

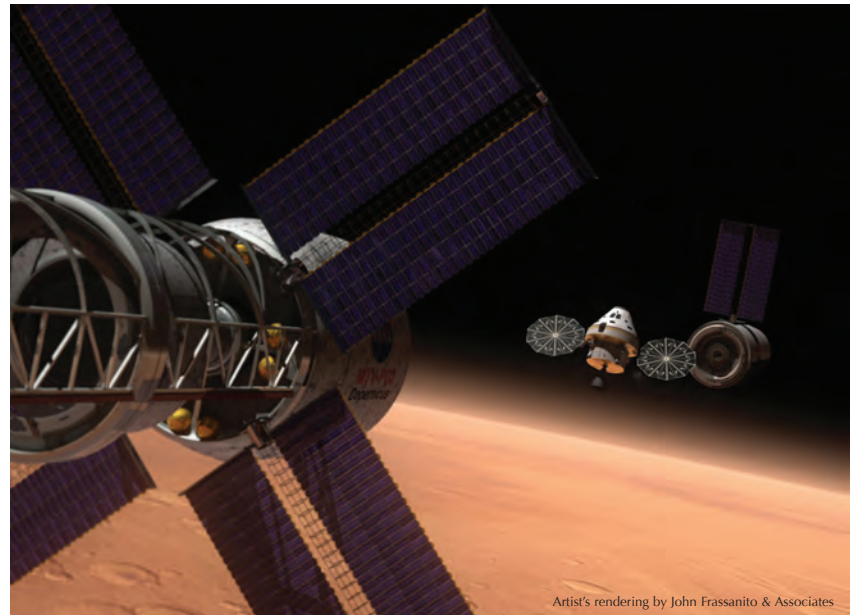
Launching a Transformative Mission: NASA's Path to Mars

By W. Henry Lambright

How does an agency launch a new mission, especially a transformative one that reaches far into the future? Who leads in this process? How? Consider the case of NASA since the Columbia Space Shuttle disaster of 2003. In the ensuing decade, NASA has seen the retirement of the shuttle, completion of the International Space Station (ISS), the start of a commercial cargo and crew service to ISS, the end of one major rocket development program, and the decision to develop a different, giant rocket capable of taking astronauts and cargo to deep space—the moon, an asteroid, and eventually Mars. Indeed, viewed historically, NASA and its political masters have initiated and sustained a transformative decision process for human space flight exploration, with Mars as a destination. The FY 2014 budget proposal of President Barack Obama includes an Asteroid Retrieval Initiative mission as a stepping-stone in the direction of Mars.

All of this is big change. It does not happen easily or without conflict. Some existing models of policy innovation paint a straightforward, rational process: agenda-setting, formulation, adoption, implementation, perhaps evaluation/reorientation, and institutionalization. Reality is not so straightforward. It is a case of two steps forward, one step backward, and an occasional misdirection. Charles Lindblom was closer to the truth when he used “muddling through” and “disjointed incrementalism” as a description of policy making.¹ There is disagreement about what is the right policy, and struggle over whose view of what is best for the country. So it has been in space policy. The stakes are high, and there are those who ponder whether and how the U.S. can still do “big things.”²

This article traces the history of policy change at NASA over the past decade and draws lessons learned about the process.³



Artist's rendering by John Frassanito & Associates

Establishing a New Mission: NASA Leads the Adoption Process

For decades, NASA has wanted to get back to human exploration of deep space, Mars in particular. On February 1, 2003, a window of opportunity opened, tragically. The Columbia Shuttle disintegrated as it entered Earth's atmosphere, killing seven astronauts, and scattering debris over a number of states. NASA Administrator Sean O'Keefe steered an interagency decision process toward a presidential decision. On January 14, 2004, George W. Bush proclaimed that NASA would retire the shuttle, finish ISS, return to the moon by 2020, and eventually go to Mars and beyond.

The mood of the country was receptive to this decision. It eventually received congressional endorsement and NASA got a substantial budget raise to get started. O'Keefe moved swiftly to create a new directorate within NASA and appointed a manager to specify how this exploration mission would be implemented. Then, in early 2005, O'Keefe left NASA for

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a university presidency. However, he had gotten the new mission adopted. He had led through joint decision-making and had NASA, the White House, and Congress aboard.

