A new US approach to human spaceflight?

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1. Overview

On 1 February 2010, US President Barack Obama sent to Congress his proposal for the NASA (and other government agencies) budget for Fiscal Year 2011, which would begin on 1 October 2010. The NASA budget reflected a dramatic shift in strategy for the US human spaceflight program. Since 2004, that program had been focused on ending Space Shuttle flights in 2010, after assembly of the International Space Station (ISS) was completed, and developing the capabilities to return to the Moon by 2010. Since 2005, those capabilities were embodied in a program called Constellation, with its initial elements being an Orion spacecraft capable of carrying four astronauts to the Moon and a launch vehicle called Ares-1 capable of launching Orion to low-Earth orbit, thus replacing the Space Shuttle as the US means for human access to space. Other elements of Constellation, not yet under development as of 2010, included a heavy-lift booster, Ares-5, and a lunar lander, Altair.

President Obama proposed cancelling Constellation and instead relying on a private sector—NASA partnership to carry astronauts to the ISS. Under the 2004 vision, the USA had indicated that it might withdraw from involvement in the ISS after 2015; the Obama administration proposed extending its operations until at least 2020. Central to the proposed new strategy for human spaceflight was a pause in developing new flight systems, instead making substantial investments in developing and demonstrating new, “game-changing”, technologies for several years and only then embodying them in a new heavy-lift launch vehicle and a crew-carrying spacecraft for deep space missions. The strategy, based on forecasts of likely future budgets, did not call for parallel development of a spacecraft capable of landing on a planetary (or lunar) surface. Future journeys would go to multiple destinations beyond Earth orbit, not just the Moon, with the first missions coming sometime after 2020.

The Obama proposal came under immediate attack from members of Congress whose districts would be affected by the new strategy, firms that were threatened by the cancellation of their Constellation contracts, and spaceflight veterans, including several Apollo astronauts. The criticisms focused on the viability of relying on the private sector for crew transport to the ISS and the lack of specific goals and schedules for deep space exploration missions. Senator Richard Shelby (R-AL) succeeded in getting a provision written into law that prohibited NASA from cancelling any Constellation contracts and from starting the new programs proposed by the president until the Congress completed action on the FY2011 budget proposal and had either approved, rejected or modified the new human spaceflight strategy.

Responding to some of these criticisms, President Obama went to the Kennedy Space Center in Florida on 15 April to deliver a speech intended to communicate his personal support for the new human spaceflight strategy and to clarify a few points. He resuscitated the Orion spacecraft, but initially only in a version that could be used as a crew rescue vehicle for the ISS. He said that an early mission goal would be to rendezvous with a near-Earth asteroid in the 2025 time frame, with flights to the vicinity of Mars by the mid-2030s. He also indicated that the Moon would not be the first destination of deep space missions, as it had been in the 2004 vision.

The president’s speech only intensified criticisms and uncertainty. Between April and September NASA had the unenviable task of both continuing to work on its Constellation efforts (although at a reduced pace) and carrying out intense planning on what it would do if the president’s proposal emerged from the Congress unchanged, even though all involved knew that such an outcome was impossible. NASA also had to prepare its FY2012 budget proposal for the White House without knowing what it would be doing in FY2011.
Meanwhile, the two congressional committees with oversight (but not funding) responsibility for NASA passed three-year “authorization” bills for NASA; these bills set the upper limit of the funds that might be provided to NASA for different purposes and specified the policy framework for NASA activities for the next three years. The Senate Committee on Commerce, Science and Transportation passed legislation that attempted to find a compromise position between the president’s new strategy and the need to protect the jobs and other capabilities currently involved in human spaceflight. While accepting the principle of an enhanced private sector role in providing crew transportation services and approving modest investments in new exploration-related technologies, the bill also ordered NASA to begin immediate development of a heavy-lift launcher and specified in some detail the design of that vehicle. It also directed NASA to continue developing a spacecraft to carry astronauts into deep space. The Senate bill also provided for at least one additional Space Shuttle flight, no earlier than June 2011. The House Committee on Science approved a bill that in its essence directed NASA to move forward with something closely resembling Constellation; many elements of the president’s strategy were not included in this bill, particularly the switch of primary responsibility for crew transport to the private sector. As Congress in late September rushed towards adjournment in advance of the November elections, the House very reluctantly agreed to accept the Senate version of the authorization bill, and President Obama signed that bill into law on 11 October.

