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Space Exploration: Report of the Aldridge Commission on Implementation of President Bush's Exploration Initiative

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Summary

When President George W. Bush announced new exploration goals for the National Aeronautics and Space Administration (NASA) on January 14, 2004, he also said he would establish a commission to provide advice on how to implement the initiative. Chaired by Edward C. "Pete" Aldridge, Jr., the commission submitted its report on June 16, 2004. Four of its recommendations may frame congressional debate on the report: to convert NASA's field centers into Federally Funded Research and Development Centers (FFRDCs), to create a White House Space Exploration Steering Council, to increase the role of the private sector in space activities, and to set certain conditions for international participation. This report will not be updated.

Background and Commission Members

On January 14, 2004, President Bush made a major space policy address in which he directed NASA to focus its activities on returning humans to the Moon by 2020, and someday sending them to Mars and "worlds beyond." The initiative involves both human and robotic space missions, and the President invited other countries to participate. See CRS Report RS21720 for more information on the President's new exploration initiative.

The President simultaneously announced that he would create a commission to make recommendations on implementing the vision, and that it would be chaired by **Edward C. "Pete" Aldridge, Jr.**, former Secretary of the Air Force. The President's Commission on Implementation of United States Space Exploration was formally created on January 27, 2004, and given 120 days from the date of its first meeting to submit a report.

In addition to Mr. Aldridge, the Commission members were: **Carleton "Carly" Fiorina**, chairwoman and Chief Executive Officer (CEO) of Hewlett Packard; **Michael Jackson**, senior vice president of AECOM Technology, and former Deputy Secretary of the Department of Transportation; **Laurie Leshin**, director of Arizona State University's Center for Meteorite Studies; **Gen. Lester Lyles (Ret.)**, former commander of Air Force Materiel Command; **Paul Spudis**, planetary scientist at Johns Hopkins University

Applied Physics Laboratory; **Neil DeGrasse Tyson**, astrophysicist and Director of the Hayden Planetarium; **Robert Walker**, chairman and CEO of Wexler and Walker Public Policy Associates, and former Chairman of the House Science Committee, U.S. House of Representatives; and **Maria Zuber**, head of the Department of Earth, Atmospheric and Planetary Sciences at the Massachusetts Institute of Technology.

Summary of the Commission's Findings and Recommendations

The Commission submitted its report to Vice President Cheney on June 16, 2004. The report, *A Journey to Inspire, Innovate, and Discover*, is available at the Commission's website [http://www.moontomars.org]. Its eight findings and 15 recommendations are paraphrased in the following table.

Aldridge Commission Findings and Recommendations

Finding 1	**The long-term, ambitious space agenda advanced by the President will significantly help the United States protect its technological leadership, economic vitality and security.**
Finding 2	**The vision must be managed as a significant national priority, a shared commitment of the President, Congress, and the American people.**
Recommendation 2-1	The President should establish a permanent Space Exploration Steering Council, reporting to the President, chaired by the Vice President or other senior White House executive, to develop policies and coordinate work across agencies to share technologies, facilities, and talent.
Finding 3	**NASA's relationship to the private sector, its organizational structure, business culture, and management processes — largely inherited from the Apollo era — must be decisively transformed.**
Recommendation 3-1	The private sector should assume the primary role of providing services to NASA, especially accessing low Earth orbit. NASA's role must be limited to only those areas where there is irrefutable demonstration that only the government can perform the proposed activity.
Recommendation 3-2	NASA should be transformed to become more focused and effectively integrated to implement the vision, with a structure that affixes clear authority and accountability.
Recommendation 3-3	NASA Centers should be reconfigured as Federally Funded Research and Development Centers (FFRDC's) to enable innovation, to work effectively with the private sector, and to stimulate economic development, although certain functions should remain under federal management.