NASA Pursues Implementation

The new program was called Constellation. Michael Griffin took over as NASA administrator. An able technical manager, he believed the moon-Mars decision was the right one. He evaluated the plans he inherited and reshaped them, putting his own appointees in charge of carrying them out. Under Griffin, Constellation soon took the following form:

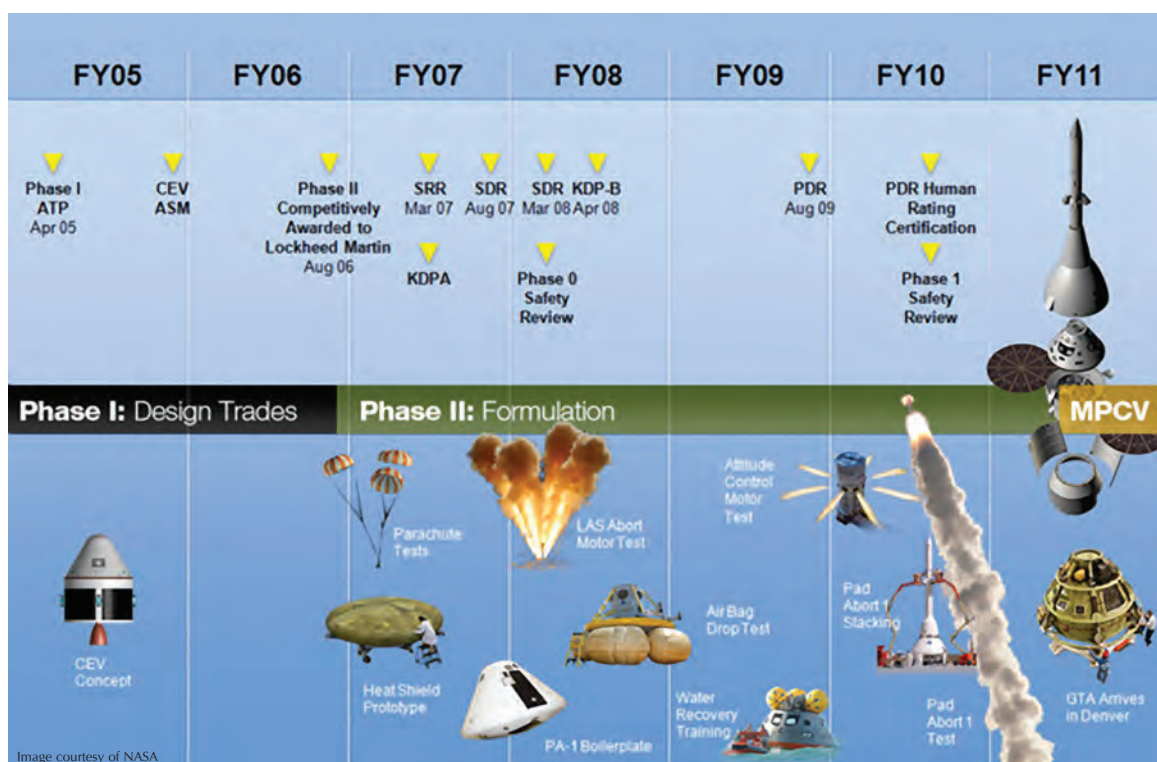
- a new rocket capable of replacing the shuttle (Ares 1)
- a spacecraft for astronauts atop the rocket (Orion)

- a heavy-lift rocket that could transport cargo and astronauts to the moon and beyond (Ares 5)
- a Moon lander (Altair)

Griffin envisioned a possible moon base. He also initiated a program to nurture a commercial “taxi” service for cargo delivery to ISS.

The good news for Constellation was that Bush had a second term. There was some time to move this presidentially announced plan into action. The bad news was that Bush and Congress had priorities higher than space and the public momentum of Columbia faded. NASA could not get the money it needed for the new mission and all the old

Timeline for development of the Multi-Purpose Crew Vehicle



Designating Orion as NASA's Multi-Purpose Crew Vehicle provides the nation with an affordable solution for multiple mission capability by continuing the technology innovations and spacecraft development the NASA-industry team has accomplished.

missions were still on its plate, especially the shuttle. The result was that Griffin could not narrow the gap between prospective shuttle retirement and start of the successor, Ares 1/Orion. He did move forward as best he could with the first components of Constellation.