Decisions on what funds NASA will have to carry out the provisions of the bill rest with the appropriations committees of the Senate and House. Neither house of Congress completed work on the NASA appropriations bill by the time Fiscal Year 2011 began on 1 October. Rather, NASA (and most other agencies of the government) were forced to operate under what is called a Continuing Resolution, which funds NASA at Fiscal Year 2010 levels and prohibits it from making any of the changes contained in the president’s original proposal. It is not clear when the Congress will actually pass a NASA appropriations bill; this may not happen until early in 2011. Meanwhile, all NASA could do from September on was plan for its new direction, now in terms of the provisions of the authorization bill.

I have been observing space decisions in the USA for over four decades, and I have never seen such a confused situation, with NASA unable to articulate a convincing case in support of the new White House strategy and with such intense congressional involvement (reflecting the billions of dollars and thousands of jobs at stake) in the specifics of the US program of future human spaceflight. (It should be noted that the other areas of NASA activities, particularly space science and aeronautics research, are not controversial; the debate is only about the future path for the human spaceflight effort). The following paragraphs attempt to describe how this situation came to be.

2. Origins of the new strategy

After his election as the 44th US president in November 2008 and in anticipation of entering the White House on 20 January 2009, Barack Obama created a number of transition teams, both on issues he would face as president and for most federal agencies, including NASA. The NASA transition team was led by Obama space advisor Lori Garver, a veteran space policy activist who had worked at NASA during the Clinton administration. She and her small transition team lacked technical backgrounds, but were deeply familiar with the content of the then-current NASA program and the criticisms of that program. Garver’s primary task was to advise the incoming administration regarding whether it should embrace the Constellation program as its own during the eight years that Barack Obama hoped to spend in the White House, or whether changes in that program were needed to advance Obama administration priorities.

The transition team heard a number of worrying criticisms of the Constellation program as it opened its doors to all who had a legitimate perspective on the US space program. During its work, Garver was personally challenged by still-NASA Administrator Mike Griffin regarding her lack of technical qualifications to assess the NASA program, especially Constellation. Griffin had been the primary architect of Constellation and hoped to retain his position as administrator under the Obama administration so he could see the program through to at least initial flights of the Orion spacecraft on the Ares-1 launcher.

That was not to be. Griffin’s pro-forma resignation was accepted, and a search for a new NASA administrator was initiated. The transition team had concluded that there were enough concerns about the content, budget and schedule of the Constellation program to merit a top-level, technically experienced, independent review of the program and possible alternatives. The hope was that a new NASA administrator could be identified before the 20 January 2009, presidential inaugural, and that that person would immediately commission such an external review upon taking office.

However, the search for a NASA administrator dragged on for several months before an acceptable candidate, former astronaut and retired Marine Major General Charles Bolden, was identified. His nomination as administrator and that of Lori Garver as deputy administrator were sent to the Senate only on 23 May 2009. The White House had decided earlier that it could wait no longer for a new NASA administrator, and on 7 May announced the formation of a 10-person “Review of United States Human Spaceflight Plans Committee”.

That committee quickly became known as the Augustine Committee after its chair, retired aerospace industrialist Norm Augustine. The committee spent an intense three months hearing from US and foreign space leaders and many others about options for future human spaceflight and conducting its own in-depth analysis. Its interim report was released on 8 September 2009 and declared that “the US human spaceflight program appears to be on an unsustainable trajectory”. In its final report, released on 22 October, the committee proposed an increase in the NASA budget, suggested the need for substantial investment in technologies related to human spaceflight, advised that ISS operations should be extended to 2020, noted that it was feasible for the private sector to take on a larger role in carrying people into orbit, and offered a variety of options for future human spaceflight beyond low-Earth orbit. Common to many of the options was what was called a “flexible path” approach that would take explorers to a variety of destinations in deep space but would not land on either the lunar or Martian surface for some years. The approach, projecting that future budgets would support developing two new large systems, but not three, called for the development of a heavy-lift launcher and a deep-space spacecraft, but not a landing vehicle. In releasing the report, Augustine was particularly critical of the Ares-1 launcher, calling it “the wrong launcher at the wrong time”.

