needs to structure each future increment of SLS capability with a total cost exceeding \$250 million as a major project.

Recommendation: To provide the Congress with the necessary insight into program planning and affordability, and to decrease the risk of cost and schedule overruns, NASA's Administrator should direct the Human Exploration and Operations Mission Directorate to identify a range of possible missions for each future SLS variant that includes cost and schedule estimates and plans for how those possible missions would fit within NASA's funding profile.

Actions Needed: NASA agreed with this recommendation. NASA officials stated that it is currently reviewing and updating its mission portfolio to align with Space Policy Directive-1. To fully address this recommendation, NASA will need to identify cost and schedule estimates for possible SLS missions beyond its first exploration mission, EM-1, and how its planned missions would fit within NASA's funding profile.

Recommendation: To provide the Congress with the necessary insight into program planning and affordability, and to decrease the risk of cost and schedule overruns, NASA's Administrator should direct the Human Exploration and Operations Mission Directorate to take the following action: To promote affordability, before finalizing acquisition plans for future capability variants, NASA should assess the full range of competition opportunities and provide to the Congress the agency's assessment of the extent to which development and production of future elements of the SLS could be competitively procured.

Actions Needed: NASA agreed with this recommendation. NASA officials stated that it is in the process of identifying a procurement approach to manage procurement costs and provide flexibility in an environment of changing missions and flight manifests that may necessitate design changes and require procurement flexibility. Officials stated that NASA will implement an acquisition strategy for future missions in 2019. To fully implement this recommendation, this

approach would have to assess the full range of competition opportunities for future elements of SLS that NASA plans to acquire, and report it to Congress.

High-Risk Area: NASA Acquisition Management

Director: Cristina Chaplain, Contracting and National Security Acquisitions

Contact information: chaplainc@gao.gov, (202) 512-4841

NASA: Earned Value Management Implementation across Major Spaceflight Projects is Uneven. [GAO-13-22](#). Washington, D.C.: November 19, 2012.

Recommendation: To improve NASA management and oversight of its spaceflight projects, and to improve the reliability of project earned value management (EVM) data, the NASA Administrator should direct the appropriate offices to modify the NASA Procedural Requirements 7120.5 to require projects to implement a formal surveillance program that: (1) Ensures anomalies in contractor-delivered and in-house monthly EVM reports are identified and explained, and report periodically to the center and mission directorate's leadership on relevant trends in the number of unexplained anomalies. (2) Ensures consistent use of work breakdown structures (WBSs) for both the EVM report and the schedule. (3) Ensures that lower-level EVM data reconcile with project-level EVM data using the same WBS. (4) Improves underlying schedules so that they are properly sequenced using predecessor and successor dependencies and are free of constraints to the extent practicable so that the EVM baseline is reliable.

Actions needed: NASA partially agreed with this recommendation, stating that the reliability and utility of the EVM data needed to be improved but that it did not plan to implement a formal surveillance plan due to resource constraints. Since commenting on the report, in December 2018, NASA included an initiative in its Corrective Action Plan—a plan put in place in response to recent programmatic performance and NASA's designation on GAO's High-Risk List—to enhance EVM implementation. To fully implement this recommendation, NASA will need to take action and provide documentary support for several of its identified planned next steps to enhance EVM surveillance. Without implementing proper surveillance, NASA may be utilizing unreliable EVM data in its analyses to inform its cost and schedule decision making.

High-Risk Area: NASA Acquisition Management

Director: Cristina Chaplain, Contracting and National Security Acquisitions

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Orion Multi-Purpose Crew Vehicle: Action Needed to Improve Visibility into Cost, Schedule, and Capacity to Resolve Technical Challenges. [GAO-16-620](#). Washington, D.C.: July 27, 2016.

Recommendation: To provide the Congress and NASA reliable estimates of program cost and schedule that are useful to support management and stakeholder decisions, the NASA Administrator should direct the Orion program to perform an updated Joint Cost and Schedule Confidence Level analysis including updating cost and schedule estimates in adherence with cost and schedule estimating best practices.

Actions Needed: NASA partially agreed with this recommendation, stating that the agency reviewed, in detail, the Orion integrated cost/schedule and risk analysis methodology and determined the rigor to be a sufficient basis for the agency commitments. In September 2018, NASA officials reiterated previous statements that they have no plans to update the joint confidence level analysis for the Orion program. We maintain that NASA should update its analysis that informed its baseline because we found that the cost and schedule estimates

underlying those baselines are not reliable, as they did not conform to best practices. Further, an updated analysis would be beneficial given numerous conditions and risks have changed since the analysis was completed, including delays for the first exploration mission.

High-Risk Area: NASA Acquisition Management

Director: Cristina Chaplain, Contracting and National Security Acquisitions

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NASA Commercial Crew Program: Plan Needed to Ensure Uninterrupted Access to the International Space Station. [GAO-18-476](#). Washington, D.C.: July 11, 2018.

Recommendation: The NASA Administrator should develop and maintain a contingency plan for ensuring a presence on the International Space Station (ISS) until a Commercial Crew Program contractor is certified.

Actions Needed: NASA agreed with this recommendation. NASA is considering contracting with the State Space Corporation "Roscosmos" for two seats on the Russian Soyuz spacecraft vehicle for one crewmember in the fall of 2019 and one crewmember in the spring of 2020. To fully implement this recommendation, NASA needs to provide additional support regarding planning efforts to ensure uninterrupted access to the ISS if delays with the Commercial Crew Program contractors continue beyond these dates.

High-Risk Area: NASA Acquisition Management

Director: Cristina Chaplain, Contracting and National Security Acquisitions

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Improving Efficiency and Effectiveness

Federal Research Grants: Opportunities Remain for Agencies to Streamline Administrative Requirements. [GAO-16-573](#). Washington, D.C.: June 22, 2016.

Recommendation: To further standardize administrative research requirements, the Secretary of Energy, the NASA Administrator, the Secretary of Health and Human Services, and the Director of the National Science Foundation should coordinate through the Office of Science and Technology Policy's Research Business Models working group to identify additional areas where they can standardize requirements and report on these efforts.

Actions Needed: NASA agreed with this recommendation and stated that it had started to address this recommendation through meetings with an interagency working group. In May 2018, this group identified several potential areas for standardization or harmonization of requirements, such as the policy for what constitutes a financial conflict of interest.

Managing Director: John Neumann, Science, Technology Assessment, and Analytics

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