

GAO

Report to the Ranking Minority  
Member, Committee on Governmental  
Affairs, U.S. Senate

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November 2001

NASA

Status of Plans for  
Achieving Key  
Outcomes and  
Addressing Major  
Management  
Challenges



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United States General Accounting Office  
Washington, DC 20548

November 27, 2001

The Honorable Fred Thompson  
Ranking Minority Member  
Committee on Governmental Affairs  
United States Senate

Dear Senator Thompson:

As you requested, we reviewed the National Aeronautics and Space Administration's (NASA) fiscal year 2002 performance plan required by the Government Performance and Results Act of 1993 (GPRA)<sup>1</sup> to assess the agency's planned performance for the selected key outcomes that you identified as important mission areas for the agency.<sup>2</sup> These are the same outcomes we addressed in our June 2000 review of NASA's fiscal year 1999 performance report and fiscal year 2001 performance plan to provide a baseline by which to measure the agency's performance from year to year.<sup>3</sup> We also addressed these outcomes in our July 2001 review of NASA's fiscal year 2000 performance report.<sup>4</sup> As agreed with your office, we are issuing this separate report on our assessment of the selected outcomes in NASA's fiscal year 2002 performance plan. The selected key outcomes are to

- expand scientific knowledge of the Earth system,
- expand the commercial development of space, and
- deploy and operate the International Space Station (ISS) safely and cost effectively.<sup>5</sup>

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<sup>1</sup>P.L. 103-62, 107 Stat. 285.

<sup>2</sup>This report is one of a series of reports on the 24 Chief Financial Officers (CFO) Act of 1990 (P.L. 101-576, 104 Stat. 2838) agencies' fiscal year 2000 performance reports and fiscal year 2002 performance plans.

<sup>3</sup>*Observations on the National Aeronautics and Space Administration's Fiscal Year 1999 Performance Report and Fiscal Year 2001 Performance Plan* (GAO/NSIAD-00-192R, June 30, 2000).

<sup>4</sup>*NASA: Status of Achieving Key Outcomes and Addressing Major Management Challenges* (GAO-01-868, July 31, 2001).

<sup>5</sup>NASA's fiscal year 2002 performance plan identifies an objective closely related to this key outcome. That objective is to operate the space station to advance science, exploration, engineering, and commerce. We based our assessment on that objective.

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As agreed, using the selected key outcomes for NASA as a framework, we (1) assessed NASA's planned progress toward achieving these outcomes, and the strategies the agency has in place to achieve them; and (2) compared NASA's fiscal year 2002 performance plan with the agency's prior year performance plan for these outcomes. Additionally, we agreed to analyze how NASA addressed its major management challenges, including the governmentwide high-risk areas of strategic human capital management and information security, that we and NASA's Office of Inspector General (OIG) identified. Appendix I provides detailed information on how NASA addressed these challenges. Appendix II contains NASA's comments on a draft of our report.

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## Results in Brief

NASA has improved its fiscal year 2002 performance plan and responded to recommendations or suggestions by us and others to make its plan more useful—particularly by providing more comprehensive explanations on how it plans to verify and validate performance data and by better portraying how its performance goals will benefit the public. Generally, NASA's annual performance goals for its outcomes appear to be objective and help to measure progress toward the outcomes. However, the plan still does not explain the reasons for changes in performance goals. Not having these explanations could hinder the ability to assess NASA's performance over time.

- Planned outcome: Expanding scientific knowledge of the Earth system.

NASA's annual performance goals for this outcome appear objective; and many of the supporting performance indicators increase the measurability of the performance goals. Also, in response to the NASA Advisory Council's specific recommendation, NASA explains how each performance goal will benefit the public. However, these performance goals and indicators do not reflect programs and activities being undertaken with other agencies for the strategic goal, "observe, understand, and model the Earth system to learn how it is changing and the consequences for life on Earth," even though NASA's recently updated Strategic Plan identifies 16 federal partners contributing to this goal.<sup>6</sup>

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<sup>6</sup>We based our assessment of the Earth Science outcome on this strategic goal. The performance plan does reflect collaboration with other partners for one strategic goal within this outcome not covered by our review.

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NASA's strategies for achieving this outcome appear to be clear and reasonable.

- Planned outcome: Expanding the commercial development of space.

NASA generally presents performance goals that appear objective and measurable for this outcome and explains how each will benefit the public. Although the agency's strategies for meeting these performance goals are generally clear and reasonable, there are some exceptions. For example, the goal to develop and test competing technologies for human missions beyond low earth orbit in cooperation with international partners does not address how NASA will actually test those technologies.

- Planned outcome: Deploying and operating the International Space Station safely and cost-effectively.

NASA's performance goals for this outcome appear objective and measurable, and NASA explains how they will benefit the public. However, one of the indicators for the safety performance goal is not articulated understandably, which makes it difficult to ascertain its relationship to the performance goal or assess its measurability. Also, the plan does not clearly indicate how NASA will ensure that the safety goal is achieved, nor does it show how the agency will achieve the remaining three performance goals of (1) demonstrating space station progress and readiness at a level sufficient to show adequate readiness in the assembly schedule, (2) successfully completing 90% of the space station's planned mission objectives, and (3) demonstrating progress toward developing space station research hardware. NASA does not sufficiently elaborate on the nature of its space station budget accountability reforms mentioned in the plan, nor how the reforms will address space station cost growth, a long-standing and ongoing management problem. Furthermore, it does not acknowledge anywhere in the plan that the International Space Station cost control issue is a management challenge—although it does so for some of the other challenges.

NASA has made improvements in its fiscal year 2002 performance plan when compared to its 2001 plan. In addition to its verification and validation efforts, NASA adds several features that enhance the format and/or content of its performance plan, including a better characterization of its annual performance measures as "goals" instead of "targets." It also adds discussions on how its annual performance goals will benefit the public and displays annual performance goals and associated performance assessments for fiscal years 1999 to 2002, to help demonstrate cumulative

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progress towards achievement of strategic goals and objectives. Moreover, NASA adds an agencywide human capital objective and associated annual performance goals and indicators to the plan. However, NASA can further enhance the credibility of its verification and validation efforts by being more forthcoming about possible limitations in its performance data. Furthermore, it can relate its human capital performance goals and indicators to specific programs where issues of critical staffing shortages have been identified. It can also enhance understanding of its rationale for characterizing successful achievement despite not meeting all supporting performance indicators for its goals by including in the plan an explanation for its decision to use this approach. And it can provide a clear rationale for how information technology-related strategies and programs will contribute specifically to the achievement of its goals and show the allocation of information technology-related dollars and personnel to performance goals.

In assessing how NASA addressed major management challenges, we found the agency's performance plan has strategic objectives and performance goals and measures related to two of our governmentwide high-risk areas—strategic human capital management and information security. While NASA's inclusion of human capital as a strategic objective is an improvement, it did not tie its performance goals and indicators to specific programs facing human capital shortages, such as the space shuttle program. Regarding information security, the plan's performance goals are not fully responsive to recommendations we made in our 1999 report.

In addition, we identified three other challenges facing NASA: (1) correcting contract management weaknesses, (2) controlling International Space Station costs, and (3) effectively implementing the faster-better-cheaper approach to space exploration projects. We found that NASA's performance plan has an annual performance goal and measures directly related to the challenge of correcting contract management weaknesses. However, until NASA's Integrated Financial Management System—which is central to providing effective management and oversight over its procurement dollars—is operational, performance and cost assessments may be incomplete. The plan contains an annual performance goal and indicator that are indirectly related to the challenge of controlling International Space Station costs. But the plan does not indicate the extent NASA will address space station cost growth. Furthermore, the plan does not include goals and measures directly related to effective implementation of the faster-better-cheaper approach to space exploration projects.

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We provided copies of a draft of this report to NASA for its review and comment. In written comments on the report, NASA generally agreed with the information presented in the report and noted several improvements it would make to its fiscal year 2001 performance report and/or fiscal year 2003 performance plan. NASA's written comments are included as appendix II.

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## Background

GPRA is intended to shift the focus of government decisionmaking, management, and accountability from activities and processes to the results and outcomes achieved by federal programs. New and valuable information on the plans, goals, and strategies of federal agencies has been provided since federal agencies began implementing GPRA. Under GPRA, annual performance plans are to clearly inform the Congress and the public of (1) the annual performance goals for agencies' major programs and activities, (2) the measures that will be used to gauge performance, (3) the strategies and resources required to achieve the performance goals, and (4) the procedures that will be used to verify and validate performance information. These annual plans, issued soon after transmittal of the President's budget, provide a direct linkage between an agency's longer-term goals and mission and day-to-day activities.<sup>7</sup> Annual performance reports are to report subsequently on the degree to which performance goals were met. The issuance of the agencies' performance reports, due by March 31 of each year, represents a new and potentially more substantive phase in the implementation of GPRA—the opportunity to assess federal agencies' actual performance for the prior fiscal year and to consider what steps are needed to improve performance, and reduce costs in the future.<sup>8</sup> NASA's final performance plan was provided to the Congress on July 17, 2001.