The White House expected, but apparently did not clearly communicate to NASA, that the plans the space agency submitted in Fall 2009 for inclusion in the president’s FY2011 budget proposal should substantially reflect the findings of the Augustine Committee. That did not happen; NASA’s budget submissions were still based on the Constellation elements and approach. After several iterations, top White House officials and the NASA leadership, with the concurrence of President Obama, decided in December that a new strategy for human spaceflight would be developed within the Executive Office of the President without the involvement of most of NASA’s top program and center officials.
3. New strategy developed and announced

Working urgently and with a high level of secrecy because they realized that, if planning for a dramatic shift in strategy became known, there would be an immediate critical reaction, during January 2010 a small group of people from the Office and Management and Budget, Office of Science and Technology Policy, National Security Council, and some immediate presidential advisers, plus some of NASA’s political leadership, crafted the basic features of a new approach to human spaceflight. That approach closely reflected the findings of the Augustine Committee. There was agreement to increase the NASA budget by a total of $1 billion over the next five years (rather than the more substantial increase that the Augustine Committee had proposed) and to reallocate a large share of that budget in the next several years away from Constellation and towards investments in new technology related to propulsion and in-orbit operations that would enable future exploration. There was also agreement to jump start an industry-government partnership in carrying crews to orbit with a multi-billion dollar investment in fostering that partnership. All these decisions were made without the in-depth analysis typical of the “normal” budget process, and the level of resources allocated to different initiatives was somewhat arbitrary. Absolutely critical to the new approach was freeing up the funds dedicated to the Constellation program; the decision was made to cancel that program in its entirety, and with it the goal of returning to the Moon by 2020.

Given the secrecy with which these decisions were being made, many at the last minute, there was no time to alert various stakeholders about the radical character of the changes the president would propose on 1 February. In a normal budget process relevant members of the Congress and their staff, space-related media, various opinion leaders, and occasionally industry leaders are briefed on the contents of the budget. This did not happen, or happened at the very last minute, with respect to the FY2011 NASA budget. Thus almost everyone concerned was quite surprised by the announcement of the new strategy for human spaceflight.

That strategy called for almost $11 billion of investment over a five-year period in exploration-related technology developments and demonstrations and propulsion research and development; almost $5 billion of investment in further-off technologies; and $6 billion to spur the development of commercial spaceflight capabilities. There were no funds for building new spacecraft or launchers in the five-year budget outlook; those developments would come only after several years of technology investments. No destinations or a timetable for exploratory missions were set out.

There was little in-depth analysis in support of particular budget allocations available. Because among those not informed of the decisions until the last minute were the top officials at NASA headquarters and field centers, congressmen and reporters asking for explanations of the new strategy did not get satisfying answers. In addition, the budget release came at a time when a new head of public affairs for NASA had just been appointed, and the public “roll out” of the budget was very poorly executed. NASA totally lost control of the message associated with the shift in strategy. The result of this communication failure was widespread misunderstanding of the new strategy, leading to mistaken reports such as “President Obama abandons human spaceflight”. NASA was quickly put on the defensive rather than being able to actively advocate the president’s new approach.

4. Congress objects

It should have come as no surprise to advocates of the new strategy that the relevant members and committees of Congress were skeptical, if not directly hostile, to the new strategy. Even in September 2009, when Norm Augustine had testified before both the House Committee on Science and the Senate Committee on Commerce, Science, and Transportation, almost all members had pushed Augustine to explain why his committee had not recommended increasing the budget for Constellation to get the program back on schedule, or close to it, rather than suggesting alternatives to the “program of record”. Many members were more interested in making statements in support of their constituents’ interests than they were in listening to Augustine’s explanations.

So when a new strategy reflecting the conclusions of the Augustine Committee’s findings came before those same two committees after the release of the president’s budget, there was a great deal of hostility evident among some members, such as Senators Richard Shelby (R-AL) and David Vitter (R-LA) and Representatives Bart Gordon (D-TN), Gabrielle Giffords (D-AZ) and Ralph Hall (R-TX). Gordon was chair of the House Committee on Science and Giffords the Chair of its Subcommittee on Space and Aeronautics. Senator Shelby was able to get written into law a prohibition against NASA cancelling any Constellation contracts. One sticking point among many members was that some $9 billion had already been spent on the program, and it seemed prudent not to write off that investment. Trying to find some form of compromise between the congressional concerns and the White House proposal were Senators Bill Nelson (D-FL) and Kay Bailey Hutchison (R-TX). They were the chairman and ranking minority member of the Senate Science and Space Subcommittee, and were looked to by other senators without direct space interests for leadership in crafting the Senate reaction to the White House.