The White House Seeks to Terminate

Taking office as president in January, 2009, Barack Obama had to deal with the Great Recession and two wars. He delegated space policy to his science advisor, John Holdren, who in turn empowered an independent advisory group headed by Norman Augustine to reevaluate Constellation and provide options. Meanwhile, Obama appointed Charles Bolden administrator and Lori Garver his deputy, while implementation of Constellation continued.

In September, the Augustine panel called the existing Constellation program unsustainable with the money it had and that which was projected. Calling for an additional \$3 billion for NASA, the panel provided various options. It said Mars was the ultimate destination, but that it was too far in the future. There had to be interim goals. One was the moon—the existing policy route. Another, which the panel seemed to favor, was a “flexible path.” This would involve flights to the moon (not necessarily landing), asteroids, gravitationally stable places in space called La Grange points, and moons of Mars. It suggested the commercial cargo program of Griffin be extended to commercial crew. This would allow NASA to devote its resources to the new mission of exploration, letting the private sector gradually take over routine services to ISS.⁴

The White House drove policy change. It was supportive of Mars as destination, but was unenthusiastic about the moon goal and Constellation. NASA’s Garver was significantly involved in decision-making. Bolden was involved to a much lesser degree. The White House saw NASA as an organization resistant to change and excluded it as much as possible as the budget decision process moved to finality. Congress was equally on the sidelines.

Obama was given various options in human space flight policy by his advisors. The one he chose was to terminate not only Ares 1 (which was expected), but Constellation as a whole. The president decided to provide NASA with a raise (but not at the Augustine panel level) enabling it to promote commercial crew as well as cargo delivery to ISS, and advanced technology to enable game-changing reforms in space flight to speed the eventual journey to Mars. The moon was rejected, but no interim destination specified in its place.



In this artist's conception, an astronaut performs a tethering maneuver at an asteroid. The Space Exploration Vehicle (SEV) is close by, with the Orion Multi-Purpose Crew Vehicle (MPCV) docked to a habitat in the background.

The White House indicated it would extend the life of ISS to 2020, at least.⁵

Congress Pushes Back

The rollout of the new policy came in the proposed NASA budget, announced February 1, 2010. Whatever the positive elements of the policy, they were lost in the glare of Constellation cancellation. Bolden gave a scripted defense of the policy and (at White House instruction) left it to Garver and the Office of Science and Technology Policy's Chief of Staff Jim Kohlenberger to answer questions. When a reporter noted the sunk costs in Constellation (approximately \$9 billion), Kohlenberger stated: “The fact that we poured \$9 billion into an unexecutable program really isn't an excuse to pour another \$50 billion into it and still not have an executable program.”⁶

There was an immediate push-back from Congress, led by a bipartisan group of senators from “space states”—Florida, Texas, and Alabama. From their perspective, termination of Constellation in the face of shuttle retirement (in 2011) meant thousands of layoffs for NASA and industry. Change was expected, but this was too much change, and its scope came as a shock. Without question, the White House lost the media and public relations fight. Obama was painted as killing human space flight. Bolden supported the president

publicly, but privately argued for “transition” rather than “termination,” with a destination defined. He wanted the president to make Mars the ultimate destination.

On April 15, Obama went to the Kennedy Space Center in Florida and revised his policy. While Ares 1 would go in favor of commercial crew, he promised to make a decision to initiate a heavy-lift rocket by the end of his term. Orion, or a version of it, would be developed. The moon was out, and he offered an asteroid by 2025 as the interim destination. He called for going to Mars in the mid-2030s.⁷ He also indicated there would be a program to help space workers who were hurt when the shuttle ended. The April speech did not quell the opposition.

Seeking Compromise—Joint Decision-Making

Obama assigned Rob Nabors, senior advisor to White House Chief of Staff Rahm Emanuel, to find a compromise. Senator Bill Nelson (D-FL), chair of NASA’s authorization subcommittee, took the lead for Congress in negotiations. On September 29, a compromise was reached. Ares 1 would end, Orion (renamed Orion Multi-Purpose Crew Vehicle or MPCV) would continue, a new heavy-lift rocket called Space Launch System (SLS) would be developed, and commercial

crew and advanced technology would be furthered. Congress wanted to act quickly on the rocket and set the requirements for doing so. The major aspects of this agreement were put into NASA’s Authorization Act for 2010, which Obama signed in early October.