Recommendation 3-4	Three new NASA organizations should be created: a technical advisory board to give NASA's leadership independent and responsible advice on technology and risk mitigation plans; an independent cost estimating organization; and a research and technology organization that sponsors high risk/high payoff technology advancement while tolerating periodic failures.
Recommendation 3-5	NASA should adopt personnel and management reforms, including the use of a "system-of-systems" approach; policies of spiral, evolutionary development; reliance on lead system integrators; and independent technical and cost assessments.
Finding 4	**Successful development of enabling technologies is critical to attaining exploration objectives within reasonable schedules and affordable costs.**
Recommendation 4-1	NASA should form special project teams for each enabling technology to: conduct initial assessments of the technologies, develop a roadmap leading to mature technologies, integrate technologies into the exploration architecture, and develop a plan for transition of technologies to the private sector.
Finding 5	**Sustaining long-term exploration requires a robust space industry that will contribute to national economic growth, produce new products, and lead the world in invention and innovation. That industry will become a national treasure.**
Recommendation 5-1	NASA should aggressively use its contractual authority to reach into the commercial and nonprofit communities to bring out the best ideas, technologies, and management tools.
Recommendation 5-2	Congress should increase the potential for commercial opportunities related to the vision by providing incentives for entrepreneurial investment in space, creating significant monetary prizes for accomplishing space missions and/or technology development, and assuring property rights for those seeking to develop space resources and infrastructure.
Finding 6	**International talents and technologies will be of significant value in implementing the vision. Tapping into the global marketplace is consistent with using private sector resources to meet mission goals.**
Recommendation 6-1	NASA should pursue international partnerships based on an architecture that would encourage global investment in support of the vision.
Finding 7	**Scientific knowledge will enable, and be enabled by, implementation of the vision.**
Recommendation 7-1	NASA should seek routine input from the scientific community on exploration architectures to ensure maximum use is made of existing assets and emerging capabilities.

Recommendation 7-2	NASA should ask the National Academy of Sciences to engage its constituent scientific community in a re-evaluation of priorities to exploit opportunities created by the vision, especially how machines and humans, used separately and in combination, can maximize scientific returns.
Recommendation 7-3	A discovery-based criterion should be used to select destinations beyond the Moon and Mars that also considers affordability, technical maturity, scientific importance, and emerging capability such as access to in-situ space resources
Finding 8	**The vision offers extraordinary opportunities to stimulate math, science, and engineering excellence for America's students and teachers, and to engage the public in a journey that will shape the course of human destiny.**
Recommendation 8-1	The Space Exploration Steering Council should work with the education community and state and local political leaders to produce an action plan that leverages the vision in support of the nation's commitment to improve math, science, and engineering education.
Recommendation 8-2	Industry, professional organizations, and the media should engage the public in understanding why space exploration is vital to our scientific, economic, and security interests.

Source: Paraphrased by CRS from the Commission's report, available at [http://www.moontomars.org].

The Commission emphasized that the vision is a "go as you can pay" endeavor, in which technological advances and discoveries will be made on an incremental basis based on whatever level of funding the country provides. Noting that accomplishing the vision will take decades, spanning multiple presidential terms and sessions of Congress, the Commission identified three "imperatives for success": sustainability, affordability, and credibility. The report concluded that "While discovery is the goal of space exploration, the Commission is certain that the benefits here on Earth will make the journey at least as important as the destination." (p. 6).

Selected Issues for Congress

The President's vision, and the Commission's report, pose many issues for Congress. CRS Report RS21720 identifies issues associated with the vision overall, and CRS Report RS21744 discusses it in the context of the FY2005 NASA budget. Four of the Commission's recommendations that may be of particular interest are the following.

Converting NASA Centers to Federally Funded Research and Development Centers (FFRDCs). NASA is managed from NASA Headquarters in Washington, D.C. It has nine major field centers: **Ames Research Center**, Moffett Field, CA; **Dryden Flight Research Center**, Edwards, CA; **Glenn Research Center**, Cleveland, OH; **Goddard Space Flight Center**, Greenbelt, MD; **Johnson Space Center**, Houston, TX; **Kennedy Space Center**, Cape Canaveral, FL: **Langley Research Center**, Hampton, VA; **Marshall Space Flight Center**, Huntsville, AL; **Stennis Space Center**, in Mississippi, near Slidell, LA.

Another NASA facility, the Jet Propulsion Laboratory (JPL) in Pasadena, CA, is often referred to as a 10th NASA center, but actually is an FFRDC operated for NASA by the California Institute of Technology. JPL executes many of NASA's planetary exploration programs, and is one of 36 FFRDCs. Many of the others are operated for the Department of Energy (DOE) or Department of Defense (DOD). Commission Chairman Aldridge was President of a DOD FFRDC, the Aerospace Corporation, from 1992-2001.

FFRDCs are not-for-profit entities exclusively or substantially funded by the federal government that are created pursuant to Federal Acquisition Regulations.[1] Those regulations specify that FFRDCs should be created only if an agency cannot accomplish an activity in-house, through other government agencies, or through traditional government procurement procedures. Most FFRDCs operate under five-year contracts with the sponsoring agency. They are not subject to Office of Personnel Management regulations and thus may offer better salaries and benefits than the government, and adapt more readily to changing requirements. Limits are placed on their activities. For example, they cannot compete with for-profit companies for other government contracts.

