Remote Sensing Hands Us THE WORLD

Developed for military purposes, remote sensing transitions to the commercial market.

Photo reconnaissance and associated measurements using photogrammetry have been around for a long time, with the evolution of these techniques described by long periods of stable development and marked by revolutionary events; the past 70 years have been an extremely remarkable time.

During World War II, optical photoreconnaissance was the answer to finding and destroying military targets through optical images and bomb sights—changing the way modern wars are fought and, thus, the course of history. The same, albeit significantly evolved, high-resolution technology influenced human history through the ’60s, ’70s, ’80s, and ’90s, sometimes pushing the world towards the brink of global destruction only to suddenly pull it back.

As the need for intelligence grew in a complex modern world, new military needs arose and new systems were developed to solve them, including light detection and ranging (LIDAR); radar and synthetic aperture radar; multi- and hyperspectral imaging; and high-resolution, space-based optical photogrammetry. As these new technologies developed, new application areas, often outside the military and intelligence arenas, have been identified leading to today’s field of remote sensing. Remote sensing literally includes everything between heaven, Earth, and beyond that can be characterized without physical contact by sensing electromagnetic radiation—although common usage restricts it to mainly space-based imaging systems and some airborne and terrestrial imaging systems.

In recent years, the U.S. government has provided another revolutionary catalyst to the remote sensing market, using military and intelligence funding to support the commercial space-based remote sensing industry. “The real news happened in recent years when commercial satellite companies became a real element in the marketplace thanks to the U.S. government spending so much money on imagery,” explains Joan Lurie of GCC Inc. (New York, NY), who is also an oe magazine editorial advisory board member.

Frost & Sullivan (San Jose, CA) research analyst Vignesh Kadirvel estimates that revenue from North American remote sensing markets totaled $1.29 billion in 2003 and will reach $1.68 billion by 2010. About one-third to one-half of 2003 revenue came from U.S. government sources based on the five-year $1 billion imagery purchase program called ClearView, awarded by the U.S. National Geospatial Intelligence Agency (NGA; Bethesda, MD), a component of the U.S. Department of Defense. In late 2003, NGA awarded DigitalGlobe (Longmont, CO) another $500 million, five-year contract that will support a new, commercial satellite with unprecedented resolution of half a meter. A second $500 million NextView contract is expected by the end of 2004.

Thanks to support from governments and militaries around the world, and growing interest from land development-related industries such as real estate, mining, and petroleum, the remote sensing industry is approaching commercial viability as its technology proves its maturity. With steady funding available, suppliers of high-resolution panchromatic spaceborne imaging, four-band multispectral imaging, and terrestrial LIDAR systems are working on ways to make their information more useful, through improved visualization software and information distribution, and particularly through better integration with location-base or geographic information systems data. Hyperspectral imagers sensitive to hundreds of spectral bands have been limited mainly to airborne platforms because of bandwidth requirements and the large pixel sizes due to low photon counts in small spectral bands. In spaceborne systems, large pixels translate to low resolution, and that has been problematic for commercialization of this technology.

“High-resolution imaging has certainly been leading the commercial interest in remote sensing ... [but] one very interesting thing about hyperspectral imaging is its appeal to oil companies,” says Lurie. “Surface properties that hyperspectral imagers sense can reveal what’s below the surface, and hence the oil companies’ interest for exploration.”

As remote sensing technologies penetrate daily business operations, the industry can expect further commercial successes that will fuel new applications and add to the worth of this technology. oe