NASA's mission encompasses human exploration and development of space, the advancement and communication of scientific knowledge, and research and development of aeronautical and space technologies. Its activities span a broad range of complex and technical endeavors—from investigating and evaluating the composition and resources of Mars; to working with international partners to complete and operate the International Space Station; to providing satellite and aircraft observations

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<sup>7</sup>The fiscal year 2002 performance plan is the fourth of these annual plans under GPRA.

<sup>8</sup>The fiscal year 2000 performance report is the second of these annual reports under GPRA.

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of earth for scientific and weather forecasting purposes; to developing new technologies designed to improve air flight safety.

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## Assessment of NASA's Performance Goals and Strategies for Accomplishing Selected Key Outcomes

This section discusses our analysis of NASA's performance goals and measures and strategies the agency has in place, particularly strategic human capital management<sup>9</sup> and information technology, for accomplishing the outcomes. In discussing these outcomes, we have also provided information drawn from our prior work on the extent to which the agency provides assurance that its reported performance information will be credible.

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### Scientific Knowledge of the Earth System

NASA revised its strategic goal and most of its objectives for this key outcome in its fiscal year 2002 performance plan. We based our assessment on the strategic goal to observe, understand, and model the Earth system to learn how it is changing and the consequences of change for life on this planet. The previous goal was to expand scientific knowledge by characterizing the Earth system.

NASA's performance plan does not explain why it adjusted its previous strategic goal and objectives, nor does it explain why it developed newly formulated annual performance goals and supporting indicators for fiscal year 2002. In discussing the reasons for these changes, NASA officials told us that changes in goals and measures were necessitated by the formulation of new strategic science questions for the Earth Science Enterprise and a refocused strategic plan. In our view, providing this explanation in the plan would have been useful. The performance plan includes a chart that displays annual performance goals and associated performance assessments for fiscal years 1999 to 2002, to help demonstrate cumulative progress towards achievement of strategic goals and objectives and to facilitate performance trend analysis. However, explaining changes in goals and measures over time would improve the performance trend analyses, and clarify the reasons for the new measures. On the other hand, by changing its performance goals annually, NASA

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<sup>9</sup>Key elements of modern strategic human capital management include strategic human capital planning and organizational alignment; leadership continuity and succession planning; acquiring and developing staffs whose size, skills, and deployment meet agency needs; and creating results-oriented organizational cultures.



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could hinder its ability to make comparisons between fiscal years and effectively analyze trends in performance.

Generally, NASA's fiscal year 2002 annual performance goals for this outcome appear to be objective and help to measure progress toward achieving it. Specific ways to measure the performance goals are established through two or more indicators that in many cases provide specific, quantifiable values that increase the measurability of the performance goal. An example of such an indicator is: "Increase the coverage of space-based maps of coral reef distribution by 25 percent beyond current estimates using remotely sensed imagery." NASA added discussions on how each performance goal would benefit the public, as recommended by the NASA Advisory Council in its evaluation of NASA's fiscal year 2000 performance report. In some cases these discussions clearly articulate the benefit to the public; in other cases they only provide descriptive or background information. For example, one performance goal calls for increasing the understanding of stratospheric ozone changes, as the abundance of ozone-destroying chemicals decreases and new substitutes increases. The public benefit statement, "Reduction in atmospheric ozone amounts leads to an increased flux of ultraviolet radiation at the Earth's surface, with harmful effects on plant and animal life including human health," explains the effect of reduced ozone amounts rather than how the goal will benefit the public.

NASA indicates that it will consider many of the Earth Science goals as fully met if a specified number of the supporting indicators (such as 3 out of 4) are achieved in fiscal year 2002. NASA officials told us that this approach allows for some flexibility in rating success. Specifically, since research and development by its very nature is unpredictable, these officials believe that, for example, not meeting all indicators still implies significant progress in achieving scientific goals. NASA could fully explain in the plan why it does not believe it has to meet all supporting indicators. This would put its actual performance in the proper perspective. The following is one example of such a goal:

"Annual performance goal – Increase understanding of global precipitation, evaporation and how the cycling of water through the Earth system is changing by meeting at least 3 of 4 performance indicators.

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## Indicators

- Combine analysis of global water vapor, precipitation and wind data sets to decipher variations (and possible trends) in the cycling of water through the atmosphere and their relation to sea surface temperature changes.
- Analyze data from polar and geostationary satellites in a consistent fashion over at least two decades to evaluate whether the detectable moisture fluxes are increasing beyond the expected ranges of natural variability.
- Determine the time and spatial variability of the occurrence of strong convection regions, precipitation events, and areas of drought to assess whether or not there are discernable global changes in the distribution of moisture availability useful to food and fiber production and management of fresh water resources.
- Establish passive and active rainfall retrievals of zonal means to establish a calibration point for long-term data records of the World Climate Research Program, Global Precipitation Climatology Project (GPCP).”

Concerning interagency and crosscutting activities, we note that within this outcome, NASA does not include annual performance goals and indicators that reflect programs or activities being undertaken with other agencies in fiscal year 2002 for the strategic goal covered by our review, even though NASA’s latest Strategic Plan identifies 16 federal agencies that contribute to this goal.<sup>10</sup> These agencies include the departments of Defense and Commerce, the National Oceanic and Atmospheric Administration, and the Federal Emergency Management Agency. If NASA has planned collaborative efforts related to the performance goals and indicators for this outcome, these are not identified in the performance plan. The performance plan provides an opportunity to evidence coordination among crosscutting programs and reflect the expected contribution of other agencies toward related goals.

NASA states that its implementation strategy for Earth Science research programs is focused on a set of strategic science questions directed at understanding how the Earth system is changing and the consequences for

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<sup>10</sup>The performance plan does include an objective and annual performance goals that reflect collaboration with other agencies for one strategic goal within this outcome not covered by our review. That strategic goal is to develop and adopt advanced technologies to enable mission success and serve national priorities.

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life on Earth. The plan indicates that these questions can be addressed effectively with NASA's capabilities, which include observational programs, research and analysis, modeling, and advanced technology. In general, the plan provides clear and reasonable information technology. One annual performance goal within this outcome is to successfully disseminate Earth Science data to enable NASA's Earth Science research and applications goals and objectives. To achieve this goal, NASA set several specific performance indicators, such as increasing the number of distinct NASA Earth Observing System Data and Information System (EOSDIS) customers by 20 percent compared to fiscal year 2001; increasing scientific and applications-data products delivered from the Earth Observing System (EOS) Distributed Active Archive Centers (DAAC) by 10 percent compared to fiscal year 2001; and increasing the number of favorable comments from DAAC and other users over fiscal year 2001 and decreasing the total percentage of order errors by 5 percent over fiscal year 2001. These indicators provide specific, quantifiable ways to measure increases in output from NASA's EOSDIS and DAACs. Based on NASA's reported success in meeting similar indicators for fiscal year 2000, these indicators appear to be reasonable for fiscal year 2002.

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## Commercial Development of Space

In some instances, NASA revised or added strategic goals and objectives, and annual performance goals within this outcome for fiscal year 2002. For example, the agency added (1) a new strategic goal to provide commercial industry with the opportunity to meet NASA's future launch needs, including human access to space, with new launch vehicles that promise to dramatically reduce cost and improve safety and reliability and (2) a new strategic objective to develop new capabilities for human space flight and commercial applications through partnerships with the private sector. Furthermore, most of the annual performance goals are either new or revised from targets in NASA's prior year performance plan. Further, NASA does not provide any rationale or reasons for the changes in the plan. NASA officials told us that, generally, the changes were made to (1) improve NASA's ability to assess progress toward achieving goals and objectives; (2) reflect commitment to safety and privatization efforts; or (3) reflect the broader scope of programs and activities and shifts in Enterprise responsibilities. Again, providing such explanations in the performance plan, in our view, would have been useful.

NASA displays its annual performance goals and associated performance assessments for fiscal years 1999 to 2002 to help demonstrate cumulative progress towards achievement of strategic goals and objectives and to facilitate performance trend analysis. As emphasized earlier, changing

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performance goals annually could hinder NASA's ability to make comparisons between years and effectively analyze trends in performance. NASA generally presents performance goals that appear to be objective and help to measure progress toward this outcome. The agency also explains how each performance goal will benefit the public.