As the heavy-lift rocket became increasingly the focus of debate, NASA (and Bolden) gradually moved more and more from the periphery to the center of decision-making. The design had to be “affordable, sustainable, and realistic,” said Bolden. Congress complained bitterly about delays in announcing a design and getting started on SLS, and threatened Bolden with a subpoena to get information. A *Wall Street Journal* article in early September 2011 brought matters to a head. It spoke of “sticker shock” at OMB about SLS costs. A number of senators, including Nelson and Kay Bailey Hutchison (R-TX), exploded, seeing the article as a deliberate attempt by the White House to kill SLS.⁸

On September 13, OMB Director Jacob Lew, Holdren, and Bolden convened and decided to settle the rocket and other budget matters. They agreed on top priorities for NASA that would get support in spite of the budget climate. Lew went with Bolden subsequently to the Hill and met with Nelson and Hutchison. Lew said he spoke for Obama. They essentially reaffirmed the compromise of fall 2010 in terms of human space flight. The difference was agreement on the heavy-lift rocket’s design and start.

On September 14, at a press conference, with Nelson, Hutchison, Bolden, and many others attending, the announcement was made about SLS. This was the decision to implement immediately the building of an evolvable rocket, created in stages, eventually capable of going to whatever destinations were determined—but ultimately to Mars. It would cost \$18 billion through 2017. The first flight would be in 2017. The power of the rocket would grow in subsequent years. The development cost would be \$3 billion each year of development, NASA said, with these costs covering the rocket and space capsule as a system.⁹

NASA Moves to Full Implementation

The decision of September 14, 2011, did not end debate. Decisions can unravel, and the senators behind SLS (nicknamed “Senate Launched System”) carefully watched subsequent decision-making as NASA’s budget was squeezed. They wanted to make sure SLS/Orion was protected and reduced spending on other programs including commercial crew, an Obama priority in the compromise, to do so. The Orion space capsule, commercial crew, and advanced technologies had been making modest progress in spite of the struggles



Cutaway view of the Multi-Purpose Crew Vehicle.

between the White House and Congress. They continued to do so. Now the big rocket could be developed.

The reelection of Obama and Nelson in November 2012 indicated there was a chance for policy continuity. In 2013, the president retained Bolden and Garver, NASA's leadership team. It was up to Bolden in particular to direct NASA in implementation of the Obama-Congress compromise. Given the budget uncertainties, his challenge was daunting.

A Proposed Step Forward

What Bolden needed was a specific project that would move NASA toward Mars and congeal the current unwieldy coalition in support of Mars exploration. He may have gotten it in the FY 2014 budget proposal of President Obama, released April 10, 2013. It calls for \$105 million to initiate a mission to capture robotically an asteroid by 2025. It would require use of the congressionally desired SLS/Orion. It would yield new scientific understanding and extend technology. It would encourage commercial interests that see possibilities in asteroid mining. It would also have the added benefit of learning how to deflect an asteroid. Given recent events in Russia, where an asteroid exploded in the atmosphere above a city and caused 1,000 injuries, that is a skill humanity would be wise to obtain.

Such a project has the potential to satisfy multiple interests and move NASA in the direction the president, Congress, and the agency all want to go. It could also be the kind of first that can galvanize public interest. It will require funding every year from FY 2014 until 2025, and hence is a leadership challenge in these hard times. Still, it gives hope for progress.

Conclusions and Lessons Learned

The decision-making process for the new exploration mission of NASA has been one of "muddling through," far from the rational model posed at the outset. Could the nation have done better? The following reflections on the past 10 years may be worth considering for lessons learned.

- NASA does have a human exploration mission aimed at Mars. It has lasted a decade, and most likely will continue. Getting it adopted in 2004 required taking advantage of a relatively brief window of opportunity, moving quickly but leaving certain issues for later resolution. Lack of clarity on divisive issues (like long-term funding and the future of the space station) can ease the adoption of a program. But those issues will arise eventually and can cause problems in implementation.



