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NASA'S PROJECT CONSTELLATION AND THE FUTURE OF HUMAN SPACEFLIGHT (Historical Information)

On January 14, 2004, President George W. Bush directed NASA to design and develop spacecraft and launch vehicles to return humans to the Moon by 2020 and someday send them to Mars in his "Vision for Space Exploration" speech. This became known as Project Constellation.

Six years later, President Barack Obama decided to cancel the Constellation program. After considerable debate, Congress largely agreed in the 2010 NASA Authorization Act (P.L. 111-267), although another law, the FY 2010 Consolidated Appropriations Act (P.L. 111-117) prohibited NASA from cancelling the program until Congress passed a subsequent appropriations act allowing it to do so. [1] That did not happen until April 15, 2011 with the passage of the final FY2011 Continuing Resolution (P.L. 112-10). At that point, the Constellation program died, although NASA continues to build one part of it – the Orion crew capsule – for undefined future human space exploration.

President Obama and the Augustine Committee on the Future of Human Spaceflight

Shortly after taking office in 2009, President Obama ordered a review of the human spaceflight program. A blue-ribbon committee chaired by retired aerospace industry executive Norman Augustine was established. Its October 2009 report stated that Constellation was "not viable" under President Obama's FY2010 budget plan and set out a number of options, but no recommendations, which were prohibited by its charter. Because the report was issued late in the congressional budget cycle and Congress wanted time to consider it before any changes were made, in December 2009 it included the language in the FY2010 Consolidated Appropriations Act (P.L. 111-117) prohibiting NASA from terminating Constellation until directed to do so in a future appropriations act.

On February 1, 2010, in his FY2011 budget request, President Obama revealed that he had decided to cancel Constellation. He proposed instead to rely on the commercial sector rather than NASA to build new U.S. crew space transportation systems ("commercial crew'") to replace the space shuttle for taking people to and from low Earth orbit (LEO), including the International Space Station. He proposed investing in technologies to enable future human exploration of space beyond LEO, but without any timeline or specific destination.

Congressional Reaction and Obama's April 15, 2010 Speech at KSC

Congress was taken by surprise. In particular, it wanted to know what the President had in mind for a destination for human space exploration and when to get there. In an April 15, 2010

[1] For an explanation of the difference between authorizations and appropriations, see our "What's a Markup?" fact sheet.

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speech at Kennedy Space Center, FL, the President said that he wanted to send astronauts to an asteroid by 2025.

On a bipartisan basis, Congress was deeply unhappy with the President's dramatic change of course. Congress had passed two laws, the 2005 NASA Authorization Act and the 2008 NASA Authorization Act, essentially endorsing President Bush's program. The first was passed while the Republicans controlled Congress and the second when Democrats controlled Congress, demonstrating bipartisan agreement on the future course of the U.S. human spaceflight program.

Chief among the congressional disagreements with the Obama plan was skepticism that the private sector was ready to take responsibility for launching astronauts to and from LEO and the International Space Station (ISS). With the end of the space shuttle program fast approaching, and no replacement in sight with the termination of the Constellation program, Congress felt that the President was abandoning U.S. leadership in space since it would be reliant on Russia to take NASA astronauts to and from ISS indefinitely. The House and Senate committees that authorize NASA activities and the appropriations committees that provide money to execute them held many hearings. With one exception, the members of those committees expressed deep skepticism that the private sector was ready to take on responsibility for transporting astronauts to and from LEO; that exception was Rep. Dana Rohrabacher (R-CA), a long time support of commercial space who was the only vocal congressional advocate for President Obama's plan. The irony of a conservative Republican being the only supporter of a liberal Democratic President's plan was not lost on those involved in the debate.

Ultimately, in October 2010, Congress passed the 2010 NASA Authorization Act (P.L. 111-267) that adopted a compromise approach in which both NASA and the commercial sector are to develop new crew transportation systems for LEO and NASA is to also develop systems for taking people beyond LEO to unspecified destinations. Specifically, NASA is directed to develop a new Space Launch System (also called a heavy lift launch vehicle—HLLV) and a Multi-Purpose Crew Vehicle (MPCV). The agency is directed to build on the work done on Constellation and for the space shuttle in designing the new systems. NASA refers to the SLS and MPCV as "Human Exploration Capabilities" in its FY2012 budget request.