The strategies for achieving the performance goals are generally clear and reasonable. However, there are some exceptions. For example, one performance goal involves developing and testing – on the ground and in space—competing technologies for human missions beyond low earth orbit in cooperation with international partners. One indicator related to this performance goal involves organizing and conducting an “international forum” at which preliminary concepts, plans, and technology options for future human/robotic exploration and development of space would be reviewed. However, the indicator does not address the testing of competing technologies. Also, NASA has a performance goal to engage the commercial community and encourage non-NASA investment in commercial space research by meeting at least three of four performance indicators, but the plan does not state why all of the supporting indicators will not be achieved.

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## International Space Station's Operation, Cost, and Safety

Since the selected key outcome of deploying and operating the space station safely and cost effectively is not included in NASA's fiscal year 2002 performance plan as a specific strategic goal or objective, we based our assessment of it on a related strategic objective in the plan—to operate the space station to advance science, exploration, engineering, and commerce.

NASA set four annual performance goals for this outcome for fiscal year 2002. The performance goals are new, but the plan does not provide any rationale for the changes. This is an important omission, because as pointed out earlier, explaining changes in goals and measures over several years would improve performance trend analyses and clarify why such changes were made. In discussing the reasons for these changes, NASA officials told us that for the International Space Station, the fiscal year 2001 goals and objectives relied on milestones that were reported as either complete or incomplete, with no provision for reporting progress toward completion. The improved goals and objectives for fiscal year 2002 are tied to milestones that allow reporting of progress in terms of the percent of the milestones completed. Thus, the new measures will provide greater visibility and improve NASA's ability to assess progress toward achieving goals and objectives. In our view, providing this explanation in the plan

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would have enhanced NASA's discussion on this outcome. Also, similar to the previous outcomes, NASA displays performance goals and associated assessments for fiscal years 1999 to 2002 to help demonstrate cumulative progress towards achievement of strategic goals and objectives and to facilitate performance trend analysis. However, changing performance goals annually could hinder NASA's ability to make comparisons between fiscal years and effectively analyze trends in performance.

Generally, NASA's four annual performance goals and supporting indicators for the space station outcome appear to be objective and help to measure progress toward this outcome. In addition, the agency explains how the goals will benefit the public, stating how completing them successfully will provide many benefits of space research through new discoveries and improved technological applications in areas such as medicine, industrial processes, and fundamental knowledge. One performance goal addresses space station safety. Specifically, the goal is to demonstrate space station on-orbit vehicle's operational safety, reliability, and performance. The goal has an indicator that provides for zero safety incidents (such as no on-orbit injuries), which appears reasonable. The other indicator is not articulated understandably, making it difficult to ascertain its relationship to the performance goal or to assess its measurability. (The language is phrased as: "Actual resources available to the payloads measured against the planned payload allocation for power, crew time, and telemetry.") Also, the plan does not clearly indicate the means or strategies NASA will use to ensure that the safety performance goal is achieved in fiscal year 2002. Similarly, the plan does not provide clear strategies for achieving the remaining three performance goals of (1) demonstrating space station progress and readiness at a level sufficient to show adequate readiness in the assembly schedule, (2) successfully completing 90% of the space station's planned mission objectives, and (3) demonstrating progress toward space station research hardware development.

NASA does not address space station cost control as part of this outcome. However, within its commercialization of space outcome, NASA set a performance goal in fiscal year 2002 to develop and execute a management plan and open future ISS hardware and service procurements to cost-effective innovation through competition, including launch services and a non-governmental organization for space station research. NASA's indicator for the management plan includes reforms that (1) strengthen its headquarters involvement, (2) increase communications, (3) provide more accurate assessment, and (4) maintain budget accountability. NASA reports that the benefit to the public of the

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management plan and reforms is to ensure that future space station costs will remain within the President's fiscal year 2002 budget plan. In our view, NASA's discussion of the proposed management plan is minimal and lacks specificity. While the management plan will reportedly include ISS budget accountability reforms, NASA does not elaborate on the nature of such reforms or indicate to what extent this plan will address space station cost growth, a long-standing management problem. Furthermore, NASA does not acknowledge anywhere in the performance plan that space station cost control is a major management challenge, although it has done so for some of the other challenges. In past years and as recently as January 2001, we have identified the need to control space station costs as a major management challenge for NASA.<sup>11</sup> We believe that the agency has the opportunity to use the completed management plan to facilitate the development of space station cost control measures in future annual performance plans. The lack of performance measures that address space station cost control is a shortcoming that we have identified in our previous reviews of the agency's annual performance plans and reports.

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## Comparison of NASA's Fiscal Year 2002 Performance Plan With the Prior Year Plan

For the selected key outcomes, this section describes major improvements or remaining weaknesses in NASA's fiscal year 2002 performance plan in comparison with its fiscal year 2001 performance plan. It also discusses the degree to which the agency's fiscal year 2002 plan addresses concerns and recommendations by the Congress, GAO, NASA's OIG, and others.

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## Comparison of Performance Plans for Fiscal Years 2001 and 2002

NASA's fiscal year 2002 performance plan differs in several significant ways from the prior plan. First, NASA portrays its planned efforts to verify and validate performance information more comprehensively than in 2001, providing greater confidence that the performance results will be credible. In our review of NASA's 2001 plan, we criticized the agency for not explicitly describing those efforts and for not addressing data limitation issues and problems. The 2002 plan includes specific agency data bases and describes methods NASA will rely on to support the credibility of reported performance information. For example, the plan references the NASA Personnel Payroll System, Incident Reporting System, Financial and

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<sup>11</sup> *Major Management Challenges and Program Risks: National Aeronautics and Space Administration* (GAO-01-258, Jan. 2001).

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Contractual Status of Programs System, and NASA Environmental Tracking System as specific data bases that will be used to verify and validate performance data. The plan describes specific processes in place to support performance claims associated with NASA's Integrated Financial Management System, performance-based contracts, contracts awarded to small and small disadvantaged businesses, and information technology. And it describes a broad array of methods to verify and validate reported performance data such as monthly reports from NASA field centers, Web statistics, count of publications, and NASA's Education Computer Aided Tracking System. Despite improvements in addressing data verification and validation methods, NASA still does not acknowledge data limitations that could hinder performance measurement. We continue to believe that NASA can further enhance the credibility of its verification and validation procedures and the usefulness of its performance data by disclosing the expected limitations of its performance data in its annual performance plans. A March 2001 NASA Office of Inspector General report identified limitations in NASA's fiscal year 2000 performance data and indicated that NASA would discuss anticipated data limitations in its performance planning beginning with its fiscal year 2002 final performance plan.<sup>12</sup> However, we reviewed the final version of the plan, and such a discussion is not included.

Second, several added features help to enhance the format and/or content of the fiscal year 2002 plan. NASA's use of "annual performance goals" in the plan characterizes its annual performance measures more clearly than the "annual performance targets," used in previous plans. The addition of discussions on how annual performance goals benefit the public helps to better understand the linkage between the goal and the expected results, although in some cases additional clarification could even better convey the actual benefit to the public. Value is added to the plan by NASA's display of annual performance goals and associated performance assessments for fiscal years 1999 to 2002, to help demonstrate cumulative progress towards achievement of strategic goals and objectives and facilitate performance trend analysis. However, changes in performance goals over many years could hinder NASA's ability to make comparisons between years and effectively analyze trends in performance.

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<sup>12</sup>*Validation And Verification Of Selected NASA FY 2000 Performance Data Related To The Government Performance And Results Act (GPRA)*, (IG-01-020, Mar. 30, 2001).

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Also, this year's plan includes an agencywide strategic objective to invest in the use of human capital. NASA set two annual performance goals for fiscal year 2002 as progress towards this objective: (1) align management of human resources to best achieve agency strategic goals and (2) attract and retain a workforce that is representative at all levels of America's diversity. However, there are no human capital initiatives specifically linked to the outcomes or annual performance goals and indicators that link to specific programs, such as the space shuttle program. (See details under management challenges.)

Third, NASA could explain in the plan what procedures it has used to characterize its performance goals as fully achieved when it has not met all of the supporting indicators for those goals. This is particularly true for the Earth Science outcome. Providing such an explanation would put the actual performance in the proper perspective.

Fourth, similar to the prior plan, the fiscal year 2002 plan still does not provide a clear rationale for how information technology-related strategies and programs will contribute specifically to achievement of NASA's goals or show any allocation of information technology-related dollars and personnel to performance goals. Goals for managing information technology are generally stated in terms of broad categories for improvement, such as increased capability and efficiency and enhanced security, and include few quantitative measures. One exception is the goal of increasing dissemination of Earth Science data, which is accomplished through EOSDIS. The plan sets several specific goals for increasing the volume and distribution of Earth Science data and products.

