

## **NASA Sees Private Sector as Key to Escaping LEO**



**The future of NASA seems to be open to debate as budget cuts increase. With more encouragement than ever for private sector involvement in things like human spaceflight, will NASA retain its iconic status, or gradually start to fade into the shadows?**

**By Sam Silverstein**

When the United States created NASA at the height of the Cold War more than a half-century ago, launching an inanimate object into orbit around the Earth was a highly strategic capability that could only be achieved with immense government investment and political will. Now, with the storied space agency focused on missions further afield in space, NASA has declared that placing even humans safely into flight above the atmosphere is well within reach of private companies—and challenged the commercial space industry to seize the initiative in an area once seen as the frontier of what civilization could accomplish.

Transporting humans to places in space close to the Earth, such as the International Space Station, does not require new technology and is entirely appropriate for the private sector to manage, says Philip McAlister, director of the NASA Commercial Spaceflight Development Division. Instead of running a taxi service to the International Space Station, McAlister says NASA wants to invest in the development of a new heavy-lift rocket and space capsule for eventual missions beyond low Earth orbit.

### **Burden of Costs**

Historically, NASA and other government customers, such as the Pentagon, have bought rides on commercial rockets to launch unmanned payloads, but only NASA's own vehicles have been used by the United States to loft humans to orbit. Now that mindset has changed, and NASA is encouraging private companies to develop launchers that could be used to carry people, as well as unmanned payloads, into space. NASA intends for these vehicles to replace the space shuttle program, which ended in 2011.

"We're starting to see areas where NASA can shift the burden of costs and oversight [to commercial providers] so the agency can focus on the cutting-edge things only it can do," says Jeff Foust, a senior analyst with Futron Corp.

Beyond enabling NASA to save money by purchasing launch services on an as-needed basis from multiple providers, the agency hopes its plan will give rise to healthy demand from private customers for reliable, affordable access to low Earth orbit, known as LEO. NASA is optimistic that private firms, backed by the promise that the agency will be a reliable anchor customer, will be ready to provide launches to LEO by the middle of this decade.

"It is time to turn human space transportation to low Earth orbit over to the private sector," says McAlister. "There will be no turning back once commercial human spaceflight to low Earth orbit is a robust, vibrant, profit-making commercial enterprise with many providers and a wide range of private and public users."

Yet as NASA turns its attention and ambition for manned missions to other parts of the solar system, lawmakers, analysts and others in the space community are raising questions about whether the agency's plan to rely on the private sector for launches closer to home will be sustainable for the space industry. They wonder whether or not private firms are truly ready for the technical and financial challenges of taking on work that has long been controlled and funded by NASA.

"The door has been opened for a much larger role for the private sector, but this is rocket science," says Bart Gordon, a Democratic representative from Tennessee until 2011 and former chairman of the House Committee on Science, Space and Technology, which has jurisdiction over NASA. "What's happened to NASA over the last few years is that the president and Congress have asked NASA to do more than they are willing to pay for. The question is will the private sector step up to provide the extra dollars that might be lost from public sector research."

NASA's budget for the 2012 fiscal year is \$18.7 billion.

In his opening statement at an October hearing of the Science Committee about NASA's efforts to privatize access to LEO, Rep. Ralph M. Hall (R-Texas), Gordon's successor as chairman of the panel, indicated he was skeptical of NASA's plans. "I have yet to be convinced that there is a sufficient commercial market that will sustain multiple private, for-profit commercial crew companies through the duration of America's commitment to the International Space Station," Hall says.

The International Space Station is expected to remain in orbit through at least 2020.

"I don't want to find ourselves at some future time throwing additional sums in this program because the commercial launch companies are 'too important to fail,'" adds Hall, calling NASA's plan to buy launch services to LEO from private firms a "perilous business proposition" for the companies involved.

### **Driving Innovations**

In a statement provided to *Via Satellite*, Hall told *Via Satellite* that NASA has an important role to play in driving innovation and supporting basic research in the space industry and related sectors of the economy. "Sustained federal investments in NASA and other science agencies can further strengthen our nation's high-tech industrial base and ensure America's position as the world leader in innovation."

Terry Hart, a former space shuttle astronaut, believes NASA's direction reflects misguided priorities among America's political leadership. Hart says he is impressed by the efforts of

companies that are participating in NASA's Commercial Orbital Transportation Services (COTS) program, which aims to spur the development of private launchers to transport crew and supplies to the International Space Station. But he says ending the space shuttle program without an alternative space transportation system already in place was shortsighted.

"We're at risk of a shortfall in infrastructure and capability. It's a crying shame and an embarrassment," says Hart, who flew on the shuttle Challenger in 1994 and went on to become president of Loral Skynet, a commercial satellite operator. "The system is broken and we don't seem able to make decisions like we used to because there are so many competing interests."

NASA's decision under President Barack Obama to abandon its Constellation launcher program, and rely entirely on still-undeveloped private launchers to transport humans and cargo to LEO, has left the United States in an uncomfortable position, says Scott Pace, director of the Space Policy Institute at The George Washington University in Washington, D.C.

