

**COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY  
U.S. HOUSE OF REPRESENTATIVES**

***The Future of NASA: Perspectives on Strategic Vision  
for America's Space Program***

Wednesday, December 12, 2012  
9:30 a.m. – 11:30 a.m.  
2318 Rayburn House Office Building

**Purpose**

On Wednesday, December 12, 2012, the Committee on Science, Space, and Technology will hold a hearing titled, “The Future of NASA: Perspectives on Strategic Vision for America’s Space Program.” The committee will review the National Research Council report on *NASA’s Strategic Direction and the Need for a National Consensus*, and hear testimony from witnesses concerning NASA’s strategic direction as the Nation faces difficult budgetary challenges.

**Over-Arching Questions**

- What steps could the government take over the next 3 to 5 years to help maintain America’s capabilities and retain world leadership in space?
- What are the priorities that policy makers should consider when evaluating future NASA plans?
- How best can NASA and its stakeholder community reach consensus on identifying and preserving critical capabilities necessary for future space science, aeronautics, and exploration programs and missions?
- What steps can NASA, Congress, and the White House take to promote greater overall efficiency at the agency, as well as maintain programmatic and funding stability for projects and programs?

**Witnesses**

**The Honorable Robert Walker**, Executive Chairman, Wexler & Walker

**Maj. Gen. Ronald Sega, USAF (Ret)**, Vice Chair, National Research Council Committee on NASA’s Strategic Direction

**The Honorable Marion C. Blakey**, President & CEO, Aerospace Industries Association

**Dr. Thomas Zurbuchen Ph.D**, Associate Professor for Space Science and Aerospace Engineering, Associate Dean for Entrepreneurial Programs, University of Michigan

**Dr. Scott Pace, Ph.D**, Director, Space Policy Institute, The George Washington University

**NASA Budget**

NASA’s budget has been relatively flat over the 15-year period from 1997 to 2011. During this period the budget each year has varied by no more than 5 percent from the average value of \$18.4 billion (in FY2011 dollars).<sup>1</sup> NASA received \$17.77 billion (actual) in FY2012; the Administration’s FY2013 NASA budget request is \$17.71 billion and the 4 year budget run out calls for flat funding at the same level.

Figure 1 illustrates the Administration’s budget requests from FY2010 through FY2013 compared to the actual amounts appropriated by Congress.

	2009	2010	2011	2012	2013	2014	2015	2016	2017
FY10 Request		\$18.69	\$18.63	\$18.61	\$18.60	\$18.86			
FY11 Request			\$19.00	\$19.45	\$19.96	\$20.60	\$20.99		
FY12 Request				\$18.72	\$18.72	\$18.72	\$18.72	\$18.72	
FY13 Request					\$17.71	\$17.71	\$17.71	\$17.71	\$17.71
<b>Actual</b>	<b>\$18.78</b>	<b>\$18.72</b>	<b>\$18.45</b>	<b>\$17.77</b>					

Figure 1(Amounts shown in billions of dollars)<sup>2</sup>

While overall funding for NASA has been flat over the last 15 years, *projected* budget increases have varied greatly from year to year. As a result, planning for large, multi-year procurements has been difficult and inefficient. In certain programs, such as human spaceflight, there has been a recurring cycle in which the projected budget increases necessary to develop complex systems have not materialized. The subsequent flat budgets have contributed to increased costs and schedule delays of new systems.

Figure 2 illustrates the percentage of NASA’s budget currently devoted to each major activity. NASA’s science directorate (28.6%) includes planetary science, Earth science, heliophysics, astrophysics, and the James Webb space telescope. Exploration (21.2%) is developing the space launch system and Orion crew vehicle for human exploration beyond low Earth orbit, as well as the commercial crew program to support the International Space Station. Space Operations (23.8%) is primarily associated with the International Space Station. Aeronautics represents approximately 3 percent of the budget, and the remaining budget funds cross-agency support (16.8%), space technology (3.2%), construction of facilities (2.2%), education (0.8%), and the office of the inspector general (0.2%).

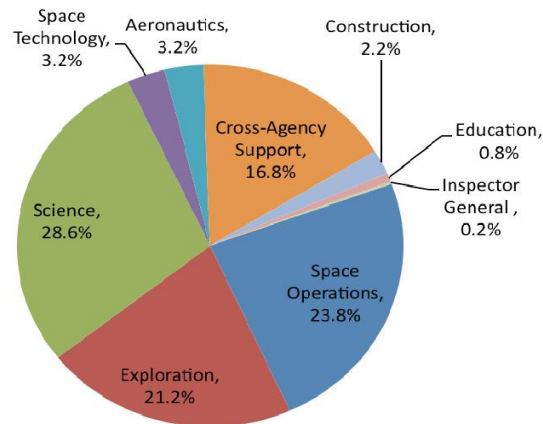


Figure 2<sup>3</sup>

<sup>1</sup> NASA’s Strategic Direction and the Need for a National Consensus, NRC, Dec. 2012

<sup>2</sup> FY10 – FY12 Budget Estimates, NASA/OMB

## **Science**

NASA's Science budget has been relatively stable for the last several years at \$4.5 billion in FY2010, \$4.9 billion in FY2011, \$5.0 billion in FY2012, and \$4.9 billion in FY2013. The most notable recent changes are within the planetary science budget, which went from \$1.5 billion in FY2012 to a requested \$1.2 billion for FY2013 – a net decrease of over 20%.