Lastly, in our review of NASA's fiscal year 2001 plan, we suggested that NASA document in its annual performance plans and reports, the rationale for establishing new performance targets to clarify the reasons for adding such targets. We had noted that while many of NASA's annual performance targets were new each year, there was no stated basis for the changes. In its fiscal year 2002 performance plan, NASA has formulated new annual performance goals and has changed many of its strategic goals and objectives without including the reasons for doing so. We continue to believe that providing the rationale for these changes will clarify the reasons for the new goals and measures and augment the value of performance trend analyses. Also, the plan does not indicate whether or not achieving any specific goals would be negatively affected by external factors. However, like the prior plan, the fiscal year 2002 plan states that successful execution of NASA's strategic goals and objectives depends on receipt of its requested appropriations, as well as provision of funds,



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materials, or services, that have been committed to the cooperative agreements or partnerships which are referenced in the performance plan.

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## NASA's Efforts to Address its Major Management Challenges Identified by GAO

We have identified two governmentwide high-risk areas: strategic human capital management and information security. Regarding strategic human capital management, NASA's fiscal year 2002 performance plan contains a strategic objective and annual performance goals and indicators directly related to human capital. Concerning information security, NASA's performance plan contains a strategic objective, an annual performance goal, and indicators directly related to this management challenge. The plan states that safety and security is one of four areas on which NASA's information technology planning is focused. The fiscal year 2002 plan is an improvement over the 2001 plan, which did not include quantifiable measures for improving information security. However, the plan's performance goals do not fully respond to the recommendations we made in 1999 when we reported that the agency lacked an effective agencywide security program.<sup>13</sup> For example, the plan sets a performance indicator of completing 90 percent of information technology security plans for critical systems. However, we recommended that all systems be formally authorized before they became operational and at least every 3 years thereafter.

In addition, we have identified three major management challenges facing NASA: (1) correcting contract management weaknesses, (2) controlling International Space Station costs, and (3) effectively implementing the faster-better-cheaper approach to space exploration projects. We found that NASA's performance plan contains an annual performance goal and indicators directly related to the problem of contract management. It is important to note that until NASA's Integrated Financial Management System—which is central to providing effective management and oversight over its procurement dollars—is operational, performance assessments relying on cost data may be incomplete and full costing will be only partially implemented.

While NASA's performance plan contains an annual performance goal and an indicator that indirectly addresses the challenge of controlling space station costs, it does not indicate the extent that NASA will address space

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<sup>13</sup>*Information Security: Many NASA Mission-Critical Systems Face Serious Risks* (GAO/AIMD-99-47, May 20, 1999).

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station cost growth. As we discussed in our January 2001 report, the International Space Station Program continues to face cost control challenges. As with contract management, until the Integrated Financial Management System is operational, NASA may lack the cost information needed to control space station costs.

Further, NASA's performance plan did not directly address the challenge of effectively implementing the faster-better-cheaper approach to space exploration projects. In January 2001, we also reported that NASA faces significant challenges as it attempts to create highly reliable missions and foster open communications under the budget constraints of the agency's faster-better-cheaper space exploration strategy. In addition, the real success of this strategy will require a comprehensive integration of lessons learned from failures on an agencywide basis. Until NASA resolves these problems, its financial resources are vulnerable to inefficient use. Appendix I provides detailed information on how NASA addressed these challenges and high-risk areas as identified by GAO and NASA's Office of Inspector General (OIG).

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## Scope and Methodology

As agreed, our evaluation was generally based on the requirements of GPRA, guidance to agencies from the Office of Management and Budget (OMB) for developing performance plans (OMB Circular A-11, Part 2), previous reports and evaluations by us and others, our knowledge of NASA's operations and programs, our identification of best practices concerning performance planning, and our observations on NASA's other GPRA-related efforts. We also discussed our review with NASA officials and with officials of NASA's OIG. The agency outcomes that were used as the basis for our review were identified by the Ranking Minority Member of the Senate Committee on Governmental Affairs as important mission areas for NASA and do not reflect the outcomes for all of NASA's programs or activities. The major management challenges confronting NASA, including the governmentwide high-risk areas of strategic human capital management and information security, were identified in our January 2001 performance and accountability series and high risk update, and by NASA's OIG in December 2000. We conducted our review from August 2001 through October 2001 in accordance with generally accepted government auditing standards.

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## Agency Comments

We provided copies of a draft of this report to NASA for its review and comment. In written comments on the report, NASA generally agreed with the information presented in the report and noted several improvements it

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would make. Concerning our suggestion that NASA could fully explain in its performance plan why it believes it is not necessary to achieve all performance indicators to demonstrate annual performance goal achievement, NASA stated that it would provide a statement containing the supporting rationale for this approach in its fiscal year 2003 performance plan.

In responding to our observation that the fiscal year 2002 plan lacked sufficient detail on the nature of the ISS's budget accountability reforms or how the reforms will address longstanding and ongoing management problems, including cost growth, NASA commented that the reforms are contained in its Program Management Action Plan that will be referred to in the fiscal year 2003 performance plan. We note that the ISS Program is being restructured in response to a potential cost growth of \$4.8 billion. The restructuring has raised widespread concerns about the potential science benefits to be realized by the United States and international partners. For this reason, we believe it is increasingly important for NASA's performance plan to provide a clear path showing how NASA intends to implement the needed reforms and how the reforms will add credibility to future ISS budgets and resolve the uncertainties concerning the utility of the ISS.

NASA also commented on a statement in our draft report that the agency does not provide a clear rationale for how IT-related strategies and programs will contribute specifically to achievement of its goals or show the allocation of IT-related dollars and personnel to performance goals. According to NASA, the IT service delivery metric in the plan aggregates each major IT service, such as NASA's Integrated Services Network. Remaining IT investments are embedded in each NASA project and managed as part of the project. While this statement may be true on the individual program level, it does not address GPRA objectives to demonstrate how IT-related strategies and programs contribute specifically to the achievement of agency goals or show the allocation of related resources.

Finally, in response to our observation regarding NASA's lack of explanations in the 2002 plan for annual performance changes, NASA agreed that including such explanations in the plan would be useful and that it would characterize reasons for annual performance changes in its 2003 performance plan.

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As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the

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date of this letter. At that time, we will send copies to appropriate congressional committees; the NASA Administrator; and the Director, Office of Management and Budget. Copies will also be made available to others on request.

If you or your staff have any questions, please call me at (202) 512-4841. Key contributors to this report were Richard J. Herley, Shirley B. Johnson, Charles W. Malphurs, Christina Chaplain, John de Ferrari, Diane G. Handley, and Fannie M. Bivins.

Sincerely yours,

A handwritten signature in black ink that reads "Allen Li". The signature is written in a cursive style with a large initial "A" and a distinct "Li" at the end.

Allen Li  
Director, Acquisition and  
Sourcing Management

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# Appendix I: Observations on NASA's Efforts to Address Its Major Management Challenges

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The following table identifies the major management challenges confronting NASA, including the governmentwide high-risk areas of strategic human capital management and information security. The first column of the table lists the management challenges that we and/or NASA's Office of Inspector General (OIG) have identified. The second column discusses the extent to which NASA's fiscal year 2002 performance plan includes performance goals and measures to address the challenges that we and the OIG identified. Of the agency's fifteen major management challenges, its performance plan has (1) goals and measures that are directly related to thirteen of the challenges; (2) a goal and measure indirectly applicable to one challenge; and (2) no goals and measures directly related to one of the challenges.

Some of the NASA performance plan's goals and measures we discuss may not track specifically with the key considerations of NASA OIG's management challenges since the challenges themselves were presented in a broad context. GAO has performed reviews affecting a number of the areas mentioned. This appendix highlights the results of our assessments, where applicable.