However, as calendar year 2011 began, Congress had not passed an appropriations bill that relieved NASA of the constraints in P.L. 111-117 to continue the Constellation program until otherwise directed by Congress. So Constellation officially continued as the agency looked at alternatives to meet the requirements of the new authorization law. In January 2011, NASA's Inspector General sent a letter to Congress warning that the agency would unnecessarily spend $215 million on Constellation by the end of February 2011, or $575 million by the end of FY2011, if Congress did not act to overturn the language in P.L. 111-117. The House passed several "Continuing Resolutions" (CRs) between January and April 2011 to keep the government operating, but none allowed Constellation to be cancelled until the last one, which was signed into law on April 15, 2011 (P.L. 112-10). That was the official end of the Constellation program as a program.

The Constellation Program Office was at NASA's Johnson Space Center (JSC), Houston, TX. The program worked for several years on a new launch vehicle to take crews to Earth orbit (Ares I), a new Heavy Lift Launch Vehicle (HLLV) to take crews and hardware to land on the Moon and Mars (Ares V), and a capsule for the crews (Orion). As required by section 309 of the 2010 NASA Authorization Act, NASA sent an interim report to Congress in January 2011 providing information on its preliminary reference designs for a new HLLV and crew capsule as required by that law. In the report, it was clear that the agency planned to continue using the

Orion design for the crew capsule, and that was made official in a press conference on May 24, 2011. The interim report suggested that the design of the new congressionally-required HLLV would be a combination of Ares and shuttle designs, but as of the date of this fact sheet, NASA has not finalized a new launch vehicle design. In the interim report, the agency said that none of the designs it looked at could be built within the budget and schedule goals stated in the law.

Hardware Elements of the Constellation Program

For historical purposes, the following are the Constellation program elements on which NASA was working. As noted, NASA continues work on the Orion capsule for future human space exploration as envisioned by President Obama.

Ares I and Ares V launch vehicles (including an Earth departure stage for Ares V)

Ares I was to be derived from the four-segment Solid Rocket Boosters (SRBs) used for NASA's space shuttle system. Ares I would have used a five-segment SRB as its first stage, plus a new second ("upper") stage on top based on the J2-X engine that traces its roots to Apollo's Saturn V rocket. Its main purpose was to launch the Orion spacecraft to LEO. A successful test of the Ares I first stage took place in September 2009. Ares V was to be much more capable, able to take 414,000 pounds to LEO or 157,000 pounds to the Moon. The Ares Projects Office was at NASA's Marshall Space Flight Center, Huntsville, AL. Ares 1 prime contractors were: ATK Launch Systems for SRBs; Pratt & Whitney Rocketdyne for the J-2X engines; and Boeing for manufacture and assembly of the upper stage and avionics integration and checkout.

Orion spacecraft to take astronauts to and from Earth orbit and lunar orbit

Orion is one element of Constellation that continues today. It is similar in appearance to an Apollo capsule although it would carry four crew members rather than three. Under the Constellation program, it was intended to launch atop an Ares I and initially take astronauts to and from the ISS. Later Orion spacecraft would take crews to and from lunar orbit and, paired with Altair, allow astronauts to live and work on the lunar surface. Today, it is envisioned to take astronauts to undefined "deep space" destinations, but NASA has not decided what launch vehicle will be developed to launch it. Prime contractor: Lockheed Martin.

Altair lunar lander

Altair was to be launched into Earth orbit by the Ares V where it and the Ares V Earth departure stage would dock with an Orion spacecraft that would be launched separately. The combined spacecraft would take astronauts to the Moon. Orion would remain in lunar orbit while Altair took astronauts to and from the lunar surface and housed them on the lunar surface. No prime contractor was ever chosen for this part of the Constellation program.