

## Commercial space: A global commons?

Even with markets rather than government determining the availability of commercial space products, the need for federal investment in space continues.

by **Frank Sietzen  
Jr.**



In the more orderly environment of the Cold War, each sector of space activity—civil, military, and commercial—had its own structure, and each was guided by either policy prescriptions or the profit motive. For a long time, civil and defense-related space programs had little in common other than the launch sites and boosters that would take them to space.

The term "commercial space," except for telecommunications satellites, was for many years considered an oxymoron. There was much speculation about creating products and profits from orbit, but there was little hardware and less money for doing so. Only with the coming of the Space Shuttle era did this perception change, and even then only briefly. Whether the International Space Station will give birth to new space-created vaccines, materials, or other products remains to be seen.

The post-Cold-War world has seen a quiet, gradual convergence, one that has made virtually every segment of space activity reliant upon the nation's commercial space sector. The absence of space as a national priority, combined with lean space budgets at both DOD and NASA, has shifted the nation's emphasis from government spinoffs to commercial technologies to the purchase and use of commercial assets.

### **Parsing risks and rewards**

While the shift may be good for the U.S. space industry in the short term, this increasing reliance on existing commercial space assets also has its potential pitfalls. One of these may be the illusion that commercial solutions will always be available, even if longer term research is cut back by federal laboratories. Use of commercial space assets is not a substitute for a strong U.S. government role in defining space priorities (read policy). Nor is it an answer to the continuing erosion of federally established space goals on which the White House and

Congress can agree.

The clear trend, as a new administration begins, is to rely on the commercial community to provide solutions to government needs in space. This includes everything from communications to remote sensing to launch options. But ask what it will mean to the commercial community, and you will likely hear many different answers. Convergence thus far has not included a consensus on where this road to space will lead. But one thing is clear: It will contain both rewards and potential risks. And those risks are only now receiving attention from space officials.

The vitality of commercial, as compared to federal, space efforts has become increasingly obvious. In 2000, for the first time, the number of commercial launches conducted from Cape Canaveral Air Station in Florida outnumbered government launches, military or civil. A Defense Science Board study released in 1998 predicted that commercial growth could, if anything, accelerate.

Within 10-15 years, said the board, the global commercial space industry would generate revenues "in excess of several hundred billion dollars" a year. Low and medium orbit telecommunications spacecraft, the study predicted, would soon provide "wide-band Internet access to the most remote parts of the globe." The government, especially the U.S. military, "would not be a large and important customer" for those global satellite services. While GPS would be maintained, the board predicted that if DOD were unable to assure GPS users that the navigation satellite system would be free of the threat of interruption, alternatives "would be provided by commercial enterprises."

*This half-meter-resolution image of Coors Field in Denver was collected by Space Imaging's Digital Airborne Imagery System on July 25, 2000. Half-meter resolution means that objects on the ground larger than 0.5m can be seen, such as the lines and demarcations in the turf on the playing field and car windshields. Opposite is a 1-m resolution image collected by the company's IKONOS satellite on March 13, 2000. Credit: spaceimaging.com.*



### **Uncharted waters**

Military use of commercial assets will not be limited to communications satellites. Increasingly, commercial remote sensing companies will see governments as just one in a long line of customers using their assets instead of dedicated systems. Analyst Barry Watts, in "The Military Use of Space: A Diagnostic Assessment," sees remote sensing as a major system whose use by federal customers is only beginning to expand. The study, released in March by the Center for Strategic and Budgetary Assessments, looks at how U.S. national security space needs will be

met in the decades ahead.

"For many U.S. intelligence officials, the public, commercial availability of imagery once carefully controlled by the government is a move into uncharted waters," Watts writes. Once available only to government customers, the technology of high-quality remote sensing imagery is now rapidly becoming a part of the space programs offered by business. He pointed to the Clinton administration's 1994 policy directive, which opened up commercial development of satellite imagery. It was, Watts suggests, more of an acknowledgment that the worldwide satellite industry would "eventually field systems with resolutions under 1 m."