**Appendix I: Observations on  
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**Table 1: Major Management Challenges**

Major management challenge	Applicable goals and measures in the fiscal year 2002 performance plan
<p><b>GAO-designated governmentwide high risk</b></p> <p><i>Strategic Human Capital Management.</i> GAO has identified shortcomings at multiple agencies involving key elements of modern human capital management, including strategic human capital planning and organizational alignment; leadership continuity and succession planning; acquiring and developing staffs whose size, skills, and deployment meet agency needs; and creating results-oriented organizational cultures.</p> <p>In August 2000, we reported that several internal NASA studies had shown that the agency's space shuttle program's workforce had been affected negatively by NASA's downsizing, much of which occurred after 1995. We also reported that NASA had begun taking actions to address its shuttle workforce problems.<sup>a</sup> In September 2001, we reported in testimony that while NASA continues to make progress in revitalizing the shuttle program's workforce, considerable challenges remain.<sup>b</sup></p> <p>In January 2001, we also reported the need to implement a human capital approach in NASA's workforce management strategies as a major management challenge.<sup>c</sup></p>	<p>The plan contains a strategic objective, annual performance goals and indicators directly related to this management challenge. The plan's strategic objective is to invest wisely in NASA's use of human capital, developing and drawing upon the talents of all NASA's people. This objective applies to all of NASA's workforce and has two related performance goals: (1) align management of human resources to best achieve agency strategic goals and objectives and (2) attract and retain a workforce that is representative at all levels of America's diversity. NASA further indicated in discussion under the second performance goal: (1) in fiscal year 2002, the agency will develop a process by which the centers will implement consistent workforce planning resulting in a plan for each center that links staffing, funding resources, mission and activities, and core competencies; (2) NASA intends in fiscal year 2002 to develop an initiative to enhance the centers' recruitment capabilities, focusing on hiring new college graduates to counterbalance the aging of the workforce due to the halt in the influx of new college graduates during the years of downsizing; and (3) NASA requested additional fiscal year 2002 resources to expand training delivery methods and emphasize the development of computer-based training alternatives that can be accessed at all locations and levels. While NASA's inclusion of human capital in its plan as a strategic objective is an improvement, it needs to relate its human capital annual performance goals and indicators to specific programs where issues of critical staffing needs have been identified, such as the space shuttle program.</p>

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**Major management challenge**

*Information Security.* Our January 2001 high-risk update noted that the agencies' and governmentwide efforts to strengthen information security have gained momentum and expanded. Nevertheless, recent audits continue to show federal computer systems are riddled with weaknesses that make them highly vulnerable to computer-based attacks and place a broad range of critical operations and assets at risk of fraud, misuse, and disruption.

In 1999, we reported that NASA lacked an effective agencywide security program that includes improvements in five areas: assessing risks and evaluating needs, implementing policies and controls, monitoring compliance with policy and effectiveness of controls, providing computer security training, and coordinating responses to security incidents.<sup>4</sup> The need for such a framework was serious; tests we conducted at 1 of NASA's 10 field centers found that mission-critical information systems were vulnerable to unauthorized access. We successfully penetrated several of these systems, including one responsible for calculating detailed positioning data for earth-orbiting spacecraft and another that processes and distributes scientific data received from these spacecraft.

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan contains a strategic objective and an annual performance goal and indicators directly related to this management challenge. The plan states that safety and security is one of four areas on which NASA's information technology planning is focused. A performance goal is established to enhance information technology security by meeting established performance indicators in three critical areas: (1) vulnerabilities detected, (2) training, and (3) information technology security plans. The plan includes specific target percentages for reducing known system vulnerabilities, training NASA personnel, and preparing information technology security plans. These are all areas where problems have been documented at NASA in the past, including our review of information security for NASA's mission critical systems, completed in 1999. The fiscal year 2002 plan is an improvement over the 2001 plan, which did not include quantifiable measures for improving information technology security. However, the plan's performance goals are not fully responsive to the recommendations we made in 1999. For example, the plan sets a performance indicator of completing 90 percent of information technology security plans for critical systems. We, on the other hand, recommended that all systems be formally authorized before they became operational and at least every 3 years thereafter. Likewise, NASA's performance indicator for information technology security training sets employee training targets between 80 and 95 percent for providing awareness training to different types of NASA employees. We recommended that NASA establish a more comprehensive program that would include certifying that NASA civil servants and contract employees are competent to discharge their information technology security-related responsibilities.

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**GAO-designated major management challenges**

*The Need to Correct Weaknesses in NASA's Contract Management:* We have reported that NASA's contract management is a continuing area of high risk. Implementation of the financial management system and its integration with full cost accounting have been delayed. Until the Integrated Financial Management System is operational, performance assessments relying on cost data may be incomplete. We have also reported that NASA is continuing to rely on undefinitized change orders—that is, contract changes initiating new work before NASA and the contractor agree on a final estimated cost and fee—to complete work on its largest space station contract. We stated that this is a risky way of doing business because it increases the potential for unforeseen cost increases and scheduling delays.

The plan contains an annual performance goal and indicators directly related to this management challenge. The performance goal is to improve the agency's financial management and accountability. This goal has two indicators (1) cost at least 75 percent of the budget available to cost during fiscal year 2002; and (2) initiate the pilot phase of the core financial project and at least one other project module of NASA's third attempt at implementing an Integrated Financial Management System (IFMS). The plan also states (1) an agency-level project team is in place at the Marshall Space Flight Center, the lead center for the core financial project, and the design phase will begin in February 2002 and (2) three "pathfinder" projects have begun to test out the processes and technical requirements for agency-wide implementation of new administrative systems. The IFMS is key to producing accurate and reliable information for full-cost accounting. Furthermore, the plan does not address the issue of undefinitized change orders.

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**Major management challenge**

*The Need to Control International Space Station (ISS) Development and Support Costs:* We have reported that the ISS program continues to face cost control challenges.<sup>o</sup> NASA's OIG also reported that the ISS program continued to experience cost overruns and scheduling delays.

*The Need to Effectively Implement the Faster-Better-Cheaper Approach to Space Exploration Projects:* We have reported that NASA faces significant challenges as it attempts to create highly reliable missions and foster open communications under the budget constraints of the agency's faster-better-cheaper space exploration strategy. In addition, real success will require a comprehensive integration of lessons learned from failures on an agencywide basis. Until NASA resolves these problems, its financial resources are vulnerable to inefficient use.

This was designated as a new major management challenge in January 2001.

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**OIG-designated major management challenges**

*Safety and Mission Assurance:* NASA's OIG has reported that safety and mission assurance has become a serious challenge for NASA. Key considerations to ensure safety in future NASA operations include (1) ensuring an appropriate level of training for staff who conduct safety reviews and evaluations; (2) maintaining adequate safety reporting systems; (3) ensuring variances to standard safety procedures are appropriately justified, reviewed, and approved; (4) maintaining an effective emergency preparedness program; (5) ensuring NASA and contractor compliance with safety standards and regulations; (6) ensuring product safety and reliability; and (7) ensuring the space shuttle and the ISS maintain crew safety.

In September 2001, we reported while NASA is making strides in revitalizing its workforce, its ability to implement safety upgrades in a timely manner is uncertain.<sup>l</sup>

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan contains an annual performance goal and indicator that indirectly addresses ISS cost control issues. The performance goal is to develop a management plan and initiate ISS reforms, but the plan does not indicate to what extent NASA will address space station cost growth. This challenge is discussed in detail in the outcomes section of this report.

The plan does not have goals and measures directly related to this management challenge.

The plan contains strategic objectives, annual performance goals and indicators directly related to this management challenge. In fact, NASA's plan contains a high emphasis on safety. The plan has a strategic objective to protect the safety of people and facilities and the health of the workforce. This objective's performance goal directs NASA to increase the safety of its infrastructure and the health of its workforce through facilities' safety improvements, reduced environmental hazards, increased physical security, enhanced safety and health awareness, and appropriate tools and procedures for health enhancement. There are eight indicators for this performance goal, which include: (1) no fatalities will result from NASA mishaps and (2) per the Federal Worker 2000 Initiative, reduce the overall occurrence of injuries (due to occupational injury or illness) by 3% per year from the fiscal year 1997 baseline to 1.15 occurrences per 100 workers. The plan also has strategic objectives to (1) provide and make use of safe, affordable, and improved access to space and (2) ensure the health, safety, and performance of humans living and working in space. Furthermore, the Aerospace Technology Enterprise has two related strategic goals (1) to revolutionize aviation – enable the safe, environmentally-friendly expansion of aviation and (2) to advance space transportation – create a safe, affordable highway through the air and into space. The plan also states that NASA management, in the interest of safety, encourages space shuttle program managers to set aside metrics when dealing with launches planned versus launches achieved during a given fiscal year. Our September 2001 testimony noted that NASA is still assessing the full package of its planned space shuttle program workforce and safety improvements, and some projects have already encountered funding and scheduling problems. Overcoming challenges related to the safety upgrades is critical since NASA will be relying on the space shuttle longer than originally anticipated.