- Leadership is needed throughout a long process of adoption, implementation, evaluation, reorientation, etc. Who leads at what stage can vary: NASA, the White House, Congress. But whoever leads needs to build a coalition of support for the decision pursued. Joint decision-making has a chance to succeed. Unilateralism usually fails.
- A decision to terminate will face significant obstacles to success when the program in question is one that has been around several years, spent billions, and has an influential constituency. Just as it takes political skill to initiate a new program, it takes great skill to kill one, particularly one that has had time to build support. An agency with too much on its plate for the money it has may well require some amputation, but the process should be surgically deft.¹⁰

- For a long-term program to succeed requires a delicate balance of stability and change. The stability is needed to get implementation accomplished. The change comes with evaluation and reorientation when problems arise or the larger political context alters radically. A presidential transition is normally a time of evaluation and change in the U.S. But too much change, too often, is a recipe for never reaching a long-term objective, even an interim one.
- A new long-term, transformative mission—such as a journey to Mars—can survive with a core of support, but to grow and move forward effectively, it needs far broader backing. NASA's human exploration mission has a nucleus of support in the space states and its contractors. But to get the enhanced resources it needs for the long haul to Mars, the mission requires a far broader national—even international—coalition. In the first Obama administration, the new mission passed its catharsis. This test showed that years after the Columbia disaster, a national consensus continues that the nation must go back to human exploration of deep space. The debate is over how and how fast, not whether. Leadership in joint decision-making by the president, Congress, and NASA will be critical to staying the course.
- Building hardware is not enough. Destinations are needed that are stepping-stones to Mars. The asteroid-capture project proposed in Obama's FY 2014 budget may be a needed catalyst. It is noteworthy that Senator Nelson declared in speaking of the project: "This is part of what will be a much broader program. The plan combines the science of mining an asteroid, along with developing ways to deflect one, along with providing a place to develop ways we can go to Mars."¹¹ Long-term missions need interim projects that unite interests. Leaders can use those projects to build and maintain momentum in a desired direction. The key is to frame these projects in ways understandable and exciting to the larger public. The people need to be part of the journey. ■

Notes

- 1 Charles Lindblom. "The Science of "Muddling Through." *Public Administration Review*, Vol. 19, No. 2 (Spring, 1959), pp. 79–88; Charles Lindblom, "Still Muddling, Not Yet Through," *Public Administration Review*, Vol. 39, No. 6 (Nov–Dec., 1979), 517–526.
- 2 Dwight Ink, W. Henry Lambricht, and John M Kamensky, "Cross-Agency Efforts Help Manage Large-Scale Initiatives," *The Public Manager* (Winter 2012), 45–48.
- 3 This essay builds on earlier work on NASA under IBM: W. Henry Lambricht, *Executive Response to Changing Fortune: Sean O'Keefe as NASA Administrator* (Washington, D.C.: IBM Center for The Business of Government, 2005); and *Launching A New Mission: Michael Griffin and NASA's Return to the Moon* (2009).
- 4 Kenneth Chang, "Panel Calls Program of NASA Unfeasible," *New York Times*, September 9, 2009, A14.
- 5 Marcia Smith, "Obama Asks for \$2.5 Billion to Cancel Constellation; \$6 Billion to Pay for Commercial Substitute," [spacepolicyonline.com](http://www.spacepolicyonline.com/pages/index.php?option=com_contents+view=article+id...), (February 1, 2010), http://www.spacepolicyonline.com/pages/index.php?option=com_contents+view=article+id...
- 6 Brian Berger, "Obama's 'Game-Changing' NASA Plan Folds Constellation, Bets Commercial," *Space News* (February 8, 2010), 1.
- 7 Marcia Smith, "Obama Promises Continued Leadership in Space," [spacepolicyonline.com](http://www.spacepolicyonline.com/pages/index.php?option=com_content_new=article+i...) (April 15, 2010), http://www.spacepolicyonline.com/pages/index.php?option=com_content_new=article+i...
- 8 Dan Leone, "Obama Administration Accused of Sabotaging Space Launch System," *Space News*. (September 12, 2011), 1; Marcia Smith, "WSJ: White House Has Sticker Shock On Exploration Program," [spacepolicyonline.com](http://www.spacepolicyonline.com/pages/index.php?option=com_content+view=article+id...) (September. 7, 2011), http://www.spacepolicyonline.com/pages/index.php?option=com_content+view=article+id...
- 9 Frank Moring, Jr., "Stepping Up," *Aviation Week and Space Technology*, (September 19, 2011), 47–50.
- 10 The author provides cases of two government leaders who carried out terminations deftly in *Forging Governmental Change: Lessons From Transformation led by Robert Gates of DOD and Francis Collins of NIH* (Washington, D.C.: IBM Center for The Business of Government 2012).
- 11 Dan Leone, "White House Sets Sights on Asteroid Capture Mission," *Space News*, (April 5, 2013), <http://www.spacenews.com/article/civil-space/34712white-house-sets-sights-on-asteroid-ca...>