What are the implications? The DSB study suggests that a commercial surveillance satellite market "will evolve fairly rapidly, with four or five suppliers providing visible, multispectral, and SAR [synthetic aperture radar] images of 1 m or better to commercial customers as well as military customers of many smaller nations." Watts says these predictions are nothing more than "sensible extrapolations" of trends in the development of commercial space and use of its programs and systems. With governments increasingly unlikely to develop their own satellite systems if comparable commercial products are available, what real difference does this make? Isn't it better for private industry to reap the rewards flowing from its technology investments?

The question is, who has made the investment? Many of the technologies now seeing life as commercial space programs started out in a government-funded research lab. And if DOD or NASA hopes to make use of future commercial systems, the investment in research by the federal government must continue and, if anything, increase.

### **Government/industry symbiosis**

"There is the assumption that the U.S. aerospace industry is a technology generation ahead of Europe, and generations ahead of the rest of the world," says Joan Johnson-Freese, professor at the Asia Pacific Center for Security Studies in Honolulu. "This assumption is prevalent, and government planning for use of commercial systems expects it," she adds. But "the fact that it isn't so (for a variety of reasons), and the subsequent need for U.S. R&D to be maintained—and even boosted—is almost totally overlooked," Freese continues.

In the rush to buy commercial assets, there is something of a "get it for nothing" attitude that some find troubling. "Indications are that some of the U.S. military services have been considering the possibility of not fielding certain follow-on communications satellites on the premise that any capacity needed in future conflicts will be readily available from commercial firms," says Watts. But it is market forces that will shape and ultimately determine what assets will be around in the future, Watts suggests. Any other space resource must come either from federal programs to fund the government's own needs, or the traditional government-industry partnership.

This partnership—of federal funding for R&D and exploitation by industry—should be nurtured, with more resources spent on research, the DOD itself warned earlier this year, in the "Dept. of Defense Space Technology Guide." It calls for both continued funding of space research and the flying of technology demonstrations.

"Some technologies are government unique, and some technologies are not commercially viable," the report says. "If such technologies are to be developed and applied, then the government must provide the investment. There are technologies essential for government missions but which may have or develop commercial application as well; however, the cost of their development is usually so high that industry cannot make a business case for maturing them commercially." In such instances, the study suggests, there are no alternatives but federally funded research.

Others suggest that in some agencies there is still resistance to exploitation of commercial space resources. "Studies on use of the commercial communications satellites predict that as much as 80% of the Defense Dept.'s needs in this area will be met by private industry," says Clayton Mowry, executive director of the Satellite Industry Association. "But the remote imaging sector is less clear in terms of the amount of [future] reliance upon commercial systems," he notes.

The National Imagery and Mapping Agency, for example, "talks a big game," says Mowry, "but has been unwilling to commit significant funds to buy imagery from commercial firms." He suggests that the commercial sector will continue to build spacecraft for basic commercial needs. "If the Pentagon has unique requirements for ensuring the performance of commercial systems on orbit, they will need to make those investments...to protect commercial systems that they use."

The whole issue of military use of commercial systems and its implications for U.S. national security has yet to be fully thought through. "'Where to from here' is the next question," says Freese. With the military's reliance on them, commercial systems may also find themselves threatened in future national security crises. In January, a war game simulation held at Schriever AFB in Colorado Springs, Colo., found that in a future conflict, U.S. adversaries quickly took out commercial satellites being used by the military. If military customers make commercial spacecraft tempting targets, what responsibilities does DOD have for protecting such systems in the future from attack? It is not an issue that is keeping business leaders up at night now, but it may be more of a concern in the future. "I haven't heard from any of my members regarding increasing risks from terrorists to their satellite systems," says Mowry.