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**Major management challenge**

*International Space Station:* NASA's OIG has reported that the ISS is a significant management challenge due to significant problems related to ISS cost, contingency planning, and the X-38/Crew Return Vehicle. Key considerations for continued ISS assembly and operation are (1) managing the political, financial, technical, and safety challenges presented by an international partnership; (2) overcoming technical challenges inherent in manufacturing, assembling, and testing complex hardware and software components provided by different nations and integrated in space; (3) safely maintaining, upgrading, and operating a structure as complicated as the space station; and (4) maximizing the beneficial use of the space station for scientific research and technology development.

In June 2001, we reported that inadequate planning and design led to ISS propulsion module failure.<sup>9</sup>

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**Applicable goals and measures in the fiscal year 2002 performance plan**

NASA OIG's description of the ISS major management challenge is more broadly focused than our related management challenge. (See discussion under GAO-designated major management challenge, the need to control ISS development and support costs.) The plan contains strategic objectives and annual performance goals directly related to this management challenge. The plan contains a strategic objective to conduct engineering research on the International Space Station to enable exploration beyond Earth orbit. This objective has a performance goal to test, at the International Space Station, competing technologies for human missions beyond low earth orbit, in cooperation with other agencies and international partners and with U.S. industry. The plan also has a strategic objective to operate the International Space Station to advance science, exploration, engineering, and commerce. This objective has four performance goals: (1) demonstrate ISS on-orbit vehicle operational safety, reliability, and performance; (2) demonstrate ISS program progress and readiness at a level sufficient to show adequate readiness in the assembly schedule; (3) successfully complete 90 percent of the ISS planned mission objectives; and (4) demonstrate progress toward ISS research hardware development. The Biological and Physical Research Enterprise has (1) strategic objectives to develop strategies to maximize scientific research output on the International Space Station and other space research platforms; (2) a strategic objective to foster commercial research endeavors with the International Space Station and other assets; and (3) a performance goal to highlight ISS-based commercial space research at business meetings and conferences. The plan also has a strategic objective to foster commercial endeavors with the International Space Station and other assets. This objective has a performance goal to develop and execute a management plan and open future station hardware and service procurements to innovation and cost-saving ideas through competition, including launch services and a non-government organization for space station research. However, the plan does not indicate the extent that NASA will address space station cost growth. This challenge is discussed in detail in the outcomes section of this report.

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*Information Technology:* NASA's OIG has reported that information technology has become a serious challenge for NASA. Key considerations for an effective information technology program include (1) ensuring data security, integrity, and application controls; (2) protecting operations and communications with spacecraft; and (3) monitoring and evaluating the streamlining of operations through outsourcing information technology operations for cost efficiencies, dependency on the vendor for technological direction, vulnerability of strategic information to outsiders, and dependency on the viability of the vendor.

NASA's OIG reported that during fiscal year 2000 NASA continued to have a fragmented information technology (IT) security program without clear lines of authority, policies, guidelines, or enforcement. The OIG reported that audits of several mission critical information systems disclosed that NASA had not implemented adequate basic controls in areas such as system access, protection of critical files, system backup and restore procedures, privileged operations controls, and system audit and monitoring capabilities.

(See discussion under governmentwide high-risk challenge: information security for additional details.)

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan contains a strategic objective, annual performance goals, and indicators directly related to this management challenge. The plan states that safety and security is one of four areas on which NASA's information technology planning is focused. The plan's strategic objective is to enhance the security, efficiency, and support provided by NASA's information technologies resources. The objective has three performance goals to (1) improve information technology infrastructure service delivery by providing increased capability and efficiency while maintaining a customer rating of satisfactory; (2) enhance mission success through seamless, community-focused electronic service delivery; and (3) enhance information technology security by meeting established performance indicators in three critical areas: (a) vulnerabilities detected, (b) training, and (c) information technology security plans. The plan includes specific target percentages for reducing known system vulnerabilities, training NASA personnel, and preparing information technology security plans. These are all areas where problems have been documented at NASA in the past, including our review of information security for NASA's mission critical systems, completed in 1999. The fiscal year 2002 plan is an improvement over the 2001 plan, which did not include quantifiable measures for improving information technology security. However, the plan's goals are not as comprehensive as the recommendations we made in 1999. For example, the plan sets a target of completing 90 percent of information technology security plans, including authorizations to process, for its critical systems. We, on the other hand, recommended that all systems be formally authorized before they become operational and at least every 3 years thereafter. Likewise, NASA's performance goal indicator for information technology security training sets targets between 80 and 95 percent for providing awareness training to different types of NASA employees. We recommended that NASA establish a more comprehensive program that would include certifying that NASA civil servants and contract employees are competent to discharge their information technology security-related responsibilities.

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*Procurement:* NASA's OIG has reported that procurement is an ongoing challenge for NASA. Key considerations for effective procurement at NASA include (1) ensuring proper levels of staffing to perform contracting requirements; (2) providing sufficient controls over and monitoring both prime and subcontractors; (3) implementing or increasing the use of innovative procurement procedures such as earned value management and performance incentive fees; and (4) ensuring costs billed to NASA cost-type contracts, due to the changing industry environment, are reasonable and allowable.

In August 2001, we reported that NASA's inability to provide timely data on obligations or support for actual costs related to the space station and shuttle raises concerns about NASA being able to achieve the discipline and accountability called for by the National Aeronautics and Space Administration Authorization Act for Fiscal Year 2000 (P.L. 106-391).<sup>h</sup>

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan contains a strategic objective, annual performance goals, and indicators directly related to this management challenge. The plan's strategic objective is to achieve the most productive application of federal acquisition policies. This objective's first performance goal is to continue to take advantage of opportunities for improved contract management by maintaining a high proportion of performance based contracts (PBCs). This performance goal's indicator is to maintain PBC obligations at greater than 80% of funds available for PBCs. The objective's second performance goal is to continue integrating small, small disadvantaged, and women-owned businesses together with minority universities into the competitive base from which NASA can purchase goods and services. NASA further indicated in discussion under the strategic objective that (1) NASA's Office of Procurement has undertaken proactive management approaches in three key areas: human capital, outsourcing and oversight, and electronic commerce; and (2) on November 2000, the Associate Administrator for Procurement and the Associate Administrator for Safety and Mission Assurance jointly announced the establishment of the Surveillance Planning Team to provide policy direction and procedural guidance on appropriate surveillance planning for NASA-contracted work based on the risk associated with the work and contractor involvement. The plan also contains a performance goal to continue implementation of planned and new privatization efforts through the space shuttle prime contract and further efforts to safely and effectively transfer civil service positions and responsibilities to the space shuttle contractor with associated performance goal indicators. The plan also contains a performance indicator to initiate the pilot phase of the core financial module and at least one other module of the integrated financial management system. If effectively implemented, this system should provide systems and processes to oversee procurement activities. However, this effort will require continued management attention to correct problems and keep projects on schedule. Furthermore, the plan does not address the issue of limiting NASA's frequent use of undefinitized contract change orders – that is, unnegotiated contract changes. Relying on unnegotiated changes as a way of doing business is risky because it increases the potential for additional unanticipated cost growth.

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*Fiscal Management:* NASA's OIG has reported that fiscal management continues to be a significant challenge for NASA. Key considerations to improved fiscal management include: (1) monitoring contractor performance of financial statement audits to ensure that the statements are properly prepared and thoroughly reviewed; (2) ensuring adequate integration and testing of newly developed automated accounting modules or capability; and (3) ensuring that NASA continues to properly account for and record financial transactions as new capability is implemented.

In March 2001, we reported that NASA's fiscal year 1999 Statement of Budgetary Resources was misstated by a reported \$644 million due, in part, to a misinterpretation of guidance and errors in NASA's ad hoc process for generating budgetary information.<sup>1</sup> In August 2001, we reported on NASA's inability to provide timely data on obligations or support for actual costs related to the space station and shuttle.<sup>1</sup>

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan contains a strategic objective, annual performance goals, and indicators directly related to this management challenge. The plan's strategic objective is to manage NASA's fiscal and physical resources optimally. This objective has an annual performance goal to improve NASA's financial management and accountability. The plan states two target indicators will measure the agency's progress in meeting this performance goal: (1) cost at least 75 percent of the budget available to cost during the fiscal year and (2) initiate the pilot phase of the core financial module and at least one other module of the integrated financial management system (IFMS). While the goal of improving financial management and accountability is commendable, additional target indicators should be incorporated to measure NASA's progress in achieving its goal. Additional performance indicators are needed to ensure that NASA's systems and processes provide a direct linkage between financial and program operations. For example, both the efficiency and effectiveness measures should be designed to assess the finance organization's ability to support NASA's mission. Without performance indicators that provide a clear linkage between financial management improvement and improved program results, NASA may not be able to accurately track its progress in achieving its performance goals. Furthermore, the implementation of the IFMS is key to producing accurate and reliable information for full-cost accounting. Until the system is operational, performance assessments relying on cost data may be incomplete and full costing will be only partially implemented. Measuring costs is key to measuring performance in terms of efficiency and cost-effectiveness.

