February 2005

NASA'S SPACE VISION

Business Case for Prometheus 1 Needed to Ensure Requirements Match Available Resources

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Highlights

Highlights of GAO-05-242, a report to congressional requesters

Why GAO Did This Study

In 2003, the National Aeronautics and Space Administration (NASA) initiated the Prometheus 1 project to explore the outer reaches of the Solar System. The Prometheus 1 spacecraft is being designed to harness nuclear energy that will increase available electrical power from about 1,000 watts to over 100,000 watts and enable the use of electric propulsion thrusters.

Historically, NASA has had difficulty implementing some initiatives. NASA's failure to adequately define requirements and quantify the resources needed to meet those requirements has resulted in some projects costing more, taking longer, and achieving less than originally planned. Prometheus 1 will need to compete for NASA resources with other space missions—including efforts to return the shuttle safely to flight and complete the International Space Station.

GAO was asked to determine (1) whether NASA is establishing initial justification for its investment in the Prometheus 1 project and (2) how the agency plans to ensure that critical technologies will be sufficiently mature at key milestones.

What GAO Recommends

GAO is making recommendations aimed at ensuring that NASA prepares a sound business case for Prometheus 1. NASA concurred with our recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-05-242.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Allen Li at (202) 512-3600 or Lia@gao.gov.

What GAO Found

NASA is in the process of establishing initial justification for its investment in the Prometheus 1 project but faces challenges establishing preliminary requirements and developing accurate cost estimates. Decision makers will not get their first comprehensive picture of the project's requirements and the resources needed to meet those requirements until the preliminary mission and systems review, scheduled for summer 2005. Defining the project's requirements and developing life-cycle cost estimates by then could be challenging, given the short time frames. The fidelity of this information should improve by the preliminary design review scheduled for 2008. At that time, NASA has the opportunity to use these more refined requirements and cost estimates to establish a sound business case for its investment in the Prometheus 1 project. According to Prometheus 1 project management, a flat funding profile is inadequate to ramp up for the planned 2015 launch of Prometheus 1, the project's first spacecraft to its original destination of Jupiter's Icy Moons. By matching requirements to resources a sound business case would allow NASA to determine whether trade-offs in the design of the spacecraft or the agency's expectations are needed to avoid outstripping available resources. Significant program cost and schedule increases in past programs can be traced to not matching requirements with resources at preliminary design review.

While development of the Prometheus 1 technologies is under way, each will require extensive advancement before they are mature enough to support reliable cost estimates. NASA is preparing technology development plans that include measurable criteria to ensure the Prometheus 1 technologies are on track for meeting NASA's maturity requirements through the end of the preliminary design phase.

GAO's best practices work has shown, however, that establishing a formal business case based on a knowledge-based approach that includes matching requirements and available resources—which include technical and engineering knowledge, time, and funding—and controls to ensure that sufficient knowledge has been attained at critical junctures within the product development process is an essential part of any product development justification. NASA's current policy does not require projects to develop knowledge-based business cases that match requirements to available resources and include controls to ensure that sufficient knowledge has been attained. Therefore, the agency had not planned to develop such a business case for Prometheus 1.

Since GAO provided our draft report to NASA for comment, the agency released its fiscal year 2006 budget request that includes changes to Prometheus 1. If properly implemented, these changes could be positive steps in addressing the findings and recommendations in this report.