Although many of those who had crafted the new space strategy were veterans of Washington politics, in developing the new approach there seems to have been little attention paid to its political feasibility — or at least, if political impacts were considered, they were not given much importance. Cancelling Constellation would mean terminating contracts worth billions of dollars and would influence the job prospects of thousands of NASA and contractor workers. The firms who would suffer from cancelled contracts quickly organized lobbying efforts against the president’s proposal; they found allies among senators and representatives whose constituencies would be most affected by the proposed changes. They were able to convince such revered figures as Apollo astronauts Neil Armstrong, James Lovell, and Eugene Cernan to testify against the president’s proposals. Former administrator Griffin spoke skeptically about the changes to Constellation. The supporters of the new strategy were handicapped by the inability, or unwillingness, of NASA leaders to provide a coherent defense of the president’s proposals and by the fact that those in the private sector who most stood to benefit from the new approach were relatively uninterested politically. Thus the first round of congressional hearings on the new strategy and the NASA budget during the February—March period did not bode well for the initiative’s success.

5. The president adds his personal support

On 15 April 2010, President Obama came to the Kennedy Space Center in Florida to add his personal endorsement of his administration’s new strategy for human spaceflight. He said: “nobody is more committed to manned spaceflight, to human exploration of space, than I am. But we’ve got to do it in a smart way, and we can’t just keep on doing the same old things that we’ve been doing and thinking that somehow is going to get us to where we want to go”. The president added in a somewhat flippan manner: “I understand that some believe that we should attempt a return to the surface of the Moon first, as previously planned. But I just have to say pretty
bluntly here: We’ve been there before”. Backtracking on the decision to cancel Orion, Obama announced that he was directing NASA to use the Orion technology as the basis for a crew rescue vehicle for the ISS. Funds to undertake such an effort were not in the president’s February budget proposal, and this White House-directed initiative caught at least some senior NASA officials by surprise.

Reacting to criticisms that there were no schedule dates or exploration destinations in his proposed strategy, the president announced that NASA would “finaliz[e] the design” of a heavy-lift launcher no later than 2015. Developing this launch vehicle and a new spacecraft, the president said, would allow the USA to send astronauts to a near-Earth asteroid by 2025 and by the mid-2030s to send a crew to orbit Mars, with a landing on the planet to follow.

While the president’s speech was intended to rally political support for his new space strategy, it seems to have had little effect except to confuse the situation even more. In particular, NASA now had to adjust the internal planning it had been doing since February to accommodate the funding for an Orion-based crew rescue vehicle and to reflect the schedule laid out in the president’s address.

6. Additional congressional actions

In the US system two different types of congressional committees are involved in reviewing the plans of the agencies of the executive branch. Authorizing committees set the policy framework for agency activities and indicate an upper limit of funding for the various elements of that activity reflecting that policy framework. Appropriations committees approve the actual funding for each agency. They most often (but not always) make decisions reflecting the guidance of the authorizing committees. It is the authorizing committees that are likely to go into greater depth in examining proposed agency activities.

The NASA authorization committee in the House of Representatives is the Committee on Science. Its chair in 2010 was Rep. Bart Gordon and its ranking minority member is Rep. Ralph Hall. The committee’s Subcommittee on Space and Aeronautics was chaired by Rep. Gabrielle Giffords, who, incidentally, is married to NASA astronaut Mark Kelly. The House committee was antagonistic towards the new human spaceflight strategy from February on and to NASA’s failure to provide requested information in support of the proposed changes and the decision to cancel Constellation. At the end of July 2010 the committee passed an authorization bill that provided very limited support for the commercial crew initiative and for exploration-related technology investments, and directed NASA to restructure exploration effort in ways closely reflecting Constellation plans; the legislation declares that NASA’s exploration efforts should be carried out “in a manner that builds on the investments made to date in the Orion, Ares−I, and heavy-lift projects... rather than discard them”.

The Senate Committee on Commerce, Science, and Transportation, also at the end of July, unanimously passed a rather different bill. That legislation, which covered NASA programs for the next three years, was the result of an attempt to find areas of compromise between the short-term concerns of senators regarding the loss of workforce capability (and jobs) resulting from cancelling Constellation and the desire to support the major elements of the president’s new strategy. This compromise effort was led by Senators Bill Nelson and Kay Bailey Hutchison and gained the support of all committee members. The major change in the bill is to move earlier the schedule for the development of a deep-space spacecraft and a heavy-lift launch vehicle; this would have the effect of preserving much of the Constellation workforce. The bill set December 2016 as the date by which both the spacecraft and heavy-lift launcher should be ready for use. The committee agreed with the cancellation of Ares−I, but was unusually specific in setting out the major design features of the new launch vehicle, implying significant future roles for the current Ares−I contractors. The committee accepted the notion that the private sector should have primary responsibility for crew transport to the ISS. It also mandated that there should be at least one more flight of the Space Shuttle, no earlier than June 2011. In order to provide funds for that Shuttle flight and for the development of a new spacecraft and heavy-lift vehicle, the committee authorized substantially less funding for commercial crew and exploration technology investments than had been requested by the White House. But these budget levels were still above those approved by the House committee. The Senate bill was approved by the whole Senate before it adjourned in early August.