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*Program and Project Management:* NASA's OIG has reported that NASA faces significant challenges in program and project management. Key considerations to effectively managing NASA programs include (1) improving planning to enable NASA to accomplish its missions in the face of budget and human capital issues; (2) eliminating duplication in programs and improving coordination with other research and development organizations; (3) ensuring that programs and projects accurately assess their progress and successfully achieve their goals; and (4) effectively using technology developments to increase NASA productivity.

Although we did not identify this issue as a management challenge, we have reported in September 2001 that there are fundamental weaknesses in the collection and sharing of lessons learned in NASA by program and project managers.<sup>k</sup> In June 2001, we also reported that the initial ISS propulsion module project did not meet performance, cost, and schedule goals largely because NASA proceeded with the contractor's proposal without following fundamental processes involving project planning and execution.<sup>l</sup>

**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan includes a strategic goal and objectives, annual performance goals, and indicators directly related to this management challenge. The plan has a strategic goal to enable NASA's strategic enterprises and their centers to deliver products and services to customers more effectively and efficiently. This goal has four related objectives: (1) enhance program safety and mission success in the delivery of products and operational services; (2) improve NASA's engineering capability to remain as a premier engineering research and development organization; (3) capture engineering and technological best practices and process knowledge to continuously improve NASA's program/project management; and (4) facilitate technology insertion and transfer and utilize commercial partnerships in research and development to the maximum extent practicable. The plan contains a performance goal to capture a set of best practices/ lessons learned from each program, to include at least one from each of the four "provide aerospace products and capabilities crosscutting process" subprocesses, commensurate with current program status. The plan contains a performance goal to earn external review rating of "achieved performance target" on making progress in the following area: design, develop, and launch projects to support future research in pursuit of Strategic Plan science objectives. This goal has an indicator to meet no fewer than 75 percent of the development performance objectives for "major programs/projects," supported by completion of performance objectives in majority of "other projects." The plan has a performance goal to identify and evaluate candidate approaches for 100- to 1000- day human missions capable of a 5- to 10- fold cost reduction—while increasing safety and effectiveness (compared to 1990s projections). The plan contains a strategic objective to meet sustained space operations needs while reducing costs. This objective has two performance goals: (1) the Space Communications program will conduct tasks that enable commercialization and will minimize investment in government infrastructure for which commercial alternatives are being developed; and (2) performance metrics for each mission will be consistent with detailed program and project operations requirements in project service level agreements.

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**Major management challenge**

*Launch Vehicles:* NASA's OIG reported on challenges in (1) ensuring the availability of small expendable launch vehicles to ensure schedule milestones and cost-effectiveness of NASA missions; (2) evaluating whether NASA is providing the majority of developmental funds and assigning technology rights to its industry partners in the development of the new reusable launch vehicles in the best interest of the government; and (3) ensuring that plans are in place and are effectively implemented to address shuttle systems obsolescence, logistics support, technical/safety upgrades, and funding.

Although we did not identify this issue as a management challenge, we have reported and testified on the factors that contributed to the difficulties experienced by the X-33 and X-34 programs and the steps needed to avoid repeating those problems within the Second Generation Reusable Launch Vehicle Program.<sup>m</sup>

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan includes a strategic goal and objective, annual performance goal and indicators directly related to this management challenge. The Aerospace Technology Enterprise has a strategic goal to provide commercial industry with the opportunity to meet NASA's future launch needs, including human access to space, with new launch vehicles that promise to dramatically reduce cost and improve safety and reliability. The strategic objective is to utilize NASA's Space Transportation Council in combination with an External Independent Review Team (EIRT) to assure agency-level integration of near- and far-term space transportation investments. The performance goal is to review results of NASA and commercial-sector performed launch system architecture studies, related requirements, and refinements in planned risk-reduction investments. There are two performance goal indicators (1) complete an assessment of the space launch initiative architectures and requirements by EIRT; the EIRT will submit a written report on their evaluation within 45 days following completion of the review; and (2) the Space Transportation Council will review progress and planning of the space launch initiative at least twice during the fiscal year, including the report filed by the EIRT. However, NASA's plan does not contain enough specific information about how NASA will ensure that the government's best interests will be served in these joint government- and industry-funded programs.

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*Technology Development:* NASA's OIG has reported that technology development has become a serious challenge for NASA. Key considerations to effective technology development include (1) achieving a balance between scientific research and technology development and demonstration projects; (2) continuing to refine the technology transfer process to ensure that U.S. industry achieves the maximum benefit from the new technologies identified; (3) determining if NASA's organizational structure effectively supports technology development and transfer; (4) forming innovative partnership arrangements with U.S. industry to share both the risk and costs of technology demonstration and commercialization; (5) ensuring that NASA technology demonstrations do not unfairly distort the marketplace; (6) ensuring that adequate controls exist on cooperative technology development programs; and (7) ensuring adequate protection of NASA-developed technology.

**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan has strategic goals, objectives and annual performance goals directly related to this management challenge. The space science enterprise contains a strategic goal: "Technology/Long-Term Future Investments: develop new technologies to enable innovative and less expensive research and flight missions." The strategic objectives for this goal are to: (1) acquire new technical approaches and capabilities; (2) validate new technologies in space; and (3) apply and transfer technology. The Earth Science Enterprise has a strategic goal to develop and adopt advanced technologies to enable mission success and serve national priorities. This goal has related objectives, performance goals, and indicators. The plan has a strategic objective to invest in the development of high-leverage technologies to enable safe, effective and affordable human/robotic exploration. This objective has a performance goal to begin development of high-leverage technologies to enable safe, effective and affordable human/robotic exploration missions beyond low earth orbit (LEO). The plan also includes performance goals to: (1) test at the International Space Station competing technologies for human missions beyond LEO, in cooperation with other agencies and international partners, and with US industry; (2) select and fund at least 3-5 proposals through the Human Exploration and Development of Space Enterprise's (HEDS) Technology and Commercialization Initiative-focused research and technology program that feature: highly innovative new technology development efforts in selected areas associated with human safety and performance in space; and (3) conduct a competitive solicitation and selection process that will fund through the HEDS research and technology program a HEDS Technology and Commercialization Initiative: (a) systems studies assessing the commercial potential associated with various prospective HEDS infrastructures/capabilities; and (b) new technology development and demonstration efforts with potential longer-term commercial space value. The Biological and Physical Research Enterprise has a performance goal to engage the commercial community and encourage non-NASA investment in commercial space research by meeting at least three of four performance indicators. The plan also has a strategic objective to transfer NASA technologies and innovations to private industry and the public sector so that the public can benefit economically as well as intellectually through clear, effective communications concerning NASA's activities.

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*International Agreements:* NASA's OIG reported that international agreements are needed to ensure effective and efficient programs. Key considerations include (1) program and project vulnerability to schedule delays and cost overruns that require diplomatic rather than contractual solutions; (2) security controls on technology that impacts national security; (3) controls to assure the quality and timeliness of the goods and services provided; (4) mechanisms to assure a balance between program needs and national considerations; (5) plans with specific critical paths and planned alternative courses of action to maintain program/project continuity; and (6) proper controls over access to NASA facilities by foreign national visitors.

Although we did not identify this issue as a major management challenge, in November 1999, we recommended measures to enhance NASA's ability to oversee and implement its export controls of ISS-related technologies.<sup>9</sup>

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**Applicable goals and measures in the fiscal year 2002 performance plan**

The plan has a strategic objective and annual performance goals directly related to this management challenge. The plan has performance goals to (1) collaborate with other federal and international agencies in developing and implementing better methods for using remotely sensed observations; (2) test at the International Space Station competing technologies for human missions beyond LEO in cooperation with other agencies and international partners and with US industry; (3) develop and test—on the ground and in space—competing technologies for human missions beyond LEO in cooperation with international partners; (4) conduct a competitive solicitation and selection process that will fund through the HEDS research and technology program the HEDS Technology and Commercialization Initiative. The fourth performance goal includes a performance indicator to develop, in conjunction with discussions with key international space organizations, and seeks management approval for an approach for undertaking the formulation of international partnerships for the development and/or demonstration of HEDS capabilities. The plan also states that in response to recommendations from the NASA OIG, NASA is clarifying the definition of "foreign national" in its foreign visitors policy to ensure appropriate and consistent use of the term in the agency's foreign visitors review program. However, NASA's indicators for this challenge lack sufficient specificity. For example, the plan does not specify actions taken to ensure security controls on technology that impacts national security.