Congress has been debating FFRDCs for several years, such as whether they still are needed, whether they are straying from their intended purposes, and whether they are receiving appropriate oversight from their sponsoring agencies. (See CRS Report RS21542 for more on these issues). How Congress will respond to a recommendation to create nine more is not clear. Details of how the transition would be accomplished were not provided. For example, the report specified that contracting, launch operations, and flight operations should remain under government management within given centers, but how the government and FFRDC structures would interact was not clarified. Also, Mr. Aldridge has said that the Commission did not recommend closing any NASA centers because it was politically unsaleable, but it is not clear how a transition to FFRDCs would avoid that step. A "transition" or "reconfiguration" into FFRDCs suggests that the centers would close and associated civil service jobs eliminated. The FFRDCs would hire whatever employees they needed, which might or might not include the displaced NASA workers. Congress could specify that NASA employees be transferred to the FFRDCs, or be given special considerations in FFRDC employment opportunities, but that might defeat the purpose of converting to FFRDCs — creating personnel flexibility. Other questions include whether FFRDCs would be more or less cost-effective than government centers, whether the private sector could perform these activities directly, whether a single contractor would manage all the NASA FFRDCs or if each would be competed separately, and, if there are multiple contractors, how they would interact.

Creating a White House Space Exploration Steering Council. Various White House-level mechanisms have been used to coordinate interagency space policy over the years. The 1958 National Aeronautics and Space Act (P.L. 85-568) created a National Aeronautics and Space Council in the White House, chaired by the President (later the Vice President). That council was abolished by President Nixon in 1973. The Carter and Reagan Administrations used committees under the auspices of the National Security Council (NSC). Dissatisfied with that approach, Congress created a National

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[1] Information in this paragraph is drawn from CRS Report RS21542, *Department of Homeland Security: Issues Concerning Establishment of Federally Funded Research and Development Centers (FFRDCs)*, by Michael E. Davey.

Space Council, chaired by the Vice President, in the FY1989 NASA authorization act (P.L. 100-685). Under President George H. W. Bush's administration, the Space Council was chaired by Vice President Quayle. President Clinton merged the Space Council functions into a National Science and Technology Council, administered through the White House Office of Science and Technology Policy. It oversaw civil and commercial space policy, while the NSC oversaw military space policy. The Space Council was not abolished. It still exists in law, but is not staffed or funded. President George W. Bush uses a Policy Coordinating Committee under the NSC (similar to the Reagan Administration) for interagency space policy coordination.

The Aldridge Commission argued that the exploration vision must be supported by the entirety of a President's team. It recommended creating a Space Exploration Steering Council, reporting to the President, and chaired by the Vice President or another senior White House executive. Whether such a council would facilitate interagency space coordination, or make it more complex, is unclear. For example, the Commission cautioned that it not become a "forum for bureaucratic micromanagement," but simultaneously asserted that it would be a "useful prod for NASA to keep its house in order." Those could be conflicting aims. The Commission said that not all interagency issues related to exploration need to be brought to the Council, and it would not replace existing mechanisms such as the NASA-DOD Partnership Council. Thus, it would be one of several parts of a space policy-making apparatus, which could add complexity as well.

Increasing the Role of the Private Sector. The Commission made several recommendations to stimulate the role of the private sector in space, including that the private sector assume the primary role of providing services to NASA, especially accessing low Earth orbit; that prizes be offered for achieving technology breakthroughs; that Congress create tax incentives; that Congress relieve regulatory obstacles; and that Congress assure appropriate property rights in space. The Commission concluded that NASA's role be limited to areas where there is "irrefutable demonstration that only the government can perform the proposed activity." Many of these recommendations have been made in the past, and much has been said, written, and promised about commercial space activities over the past two decades. Still, there are few examples of successful commercial space enterprises. Oft-cited reasons are their high risks and costs, which make it difficult to attract investors. Because of the long history of debate over space commercialization, many view the Commission's recommendations skeptically. NASA already is taking steps in some of these areas, such as offering prizes, and using the private sector for access to low Earth orbit. Congress has enacted several laws already, and a number of bills are pending, including H.R. 644, H.R. 914, H.R. 2358, H.R. 3752, and S. 1260 (see CRS Issue Brief IB93062 and CRS Issue Brief IB92011).

International Participation. President Bush invited other countries to participate in the initiative, but the Commission's report emphasized that this is a U.S. vision and other countries are being invited to support U.S. goals. The Commission states, for example: "After establishing the vision architecture and determining what the United States is willing to cede,..." then international partners could be approached. The question is whether this attitude will offer sufficient incentives to potential partners, who may want to play a role in determining the architecture. The Commission identified the Joint Strike Fighter (JSF) program as a possible model for international cooperation, although it is not clear what analogies exist between that program to build a military aircraft (see CRS Report RL31360) and this initiative to explore space.