### **NASA's new initiative**

The effects of commercial space use on defense needs are still being evaluated. Meanwhile, NASA, which has sometimes been accused of spending decades waiting for another Kennedy-style presidential space policy, is banking heavily on the commercial sector for the future of civil and human spaceflight. Beyond privatization of the Shuttle fleet and efforts to commercialize the space station, the

agency has undertaken a new effort, the Human Exploration and Development of Space Technology and Commercialization Initiative. Announced this spring, the new project is seeking to unite robotic, human, and commercial space activities to develop common capabilities.

"This is NASA's effort to interconnect future programs with the commercial development of space," said John Mankins, manager of the initiative, during a bidders' conference in Washington, D.C., this spring. "We think it has a lot of promise," he added. The project as envisioned by the space agency would attempt to spur the creation of common space systems that could be exploited both to achieve civil space exploration missions and aid business development.

On the exploration front, NASA describes the program as development of technology to support 50-100-day flights by 2010 and 300-1,000-day extended-duration human missions by 2015-2020. "These are basically strategic investments in capabilities," says Mankins, "interim steps toward building greater and longer space capabilities."

*Developing space technologies for the construction of lunar or Martian structures would help advance commercial space programs.*



In a complete departure from NASA's previous approaches to human space exploration, this initiative seeks to fuse the business development of space with crewed mission planning. "We would combine our planning for what we need for future exploration with what industry will be needing for future commercial development of space," Mankins says. NASA made the down payment on the plan this spring by sending academia and industry a cooperative agreement notice that seeks to combine commercial and exploration objectives with technology milestones.

Mankins says the new program will follow through from research proposals to test-bed demonstrations of applicable space technologies. The end result, he says, will be to fly the final candidates in actual space tests, possibly aboard the Shuttles or in extended tryouts on the space station.

The development of space technologies for construction of pressurized buildings on the Moon or lightweight structures to support bases on Mars, suggests Mankins, would also advance commercial space programs such as satellite technology and research platforms. "Technology for assembly of large structures can have other uses as well," he believes. But in the end it will take industry to determine which of the several projects NASA hopes to advance will have multiple uses—and where the crossover between commercial and civil space exploration use will come.

## **Predicting growth potential**

Beyond these issues, the question of the U.S. space industry's strength and viability as a sector of economic growth appears headed for increased attention. Before taking office as secretary of defense, Donald Rumsfeld chaired a commission that looked at the management of the U.S. national security space sector. Rumsfeld's panel found that the space industry was increasingly critical to the security and stability of the nation's economic health. Thus it should be an area of growing attention for space policy planners in the new administration.

"The U.S. will not remain the world's leading spacefaring nation by relying on yesterday's technology to meet today's requirements at tomorrow's prices," the panel's report says. "This requires a healthy industrial base," it adds. It also stresses that while the commercial sector should be strengthened, government-funded research must also keep pace with change, because the private sector cannot be the only actor on this international stage: "In particular, the government needs to significantly increase its investment in breakthrough technologies to fuel innovative, revolutionary capabilities."

Commercial space—however its customers grow and whoever exploits its resources—is here to stay, and it will change the way the U.S. and other space powers view space exploration and technology as elements of their industrial base. "The presumption of most observers today is that the growing privatization of orbital systems is merely one component of a widening trend toward a global economy whose emergence and continued expansion are inevitable," says Watts. If the expansion continues, he suggests, this confidence in the commercial element will be well placed. But he warns that such long-term projections "remain as predictable as the local weather." Space should be seen as a commons, but one whose needs have a mix of solutions, government as well as business. Whatever the mix, space as a sector should not be overlooked in future assessments of national economic needs, as it has been in the recent past.

Space, Rumsfeld's study suggests, should again be placed at the center of the nation's technology core. "There is need for greater emphasis on space-related matters, starting at the highest levels of the government," states the report, "to account for the increasingly important role played by the commercial sector."