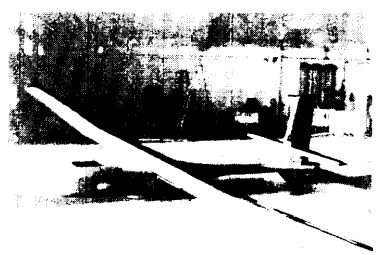
# The Role of the Private Sector 7

The United States annually invests hundreds of millions of dollars in remote sensing satellite systems and services. Some of this investment has stimulated a market for commercial products. Private industry contributes to U.S. satellite remote sensing systems in several ways. Under contract to the Federal Government, private companies build the satellites, ground stations, and distribution networks. In the case of the Landsat system, a private firm, Earth Observation Satellite Co. (EOSAT), markets data from Landsats 1 through 5 and will soon sell data from Landsat 6.[1] In a new financial and organizational arrangement, Orbital Sciences Corp. (OSC) plans to launch[2] and operate the SeaStar remote sensing satellite, which will carry a sensor capable of monitoring the color of the ocean surface. Among other ocean attributes, ocean color data indicate ocean currents, fertile fishing grounds, and ocean health. OSC will sell the data generated by this sensor to an assortment of customers, including the Federal Government.[3] Finally, the remote sensing *value-added sector* develops useful information from the raw data supplied by aircraft, satellite, and other sources, and sells the resulting information to a wide variety of users.

The value-added sector is part of a much larger information industry that employs geographic information systems (GIS) and other tools to turn raw data from satellites, aircraft, and other sources into useful information. Industry products include maps;



[1] Landsat 4 and 5 are currently operating. Landsat 6 will be launched in mid 1993.

[2] OSC plans to launch SeaStar in the third quarter of 1993 on a Pegasus launch vehicle and expects to begin full satellite operations in early 1994.

q Through NASA, which is acting as an anchor tenant for the arrangement.

inventories of crops, forests, and other renewable resources; and assessments of urban growth, cultural resources, and nonrenewable resources. According to market estimates, sales of data, hardware, and software currently total about $2 billion annually.[4] GIS hardware and software have the unique advantage of being able to handle spatial data in many different formats and to integrate them into usable computer files. For the next several years, at least, the private sector is **likely to derive greater profits from the provision of value-added services than from owning and/or operating remote sensing satellites. Private firms will also likely continue to be a source of improved methods of accessing, handling, and analyzing data.**

Improved market prospects for the sales of land remote sensing data will depend directly on the continued development of faster, more capable, and cheaper processing systems. In addition, the continued improvement of GIS software and hardware will make remotely sensed data accessible to a wider audience. In turn, the growth of the GIS industry will be aided by the development of the use of remotely sensed land data, including the extensive archives of unenhanced Landsat data that are maintained by the U.S. Geological Survey Earth Resources Observation Systems (U. S.G.S. EROS) Data Center, Sioux Falls, South Dakota.[5] OTA will assess the prospects for enhancing the private sector involvement in remote sensing in two forthcoming reports.

Despite professed interest among private entrepreneurs in building and operating land remote sensing satellites systems,[6] the high systems costs and the lack of a clearly defined market for remotely sensed data have inhibited private offerors.[7] For example, although EOSAT has streamlined the operations and data distribution system of Landsat, and achieved sufficient income to continue its efforts without government support, projected increases in revenues from data sales do not appear sufficient to enable a system operator to finance the construction and operation of the Landsat system. Despite several technological advancements since the 1970s when the National Aeronautics and Space Administration (NASA) launched the first Landsat satellites, Landsat system costs have remained high. The Landsat 6 satellite cost about $320 million to build. Landsat 7, which improves on the sensors of Landsat 6, will cost between $440 and $640 million to build, depending on whether or not it will carry the High Resolution MultiSpectral Stereo Imager (HRMSI) desired by the Department of Defense (DoD) and NASA.

Future commercialization efforts will depend on whether firms can raise sufficient private and/or public funding to pay for a system that is privately developed and operated. **The future viability of a private remote sensing system will depend on drastically reducing the costs of a satellite system through technology development and/or dramatic market growth. It may also rest on allowing private operators to determine their own data pricing policies.**[8]

**Since it** launched the frost civilian remote sensing satellite in 1960, in support of the principles of "open skies" and free flow of information, the United States has followed a policy of making remotely sensed data available on a nondiscriminatory basis to potential custom-

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4 "GIS Markets and Opportunities, 1991," Daratech, Cambridge, MA, 1991.

5 The EROS data center archive contains some 210,000 multispectral Thematic Mapper scenes gathered from around the globe since 1982.

6 See, for example, U.S. Congress, Office of Technology Assessment *Commercial Newsgathering from Space,* OTA-TM-ISC-40 (Washington DC: U.S. Government printing Office, May **1987).**

7 However, private companies have invested in less costly aircraft systems. For example, Texaco, Inc. recently embarked on a major program to develop a multiband aircraft imaging system for environmental analyses and spill detection.

