Highest Ever Resolution

A Delta 2 rocket carrying the GeoEye-1 satellite lifted off on Saturday 6th September 2008 at 11.50am from Vandenberg Air Force Base, California. Weighing 1,955kg, the satellite can capture every piece of the Earth up to every two days at approximately 10.30am local time. This interview presents further details and strategic considerations.<P>

Sixth September 2008 must have been a very exciting day - what were your feelings on reaching this milestone?
GeoEye first made history in September 1999 with the launch of its sub-metre resolution Ikonos satellite, then the highest-resolution commercial earth-imaging satellite. This title now goes to GeoEye-1. Lift-off was an exciting and defining moment for the company and a milestone for our industry, it will assure our customers access to quality imagery well into the next decade.??
The ground sampling distance (GSD) of 0.41m in the panchromatic (black & white) mode and 1.64m in multi-spectral (colour) modes is the highest ever achieved by a commercial, permanent earth-observation satellite! What fields of application are you aiming at??
Our products serve many applications in defence & intelligence, national and homeland security, air and marine transportation, oil & gas, mining, mapping and location-based services, state and local government planning, insurance and risk management, agriculture, environmental monitoring, and many more. And in addition to high GSD, high geometric accuracy enables end users to map natural and man-made features in stereo to within three metres of their actual locations on the surface of the Earth, without the use of ground control points. This high level of accuracy will remain unchallenged even when competing next-generation commercial systems are launched over the next year or so.

What will the future bring? Are there technical or legislative limitations that today prevent higher GSD?
The National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce is the regulator and licensing authority for our industry. While GeoEye-1 is able to collect imagery with a GSD of 41cm, NOAA licensing restrictions require us to resample the imagery to 50cm ground resolution before making it available for sale to commercial customers. But over time such government limitations are being lifted or modified. For example, in June 2007 NOAA removed the 24-hourhold rule for imagery collected at less than .82m resolution. Also, the US Government is currently reviewing GSD licensing restrictions and will make some new determinations next year. The study, requested by Congress, just got started in October.

When will the first images become available to users?
On 8thOctober GeoEye met another milestone when it released the first colour, half-metre resolution image. Our thanks go to all our employees and customers, especially the National Geospatial-Intelligence Agency (NGA), strategic partners, vendors and investors. GeoEye will be ready to start full commercial operations a few months after launch. As of 14thOctober the satellite was undergoing a 45- to 60-day engineering and calibration period. We have tested virtually every component. Our customer service department will be taking commercial orders for imagery and products approximately sixty days after launch.

How was the development of GeoEye-1 funded?
NGA funded about half the development and has agreed to buy imagery. This development contract (NextView) was awarded to GeoEye (then Orbimage) on 30th September 2004. GeoEye-1 is the second of two NextView satellites that are partially funded by the NGA. The total project cost, including financing, launch, launch insurance and the ground stations, is approximately US$502 million. We are not providing the specific cost of the satellite itself. NGA director vice-admiral Robert Murrett said in early October, “We are the single strongest supporter of the commercial remote-sensing industry. It is absolutely integral to our success and is a fundamental building block for what we do as an agency.” Such comments give confidence to our industry and shareholders.

In an earlier interview (GIM International, April 2006) it was announced that GeoEye-1 would be launched in Q1 2007. The actual launch has taken place eighteen months later. What were the reasons for delay?
GeoEye-1 integration and testing took longer than anticipated, and then our launch date was bumped due to the need to schedule the launch of a national security satellite for the Department of Defense. Regardless, we launched within four years of contract award, and on budget. ??
GSD and accuracy are so high that GeoEye-1 imagery could form the geometric and topographic foundation for the spatial data infrastructure in many countries, especially those lacking up-to-date topographic maps. Do you observe such developments currently underway?China is a perfect example of a developing country that needs up-to-date topographic maps. So the country has indigenously developed state-of-the-art GIS technology which has been widely used for land survey, mineral exploitation, water conservation and other applications. In November 2007 China’s national science think-tank said it would establish a key scientific research centre for earth observation that would develop geomatics technologies. These are increasingly important to the development of the country and have already been widely applied in several areas such as energy and resources, environment, oceanic and weather observation and city planning. We have had a terrific relationship with Beijing Earth Observation since it became our master reseller in China, and we are an investor in that company and its parent company, East Dawn.

What is your assessment of the effect of the popular Earth viewers, Google and Microsoft’s Virtual Earth, on the demand for commercial

high-resolution satellite imagery?
There's no question that demand for commercial high-resolution satellite imagery has increased from online mapping exposure. It's hard to believe that the first map was sent over the internet in 1996. Before that no one ever dreamed of sending geospatial information over the web. The mapping search engines and the ability to see maps and imagery over mobile phones are changing the way we navigate and relate. The growth of mobile phones will continue as their functions increase. Now GPS-enabled phones are used for geospatial-enabled social networking. Soon you will be able to look at your phone and see on an image map where your friends are when they call. According toEconomistmagazine, phone companies in India registered eight million new mobile phone subscribers in just one month! That's 11,000 per hour, 24 by 7! There will almost certainly be an imagery underlay on future GPS devices and GPS-enabled phones. We don't see this as a significant source of revenue, but it shouldgenerate a lot of publicity and public awareness of what imagery can do. We have an exclusive agreement with Google for access to GeoEye-1 imagery for the on-mapping market. That's why the Google logo was on our launch vehicle.

To quote from our previous interview: 'The number of imaging systems that are being launched by governments and quasi-governmental organisations is staggering […] we are being flooded by pixels from above'. Does the flood of pixels make it difficult for a cost-conscious company such as GeoEye to make a business out of it?
The satellite landscape has changed as more and more countries get into this business and customers in and out of government get used to seeing high-resolution imagery. India and Israel are currently selling imagery from sub-metre systems. France has a system on the drawing board. As competition increases, we plan to grow the company both organically and through acquisitions, so that eventually we become a geospatial-solutions provider and not just a pixel wholesaler. We're convinced that, even though our pixels will be the best in the industry, the price of pixels will only fall further as more and more satellites are launched and competition intensifies.We don't want to be in a race to the bottom of the pixel-pricing ladder. It's as simple as supply and demand. We already see this happening overseas. So we'll be moving up the value chain.

GeoEye-1 takes panchromatic (GSD: 0.41m) and multispectral images (GSD: 1.65m) from 681km above the surface of the Earth; an altitude that allows fifteen orbits per day. The satellite is polar-orbiting (inclination 98 degrees) and sun-synchronous, passing over a given area at about 10.30am local time. The nominal swath width is 15.2km at nadir. But the sensor can be rotated forward, backward or sideways, allowing it not only to record single images of multiple targets during a single pass or multiple images of the same target to create a stereo picture, but also revisit times up to two days. In panchromatic mode an area measuring 700,000km2, that is more than the size of the Iberian Peninsula or the Ukraine, can be recorded in a single day; in multispectral mode this is 350,000 km2. Together, Ikonos and GeoEye-1 can capture almost one million km2per day.