Despite relatively flat funding for the science directorate overall, factors such as cost overruns and the lack of small and medium-sized launch vehicles resulting in the need to use larger, more expensive vehicles are eating away at the funds available to do actual science missions.

As a result, the President's FY2013 budget request indefinitely puts on hold NASA's flagship missions – with no new starts as recommended in decadal surveys published by the National Research Council for major missions to Mars<sup>4</sup> (Mars Sample Return), the outer planets (Europa or Uranus) or for the next astrophysics mission (Wide Field Infrared Survey Telescope or WFIRST). It is widely held that NASA's flagship missions, while expensive, are the only means by which certain scientific problems can be effectively addressed. With unmatched complexity and scope, flagship missions set NASA apart from other space agencies around the world. These missions also rely on a vibrant pipeline of scientists and engineers that might otherwise not be available in the future should no new missions begin.

## **Exploration**

NASA's Exploration budget has undergone severe changes in the last several years. In FY2010 NASA's Exploration budget was \$3.8 billion and was slated to increase to \$6.0 billion by FY2013 to build the *Constellation* system which had received broad bipartisan support for several years. The following year (FY2011) the Administration abruptly canceled the program without warning either Congress or the broader international space community, which had been shifting its attention and funding toward contributing to a U.S.-led lunar mission. The cancellation of *Constellation* and abandonment of a lunar mission caused uncertainty throughout the international community. The lack of clear consensus on the direction has made it difficult to justify future funding for anything beyond the International Space Station.

For these and other reasons Congress did not concur with the Administration's proposal to eliminate development of systems for beyond Earth orbit, and directed NASA to continue work on designing and building a heavy lift Space Launch System and Orion crew capsule in the NASA Authorization Act of 2010.

The Exploration account also provides funding for the commercial crew program that is designed to provide crew transportation services to the International Space Station. The 2010 NASA Authorization Act (PL 111-267) authorized \$500 million for FY2013 for this activity, yet NASA is seeking \$825 million, arguing that commercial operations would not be possible by 2017 without this level of effort. Thus, development of "commercial" systems competes against the heavy-lift launch system for funding within the Exploration Systems budget.

---

<sup>3</sup> NASA's Strategic Direction and the Need for a National Consensus, NRC, Dec. 2012

<sup>4</sup> On Dec. 4, NASA announced its intention to initiate a new Mars lander mission that will be similar to the Mars Curiosity rover. A formal funding request is expected in the FY2014 budget request due next spring.

## **Aeronautical Research**

Current civil, general aviation, and military aircraft contain many technologies developed by NASA including, fly-by-wire, flight management systems, quieter fuel efficient turbine engines, and incorporation of composite materials into airframes and structures are just a few examples. Manufacturers world-wide have adopted NASA-developed technologies into their products.

Over the last decade, the budget for Aeronautics has been reduced from a peak of approximately \$1 billion ten years ago to just \$569.9 million in FY2012. The President's FY2013 budget request is slightly lower at \$551.5 million and remains flat in the budget run-out. As a share of NASA's budget, the percentage allocated to research in Aeronautics has dropped from approximately 7 percent in 2000 to approximately 3 percent in 2012. Currently, for every dollar the agency spends on aeronautics, it spends \$23 on space-related activities.<sup>5</sup>

## **Background of the National Research Council Study**

Concerned that NASA's budget will be significantly constrained as a result of continuing fiscal pressures, Congress directed the NASA Office of the Inspector General (P.L. 112-55) to commission a comprehensive independent assessment by the National Research Council (NRC) of NASA's strategic direction.<sup>6</sup>

Per the House report:

*Comprehensive independent assessment.—NASA has a broad mandate to execute a balanced space program that includes science, technology development, aeronautics research, human spaceflight and education. NASA regularly receives management and programmatic recommendations from GAO, the Office of Inspector General (OIG) and various commissions and other entities, as well as outside advice on scientific and technical priorities from the National Academies.*

*While each of these reviews is useful on its own, they are generally targeted to a specific issue or program and therefore do not provide a comprehensive assessment of NASA's activities. The conferees believe that such an agency-wide assessment will provide a means to evaluate whether NASA's overall strategic direction remains viable and whether agency management is optimized to support that direction.*

As part of the overall assessment, the NRC evaluated NASA's 2011 Strategic Plan which, "outlines our long-term goals as an agency and describes how we will accomplish these goals over the next decade or more."<sup>7</sup>

---

<sup>5</sup> NASA's Strategic Direction and the Need for a National Consensus, NRC, Dec. 2012

<sup>6</sup> P.L. 112-55, House Report 112-284

<sup>7</sup> 2011 Strategic Plan, Message From the Administrator, Feb. 4, 2011

## NASA 2011 Strategic Plan Goals<sup>8</sup>

- Extend and sustain human activities across the solar system.
- Expand scientific understanding of the Earth and the universe in which we live.
- Create the innovative new space technologies for our exploration, science, and economic future.
- Advance aeronautics research for societal benefit.
- Enable program and institutional capabilities to conduct NASA's aeronautics and space activities.
- Share NASA with the public, educators, and students to provide opportunities to participate in our Mission, foster innovation, and contribute to a strong national economy.