8 U.S. Congress, Office of Technology Assessment, Remotely *Sensed Data from Space: Distribution, Pricing, and Applications* (Washington DC: Office of Technology Assessment, July 1992).

ers — in other words, on terms that are the same to all customers.[9] The Land Remote Sensing Policy Act of 1992 retains nondiscriminatory data availability[10] for government-supported systems, but it gives authority to the Secretary of Commerce to license firms who wish to launch and operate privately funded systems. These firms may offer data on their own terms,[11] provided they have not received funding from the U.S. Government to acquire their systems. In January 1993, the Department of Commerce (DOC) granted the first commercial remote sensing license to WorldView Imaging Corp. of Livermore, California. The license allows WorldView to operate a pair of multispectral imaging satellites in low Earth orbit. WorldView expects to launch its satellites, which are designed to gather panchromatic data of 3 m resolution, in a few years.[12] On June 10, 1993, Lockheed Corp. announced that it filed with DOC for a license to operate a satellite system capable of 1 m resolution (panchromatic) .13

The greatest problem private industry faces in developing and operating a remote sensing system is the difficulty of obtaining sufficient private capital to finance the venture. The Federal Government is the largest customer for land remote sensing data. If private industry were able to count on sufficient sales of data to the government for its needs, the financial markets might be more willing to finance a remote sensing system. Therefore, if Congress wishes to encourage the development of a private satellite industry that builds and operates remote sensing satellites, it **could direct Federal agencies to contract for the provision of data from a privately owned and operated satellite system, or systems, rather than contract for the construction of a system to be owned by the government.**

Such an approach would give greater discretion to private industry to use its innovative powers to solve technical problems. It might also involve greater technical and financial risk, both to the government and to private firms, than one in which the private sector acts solely as contractor to the government.[14] In the long run, encouraging industry to take greater responsibility for the provision of remotely sensed data may also lead to wider data use, as industry would then be encouraged to find new uses for the data. The experiment with OSC's SeaStar satellite system should provide useful insights for the development of future privately owned satellite systems. NASA contracted with OSC to provide a specified quantity of data from the SeaWiFS sensor aboard SeaStar for a specified price. The arrangement allows NASA to provide some funding ($43.5 million) Up front that OSC has been able to use in developing the sensor and satellite. More important, NASA anchor tenant agreement with OSC also allowed the company to secure needed additional funding from the private financial market. If this arrangement proves successful, it might pave the way for similar agreements for data from larger, more complicated satellites.

In addition, **Congress might wish to explore the option of funding a research program specifically designed to reduce the costs of remote sensing systems; cost reduction would take precedence over providing greater capa-**

9 U.S. Congress, Office of Technology Assessment, *Remote Sensing and the Private Sector, OTA-ISC-TM-239* (Washington, DC: U.S. Government Printing Office, April 1984), p. 7.

10 Ibid.

11 They may, for example, elect to charge higher prices for more timely delivery of data, or, fOr an additional fee, grant exclusive access to certain data for a specified period.

12 U.S. Department of Commerce News Release, Jan. 28, 1993.

13 Leonard David, ''~~e~ Plans to Market Spy-Quality Imagery, ' *Space News,* June 14, 1993.

14 As noted earlier in this report, systems paid for solely by the Federal Government, of course, also sustain budget, technical, and programatic risks.

**bility.** It might, for example, wish to fund, on a competitive basis, the private development of sensors and small satellite buses specifically designed to reduce costs. Although such innovative programs involve greater risk than the usual way government procures new technology, as the development of amateur communications satellites has demonstrated, they also have a potentially high payoff in increased provision of inexpensive services.[15] Among other **things, an** innovative program to reduce sensor and satellite costs, or to provide increased capability, might introduce greater competition into the development of remote sensing satellite systems.

The government might also wish to involve the private sector in global change research by sharing data sets with private industry for research purposes. In a 1992 report, the Geosat Committee pointed out that the oil, gas, and mineral extraction industry is heavily involved in performing research on the environment in connection with its profit-making interests. The Geosat Committee proposed to institute pilot programs that would involve both private industry and the government in a research partnership, in which the government could gain useful global change information, and private industry would gain access to a wide variety of data to support its research interests.[16] Such research programs, in which the government and the private sector join forces in partnership, could enhance the significance of remotely sensed data for global change and even lead to innovative new methods for using them.

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15 Amateur radio operators have built and launched several small, low-cost, low-orbit communications satellites. See U.S. Congress, Office of Technology Assessment, *Affordable Spacecraft: Design and Launch Alternatives,* OTA-TM-ISC-60 (Washington DC: U.S. Government Printing Office, September 1990), pp. 19-20.

16 The Geosat Committee, Inc., ''Applying Resource Industry's Research to the U.S. Global Change Research Program,' Norman, OK, 1992.