Without the space shuttle, NASA is relying on Russia's aging Soyuz spacecraft to ferry crew members to the International Space Station until a privately operated alternative is available.

"There's nothing wrong with those things by themselves," Pace says, referring to NASA's decision to turn to commercial providers for services it sees as routine in order to focus on complex deep-space missions. "My objection is to not having government participation in there and relying heavily on the private sector for what I see as a strategic national priority."

### **Beyond LEO**

NASA also needs to do a better job defining its plans for missions beyond LEO, adds Pace, who was associate administrator for program analysis and evaluation at NASA during the administration of former President George W. Bush. This is particularly true because space missions beyond the immediate vicinity of Earth are likely to involve multiple countries due to their large scale and high cost, he says.

"There is uncertainty about where the United States is going other than sending funding to its own contractors to support operations in low Earth orbit, which is where we already are," says Pace. "We find ourselves a lot more isolated than we were a few short years ago...there has been somewhat of a vacuum of U.S. leadership."

McAlister acknowledges that NASA's decision to privatize launch services to low Earth orbit will be challenging, but says the potential opportunities justify the risks. "It entails cultural change, a shift in responsibility, and a shift in the financial risks and rewards," he says. "We will have more U.S. aerospace jobs, a stronger industrial base, a more robust International Space Station and a new market for private sector expansion. Ultimately, it will be the customers who will benefit the most. Both public and private users will have a new space transportation capability to leverage."

Commercial satellite companies could benefit if NASA is successful in its quest to spawn the development of a commercial launch industry with human-rated vehicles, says Foust. NASA's unbending need for absolute reliability when sending astronauts aloft would mean launchers certified to transport astronauts to the International Space Station could also become reliable new options for launching satellites, he says.

In addition to relying on the private sector to provide launch services, NASA might consider using private satellites for communications in place of spacecraft owned and operated by the space agency, says McAlister. NASA continues to operate its own Tracking and Data Relay Satellite System (TDRSS) to handle communications between spacecraft, but is open to the possibility of expanding its use of commercial satellites in the future.

Companies developing launchers that NASA could use to reach low Earth orbit include large aerospace firms that have long supplied services to the space agency. Orbital Sciences Corp., Alliant Techsystems Inc., Lockheed Martin Corp., Boeing Co., Sierra Nevada, Space Exploration Technologies (SpaceX) and Blue Origin are all working with NASA on various programs.

## **SpaceX**

SpaceX has already successfully launched its Falcon 9 rocket, which was developed with commercial customers in mind, and also wants to use that vehicle to loft astronauts into space. The company has signed launch contracts for missions during the next few years with a number of satellite companies, including Orbcomm, MDA, SES, Thaicom Plc., Astrium and Iridium Communications Inc.

"By [introducing] competition for human spaceflight, NASA is really forcing companies to be innovative," says SpaceX spokeswoman Kirstin Grantham. "Competition forces every company to provide the best possible options for the government and the taxpayer at the best possible price."

NASA's decision to spur development of the commercial launch business stands to benefit taxpayers, adds Grantham. "If NASA is the only customer, it has to cover all the costs," she adds. "But if NASA is [buying services along] with a multitude of companies, the costs are shared by everybody."

Another key benefit for NASA of turning to commercial companies to provide transportation to and from LEO is that it will be able to tap directly into the private sector's natural drive to maximize returns by lowering costs, says Paul Graziani, CEO of Analytical Graphics (AGI), which provides visualization software for space missions.

"Commercial companies look for efficiency because they're driving for a profit," which is defined as what the market will pay for a product or service minus the cost of providing it, Graziani says.

On the other hand, NASA also is taking advantage of the desire from well-heeled private investors to participate in the space industry regardless of whether their efforts will pay off financially, says Claude Rousseau, a senior analyst at Northern Sky Research.

## **Internet Entrepreneurs**

Wealthy individuals who are funding space-related businesses include Internet entrepreneurs Elon Musk, founder of SpaceX, and Jeff Bezos, who started Blue Origin.

"NASA no longer has the wherewithal to do everything," Rousseau says, adding, "I don't think Wall Street [would have invested in launcher startups], especially after the bubble burst on the Internet."

NASA is turning to the private sector to develop capabilities in areas other than access to low Earth orbit. An example is the space agency's Flight Opportunities Program, which aims to develop suborbital launch vehicles for use by NASA and other customers.

"Where we see commercial opportunities, we definitely want to drive any way we can to make sure we get advanced space technology and foster the commercial space industry," says L.K. Kubendran, program executive for the initiative. The program is housed under NASA's Office of the Chief Technologist and managed by the agency's Dryden Flight Research Center in Edwards, Calif.

Another objective for NASA, and space agencies worldwide, should be to increase enthusiasm among ordinary citizens for investment in the development and exploration of space, says Guennadi Kroupnik, director of satellite communications space environment projects for the Canadian Space Agency.

"This is not only about astronauts flying to space and exciting us all about space exploration. We have to find a better way to demonstrate to taxpayers and decision-makers the vast presence of space-enabled technologies in our routine day-to-day existence," Kroupnik says. "The question [of whether] we need to continue spending on space is legitimate. We should ask and come up with the right responses to demonstrate the real value of space."