### **The National Research Council Report**

The National Research Council (NRC) Committee on NASA's Strategic Direction was tasked to address the evolution of NASA's goals, objectives, and strategies, including in particular those set forth in the *2011 NASA Strategic Plan*. The committee's statement of task can be found in Appendix 1.

The committee considered the full range of NASA's activities, including space and Earth science; aeronautics; advanced technology development; human space exploration; spaceflight operations; and STEM education. On December 5, 2012, the NRC released its final report entitled, *NASA's Strategic Direction and the Need for a National Consensus*.

According to the NRC's report, the 2011 strategic plan presents a vision and mission that is vague and generic, one that is not unique to the nation's space and aeronautics enterprise, and that could apply to almost any government research and development agency. In fact, the NRC rendered the 2011 Strategic Plan "of little value," particularly given the fiscal challenges our country is facing. According to the committee, current budget trends "requires much clearer justification and prioritization for the plan to be meaningful."<sup>9</sup>

To be of real utility to the nation, the committee recommends a long-term NASA strategy that provides benefit to the nation, is integrated across mission areas, provides opportunity for scientific and engineering excellence and innovation, is credible, is global in perspective and provides for interagency collaboration.<sup>10</sup>

Among the findings, the NRC found that budget instability and limitations (both legislative and regulatory) have hampered NASA's flexibility to manage the agency in the most efficient way, which has translated into a mismatch of budgets and missions.

---

<sup>8</sup> 2011 Strategic Plan

<sup>9</sup> NASA's Strategic Direction and the Need for a National Consensus, NRC, Dec. 2012 , p. 31-32

<sup>10</sup> Ibid., pg. 39-40

The report cites examples within each major research area. For exploration, the committee found “little evidence” that the human asteroid mission by 2025 has been accepted as a compelling destination by NASA workers, the nation or by the international community. In science, the current decadal survey process has been deemed successful but without a sustainable budget. Many key priorities will likely not be pursued within any meaningful timeframe. According to the report, the decline in the aeronautics program seems to be without a clear rationale. Finally, the newly developed technology program shows promise with a clear road-map, but has yet to be funded at the requested levels.<sup>11</sup>

The NRC report outlines four approaches that policy makers could pursue to re-align NASA’s mission with its budget.

*Option 1:* Institute an aggressive restructuring program to reduce infrastructure and personnel costs to improve efficiency.

*Option 2:* Engage in and commit for the long term to more cost-sharing partnerships with other U.S. government agencies, private sector industries, and international partners.

*Option 3:* Increase the size of the NASA budget.

*Option 4:* Reduce considerably the size and scope of elements of NASA’s current program portfolio to better fit the current and anticipated budget profile. This would require reducing or eliminating one or more of NASA’s current portfolio elements (human exploration, Earth and space science, aeronautics, and space technology) in favor of the remaining elements.

These options, described in detail within the report, illustrate tradeoffs that need to be considered when charting a path forward for NASA.

---

<sup>11</sup> NASA’s Strategic Direction and the Need for a National Consensus, NRC, Dec. 2012

## **APPENDIX 1**

### NRC Statement of Task

The National Research Council will appoint an ad-hoc committee to assess whether the strategic direction of the National Aeronautics and Space Administration, as defined by the 2011 NASA strategic plan, remains viable and whether the agency's activities and organization efficiently and effectively support that direction in light of the potential for constrained budgets for the foreseeable future. In particular the committee will:

1. Consider the strategic direction of the agency as set forth most recently in 2011 NASA Strategic Plan and other relevant statements of space policy issued by the President of the United States.
2. Consider the goals for the agency set forth in the National Aeronautics and Space Act of 1958 (as amended) and the National Aeronautics and Space Administration Authorization Acts of 2005, 2008 and 2010.
3. Consider previous studies and reports relevant to this task.
4. Assess the relevance of NASA's strategic direction and goals to achieving national priorities.
5. Assess the viability of NASA's strategic direction and goals in the context of current budget expectations and stated programmatic priorities for the agency.
6. Discuss the appropriateness of the budgetary balance between NASA's various programs;
7. Examine NASA's organizational structure and identify changes that could improve the efficiency and effectiveness of the Agency's mission activities; and
8. Recommend how NASA could establish and effectively communicate a common, unifying vision for NASA's strategic direction that encompasses NASA's varied missions.