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<b>Major management challenge</b>	<b>Applicable goals and measures in the fiscal year 2002 performance plan</b>
<i>Environmental Management:</i> NASA's OIG reported that environmental management is a significant management challenge. Key considerations include: (1) prioritizing and addressing environmental obligations; (2) developing consistent procedures under an agencywide policy; and (3) negotiating cost-sharing agreements for environmental cleanup with previous government and private sector tenants that are also responsible parties.	The plan includes annual performance goals directly related to this management challenge. The plan also states that NASA's strategy for achieving its environmental vision includes four focus areas: prevention, compliance, restoration, and conservation. However, NASA's plan only has performance metrics for the areas of compliance and restoration. Additional performance indicators for the environmental focus areas of prevention and conservation are needed so that NASA can accurately and fully track its progress toward achieving its environmental vision. The compliance related performance goal is that NASA will increase the safety of its infrastructure and the health of its workforce through facilities safety improvements, reduced environmental hazards, increased physical security, enhanced safety and health awareness, and appropriate tools and procedures for health enhancement. This performance goal includes an indicator to reduce the level of agency environmental noncompliance incidents and releases in order to achieve a 5 percent reduction from the fiscal year 2000 level by 2005. The environmental restoration-related performance goal is to revitalize agency facilities and reduce environmental liability. This performance goal includes an indicator to reduce NASA's unfunded environmental liability through a long-term strategy, annually investing an amount of not less than 3-5% of the agency's environmental liability in environmental compliance and restoration funding. The plan also states management controls need to be strengthened to ensure greater visibility of and more consistent implementation of the National Environmental Policy Act (NEPA) process. The plan states review of existing management controls, development and advocacy of improvements, and training activities have been planned and are being initiated. Furthermore, the Aerospace Technology Enterprise also has a strategic objective to reduce emissions – protect local air quality and our global climate with a related performance goal and indicators.

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<sup>a</sup> *Space Shuttle: Human Capital and Safety Upgrade Challenges Require Continued Attention* (GAO/NSIAD/GGD-00-186, Aug. 15, 2000).

<sup>b</sup> *Space Shuttle Safety: Update on NASA's Progress in Revitalizing the Shuttle Workforce and Making Safety Upgrades* (GAO-01-1122T, Sept. 6, 2001).

<sup>c</sup> *Major Management Challenges and Program Risks: National Aeronautics and Space Administration* (GAO-01-258, Jan. 2001).

<sup>d</sup> *Information Security: Many NASA Mission-Critical Systems Face Serious Risks* (GAO/AIMD-99-47, May 20, 1999).

<sup>e</sup> (GAO-01-258, Jan. 2001).

<sup>f</sup> (GAO-01-1122T, Sept. 2001).

<sup>g</sup> *Space Station: Inadequate Planning and Design Led to Propulsion Module Project Failure* (GAO-01-633, Jun. 20, 2001).

<sup>h</sup> *NASA: International Space Station and Shuttle Support Cost Limits* (GAO-01-1000R, Aug. 31, 2001).

<sup>i</sup> *Financial Management: Misstatement of NASA's Statement of Budgetary Resources* (GAO-01-438, Mar. 30, 2001)

<sup>j</sup> (GAO-01-1000R, Aug. 31, 2001).

<sup>k</sup> *Survey of NASA's Lessons Learned Process* (GAO-01-1015R, Sept. 5, 2001)

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**Appendix I: Observations on  
NASA's Efforts to Address Its  
Major Management Challenges**

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<sup>1</sup> (GAO-01-633, June 2001).

<sup>m</sup> *Space Transportation: Status of the X-33 Reusable Launch Vehicle Program* (GAO/NSIAD-99-176, Aug. 11, 1999); *Space Transportation: Progress of the X-33 Reusable Launch Vehicle Program* (GAO/T-NSIAD-99-243, Sept. 29, 1999); and *Space Transportation: Critical Areas NASA Needs to Address in Managing Its Reusable Launch Vehicle Program* (GAO-01-826T, June 20, 2001).

<sup>n</sup> *Export Controls: International Space Station Technology Transfers* (GAO/NSIAD-00-14, Nov. 3, 1999).

# Appendix II: Comments From the National Aeronautics and Space Administration

National Aeronautics and  
Space Administration  
**Office of the Administrator**  
Washington, DC 20546-0001



NOV 14 2001

Mr. Allen Li  
Director, Acquisition and Sourcing  
Management Team  
United States General Accounting Office  
Washington, DC 20548

Dear Mr. Li:

NASA appreciates the opportunity to comment on your draft report entitled "Status of Achieving Key Outcomes and Addressing Major Management Challenges (GAO-02-184)." We are glad that our efforts to make the Government Performance and Results Act process more accountable and useful have been successful as reflected in your report. Although there were no recommendations, NASA would like to provide additional information and clarifications for your final report.

In the report, the General Accounting Office (GAO) stated that the FY 2002 Performance Plan did not include goals and measures directly related to effective implementation of the Faster-Better-Cheaper (FBC) approach to space exploration projects. NASA believes that FBC is a management philosophy that has applicability to all that the Agency does, if properly applied. The application of FBC to programs and projects must be done on a careful, case-by-case basis to establish the risk posture associated with a particular mission or endeavor. Through the Agency's program management process (controlled by NASA Procedures and Guidelines (NPG) 7120.5, Program and Project Management) NASA continues to improve its approach to applying the principles of FBC with safety and prudent acceptance of mission risk as key criteria. FBC is an overarching mission design philosophy for Agencywide annual performance goals and measures. We have developed multiyear trend metrics to measure its effect on Agency program approaches. Such trend data tend not to be useful for measuring progress against annual performance goals.

GAO suggested that NASA could fully explain why it believes it is not necessary to achieve all indicators to demonstrate significant performance. A statement provided to GAO on October 15, 2001, details the specifics of this rationale. In summary, the rationale is that what counts in a long-term, basic research environment is overall progress. Success or failure to achieve specific annual indicators is material to the evaluation process depending on the significance of the specific indicator in the larger context. Related achievements may still demonstrate progress towards goal achievement. Discretion has to be applied, and not requiring 100 percent successful achievement of all indicators when determining annual performance goal achievement better reflects the nature of an inherently unpredictable research and development environment while encouraging the development of challenging metrics. NASA will insert a statement in the FY 2003 Performance Plan as to the rationale supporting this approach.

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The report suggests that NASA does not sufficiently elaborate on the nature of its Space Station budget accountability reforms mentioned in the performance plan, nor how the reforms will address International Space Station (ISS) cost growth, a long-standing and ongoing management problem. Elaboration of NASA's management reforms for ISS are not contained in the FY 2002 Performance Plan but are contained in the Program Management Action Plan (PMAP) (issued 7/01). NASA's development of the PMAP is recognition that growth is a major management challenge for such a program as ISS. The PMAP lays out guidelines for a comprehensive approach to addressing ISS cost growth and will be expanded upon with details providing for quantitative indications of successful implementation by assessing development of products, fulfillment of actions, and implementation of reforms specified in the plan. NASA will include reference to the PMAP in the FY 2001 Performance Report and the FY 2003 Performance Plan.

GAO stated that NASA does not provide a clear rationale for ways in which Information Technology (IT)-related strategies and programs will contribute specifically to the achievement of its goals or show the allocation of IT-related dollars and personnel to performance goals. The IT service delivery metric in the Performance Plan aggregates each major service to include NASA Integrated Services Network (NISN), NASA ADP Consolidation Center (NACC), and Desktop LAN & Voice Communications Services (ODIN). Remaining IT investments are embedded in and are an integral part of each NASA project. Management of each project (including embedded IT) is focused on supporting NASA's missions. The embedded IT is managed as an integral part of the project. Embedded IT systems are accountable as part of the success of those specific programmatic activities, and performance goals for the embedded IT are those specifically set by each program or mission and may not be an effective metric at the aggregate level.

The GAO report calls on NASA to explain the reason for changes from the previous year's Performance Plan. The FY 2002 Performance Plan was the first opportunity to incorporate the revised content of the new NASA Strategic Plan 2000. However, we do agree that explanations for annual performance changes would be useful; therefore, NASA will characterize reasons for change in the FY 2003 Performance Plan.

NASA will take the more detailed comments in the report under consideration, relative to the details of the specific program involved. Any resulting changes will be reflected in the FY 2003 Performance Plan.

NASA would like to thank the General Accounting Office for the professional manner in which this review was conducted by your staff.

Sincerely,



Daniel R. Mulville  
Associate Deputy Administrator

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