When the Congress reconvened in mid-September, there were intense negotiations between the staffs of the Senate and House committees to attempt to reconcile the differences between the two bills. These negotiations failed. Then, on 23 September, Representative Gordon introduced a new House bill that attempted to move towards the Senate provisions, but the Senate was unwilling to accept his compromise. Ultimately the House of Representatives deferred to the Senate and reluctantly approved the Senate bill on 29 September by a 309−118 vote margin. Although the bill reflected significant modifications to President Obama’s original proposals, it was welcomed by the NASA leadership and signed by the president on 11 October.

As mentioned above, passage of the authorization bill did not end the uncertainty with respect to NASA’s short-term efforts. In order for NASA to pursue any of the program initiatives embodied in the authorization bill, a NASA budget for Fiscal Year 2011 must be appropriated by the Congress; new programs are not considered to be approved by Congress until their funding is appropriated. This did not happen by the time the fiscal year began on 1 October. Instead, NASA was forced to operate under a temporary Continuing Resolution that both forbids NASA to cancel any existing contracts and prohibits starts on new programs. Until the Congress approves a NASA appropriation, NASA must continue to operate at the FY2010 budget levels.

To complicate matters even further, the November elections resulted in a shift of party control to Republican leadership in the House of Representatives and a reduced Democrat majority in the Senate. Many Republicans are making reduction in government spending a top priority issue. If the NASA appropriation is not approved until the new Congress convenes in January 2011, NASA could face budget reductions below what the Congress has authorized, making it even more difficult to move forward with what remains of the new human spaceflight strategy.

7. What has NASA been doing?

In the months since the 1 February announcement of the new strategy for human spaceflight and the quickly following congressional prohibition against cancelling Constellation contracts and starting new programs, NASA’s Exploration Systems Mission Directorate at NASA headquarters, and the elements at NASA field centers involved with Constellation and human spaceflight in general, have had to lead a somewhat schizophrenic existence. On the one hand, under law they must move forward with at least some...
of the previously planned activities related to Constellation; they have done so at a slow pace, and have warned various contractors to preserve funds for the costs of terminating contracts, should that eventuality ensue.

On the other hand, NASA has since February 2010 been engaged in intense planning on the steps it would take if the new strategy and associated programs were approved. Between February and May, a number of internal task forces worked on fleshing out the content of each major element of the new strategy, and a Human Exploration Framework Team (HEFT) was established in April to integrate the work of these task forces into a coherent exploration program and to serve as the focal point for continued planning. A second round of HEFT planning concluded in December; it had difficulty fitting into the budget NASA projects it is likely to receive in the coming years a coherent exploration plan following presidential and Congressional guidance. NASA has issued a series of Requests for Information, has organized public forums, and otherwise engaged the non-government space community in discussions of the new initiatives. The agency recently issued small study contracts to 13 companies to explore options for the design of the heavy-lift launcher, an action of concern to those in Congress who thought that the vehicle's design had been clearly specified in the authorization bill.

8. What next?

A great deal of uncertainty with respect to the future of US human spaceflight remains at the time of writing (November 2010). The eventual balance between a spaceflight program aimed at preserving the status quo with respect to jobs and contracts and one incorporating the key elements of the new strategy proposed in February 2010 will only become clear as, first of all, the president’s budget proposal for Fiscal Year 2012 is sent to Congress in February 2011 and as NASA finally gets a FY2011 budget so it can move ahead on the steps it has been planning. No one would point to the way in which the Obama administration announced and promoted its new strategy for human spaceflight as an exemplar of high-quality policy formulation. Be that as it may, the key question is whether the logic behind the new strategy is compelling enough to carry the day. If it is, then the past 12 months will mark a turning point in US spaceflight policy, even if change comes much more gradually than advocates of the new strategy had hoped. If it is not, the decades-long situation of NASA “trying to do too much with too little” is likely to persist, and it will be preserving jobs and contracts that will dominate US spaceflight activity, rather than pursuing a truly excellent 21st century exploration program in partnership with other spacefaring countries.