

Has U.S. hit its final frontier in space?

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Still hoping for that Jetsons future? Ruh-roh, as the Jetsons' dog, Astro, might put it.

Just six years ago, President George W. Bush laid out a vision of space exploration that harked back to NASA's halcyon days built on astronauts as explorers. Bush wanted to sling them from low Earth orbit to a base on the moon and then, perhaps, on to a first manned landing on another planet, Mars.

But that was before huge federal deficits arrived, public support failed to show, and unmanned explorers scored successes -- namely the [Hubble telescope](#) and [Mars rovers](#) Spirit and Opportunity, which are still sending back signals years after they were expected to expire.

So as we look to the next decade, what sort of human space exploration will we see?

"We are on a path that will not lead to a useful, safe human exploration program," former Lockheed Martin chief Norman Augustine said when he testified to Congress in September about the blue-ribbon space exploration panel he chaired. "The primary reason is the mismatch between the tasks to be performed and the funds that are available to support those tasks."

But guardians at the [National Aeronautics and Space Administration](#) say it's premature to end the role of the astronaut.

"I do not see this president being the president who presides over the end of human spaceflight," said [NASA](#) chief Charles Bolden, a former space shuttle pilot, when he spoke Jan. 5 at the American Astronomical Society meeting in Washington. In the speech, Bolden said his agency would stress missions -- small ones -- with other nations as partners and look to new technologies, not the big chemical rockets of the past, to propel missions.

President Obama, an acknowledged "space buff," will address that mismatch soon. He will lay out his vision for the nation's future in space in coming weeks, in either the State of the Union address Jan. 27 or, at the latest, in the proposed 2011 federal budget due to be released early in February. So far, the administration has given only a few hints of what it intends for the \$18.7 billion NASA budget.

When experts try to read the tea leaves, they're not hopeful about human space exploration in the next decade.

"There won't be any," says space policy expert John Logsdon of George Washington University. Instead, he and others suggest, the administration probably will continue support of the International Space Station, which hangs in low-Earth orbit and eats up money that otherwise could send astronauts to the moon, Mars or asteroids.

"Clearly, NASA is at a crossroads," says science historian Michael Robinson of the University of Hartford in Connecticut. "We are revisiting some questions of a century ago about what we want out of exploration as a nation as we look to space."

It was Sputnik and the Cold War that gave birth to NASA in 1958 and led to the "moon race." Although arduous, costly and dangerous -- astronauts Gus Grissom, Ed White and Roger Chaffee were killed in a training accident in 1967 -- the goal of the moon landings was simple:

Land a man on the moon before the Soviet Union did.

That simplicity gave way to the space shuttle program, a compromise design selected during the Nixon administration to provide cheaper, more frequent access to space than the massive Saturn V rockets that powered the Apollo program. "If you had told me 20 years ago that we wouldn't be back on the moon by now, I'd have said you were smoking dope," Bolden said in his astronomy meeting speech.

But more moon landings held little appeal after the 1986 Challenger and 2003 Columbia accidents, along with strains on the federal budget. Obama's decision will replace the plan Bush rolled out in 2004, which called for retiring the space shuttle in 2010, dumping the International Space Station (ISS) in 2015 and landing astronauts on the moon in 2020 in a new NASA rocket. None of those looks very likely now, Logsdon and others say.

In June, Obama appointed the Augustine committee to review the human spaceflight program.

"Planning for a [human spaceflight](#) program should begin with a choice about its goals -- rather than a destination," the Augustine report said, laying out five options for NASA and calling for international colonization of the solar system as an ultimate goal. The first two options keep space agency budgets flat and essentially remove NASA from the astronaut exploration business (aside from trips to the ISS) for decades, which Bolden says isn't going to happen.

The others require adding \$3 billion to NASA's budget in 2011 and increasing the budget 2.4 percent every year. These options vary in how long they would keep the ISS operational and what rocket NASA develops as an alternative to launch astronauts beyond Earth orbit. In some options, commercial rockets would carry astronauts to the station.

Instead of landing on the moon or Mars, astronaut "flybys" would visit asteroids, the moon and Mars' tiny moons, Phobos and Deimos.

In a recent Space Policy journal, Robinson and astronomer Daniel Lester of the University of Texas noted that most scientists view the astronauts as unimportant, their achievements negligible compared with the Hubble space telescope or the Mars rovers. But they and others note that scientific results aren't the big reason for NASA's existence.

"The space program was an important source of American soft power in the competition with the Soviet Union during the Cold War. Even today, with more competitors in space, American leadership conveys a sense of competence that attracts others," says international relations expert Joseph Nye Jr. of Harvard. "While it is difficult to put a dollar figure on it, a perception that the U.S. was falling behind in space would damage our reputation."

So NASA faces hard choices. Dropping the astronaut program looks impossible, given Bolden's promise. And cutting pure science probes for the cash to build astronaut colonies would be difficult. But something has to give.

"The Bush plan always had a fatal flaw, which was walking away from the International Space Station in 2015," says Logsdon, a member of the 2004 Columbia Accident Investigation Board. "That was just never going to happen -- 20 years to build it and then we leave after five years of operation."

A wild card in the NASA equation is the burgeoning commercial space business. Aviation Week & Space Technology magazine named "The Space Entrepreneur" its 2010 person of the year this month. Celebrity airplane designer Burt Rutan last year unveiled SpaceShipTwo, which aims to carry six passengers on paying suborbital space flights. Jeff

Greason, the co-founder of XCOR Aerospace, which aims to produce the Lynx suborbital plane, served on the Augustine commission, which called for NASA to foster commercial space efforts similar to the way that Air Mail contracts lifted airlines in the 1920s -- paying NASA to carry cargo and astronauts to the ISS while the space agency develops the rocket to send people farther into space.

Bolden says Obama hasn't made up his mind yet. But former astronaut Sen. Bill Nelson, D-Fla., told Florida Today this month that he expected the proposed 2011 NASA budget to "provide some additional juice" to the space agency's \$18.7 billion budget. And ScienceInsider suggested NASA "would receive an additional \$1 billion in 2011 both to get the new Ares rocket on track and to bolster the agency's fleet of robotic Earth-monitoring spacecraft."

Of course, Congress gets a say in whatever Obama decides, and lawmakers last year made a congressional vote a requirement for any changes to NASA's Bush-era plans for space agency centers in their states. "We're all out of great solutions," Greason says. "At some point, we have to decide if we want a space program or a jobs program."

"We may want to reconsider our Cold War approach, which goes back much further, of considering exploration as people planting flags on places," says Robinson, the exploration historian. "We've been through that drill."

International cooperation is the last wild card in the debate. NASA's deputy director for strategic partnerships, Wayne Hale, recently called for all space-faring nations to join together to explore the solar system, including colonies on the moon and Mars. China, which makes no distinction between civilian and military [spaceflight](#), has announced plans to send "Taikonauts" to the moon in 2024. Would the U.S. public accept plans to team up with China, now subject to a U.S. embargo on

trading space technology, in human space exploration? "I guess we'll see," Logsdon says.

Danger surrounds human space exploration, whatever decision is announced, says former astronaut John Grunsfeld of the Space Telescope Science Institute in Baltimore, who led the spacewalking team that repaired the Hubble Space Telescope last year. "We estimated our odds (then) of not coming back at 1-in-70. Those are not very good odds," he says. "It only gets worse as you go further out."

Still, he says, those odds compare favorably to those faced by pioneers two centuries ago. In the aftermath of the space shuttle disasters, "programmatically, we have become much more cautious about risk," Grunsfeld says. "But individually, there are a lot of brave people who would be willing to face real risks to explore [space](#)."

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