State of the Ind

The "Great Recession" is over, but how did the recent economic downturn affect the remote sensing industry? What are the most significant challenges and opportunities in 2010? *Earth Imaging Journal*'s staff asked members of its Editorial Advisory Board to assess the current economic climate to discover what's changed during the last year.

In early 2009, the U.S. economy was immersed in the worst financial crisis since the Great Depression. How did the recession affect your business in 2009?

BOHANE: MDA's Geospatial Services business wasn't seriously affected by the recession in 2009. A lot of our U.S. business is with the U.S. government, and its needs for RADARSAT-2 and RADARSAT-1 remote sensing data remained strong throughout 2009. In the private sector we saw strong demand from the oil and gas sector for our operational services, mainly based around InSAR technology. Remote sensing clearly isn't recession proof, but we see regulatory and government spending priorities as bigger factors in determining demand and ultimately sales.

COPPLE: The recession had an impact on state and local budgets. In addition, American Recovery and Reinvestment Act (ARRA) money flowed much slower than predicted by the Obama administration. For example, only recently was U.S. Geological Survey (USGS) ARRA funding allocated to the states, and state use of these funds is just starting to be implemented. That may have been the plan all along for the USGS funds. However, the administration indicated most spending of the ARRA money would occur in 2009, and details generally weren't available. Sanborn was able to weather the downturn fairly well because of spending controls we implemented in late 2008 and early 2009, but it did impact the volume of business in certain markets. Sanborn branched out into new markets during 2009 to offset some of the reductions we saw occurring in traditional markets. As a result, we have a suite of new services and products ready for 2010.

DEMARGNE: As predicted at the beginning of last year, our work with state and local governments slowed in 2009 given a lack of program funding. However, the picture on the international and federal sides of our business was much brighter. An increase in U.S. and geospatial needs abroad, as well as stimulus-funded geospatial projects, translated into a steady share of work domestically and internationally.

One trend we noticed in 2009 is the willingness of agencies to work with the private

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sector to leverage cutting-edge technology for more efficient data collection and processing to extract more value out of geospatial investments. For example, Fugro is leading a large coastal mapping project in California. Funded with stimulus money and organized through the collaborative efforts of the USGS, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Army Corps of Engineers, this project uses a unique combination of topographic and bathymetric LiDAR with simultaneous digital multispectral and hyperspectral imagery. The project partnership and technical approach epitomizes the "map once, use many times" concept our profession has endorsed for years. Each agency, along with state and local users, will benefit from the same cohesive datasets to assist in managing coastal resources.

JOHNSON: Global Marketing Insights provides strategic planning, market research, and sales and marketing implementation programs. Because of the government budgeting cycle, our 2009 contracts weren't affected at the federal level. And because a large portion of the geospatial industry is underwritten by federal funding, we didn't see a decline in our commercial contracts. Our commercial geospatial clients focused their purchases on learning more about new applications and markets in which they were interested in exploring. This increased demand for our geospatial business intelligence market reports by 50 percent in 2009 compared with 2008.

LIMP: A university is a special class of enterprise, so the effect of the recession on the University of Arkansas and the Center for Advanced Spatial Technologies differed from other enterprises. Our external research funding actually increased, and we added staff and expanded our research in 2009. In part, this was due to the availability of ARRA funds that flowed to the National Science Foundation and other federal research funding agencies. Our educational programs also increased in 2009, as did the university's

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general enrollment (like many universities). During the last few years our geosciences and other collaborating faculty have developed a comprehensive geomatics curriculum that includes remote sensing, photogrammetry, GIscience, GPS and related method and theory. These classes have been well received by students. The program is designed to prepare students for ASPRS Certified Technologist or Scientist certification and/or URISA Certification. In 2010, the university is starting a new bachelor's degree in computer science with an emphasis in geo-informatics.

WILT: We were fortunate that our 2009 third-quarter revenues increased 123 percent from the same period in 2008, despite the economic downturn. This was mainly due to our new satellite, GeoEye-1, which started commercial operations in February 2009.

We and other industry experts believe that worldwide imagery demand for surveillance and change monitoring is recession resistant. The ability to observe one's borders and countries in other regions of the world is a highly coveted tool, regardless of the state of the economy. Our key customer, the U.S. National Geospatial-Intelligence Agency (NGA), has rigorous demands, and we've been meeting its requirements under the terms of our contract. We have a predictable revenue stream, and NGA gets a predictable stream of high-quality satellite imagery over any location on the planet.

Small segments of our business—our fish-finding and aerial information services—were affected by the economic downturn, and a handful of our resellers experienced a downturn directly related to the economy. We're seeing business in these areas pick up again as the economy improves.

We began the year with a new administration, and now we're slowly exiting the recession. What are the greatest challenges and opportunities facing the remote sensing industry in the coming year?

BOHANE: The greatest challenge for the remote sensing industry will be to continue to grow at rates that continue to attract investment and fund growth into a more mature industrial sector. The industry still relies heavily on the U.S. government and other governments as customers, as well as for funding satellite construction and application development. The greatest challenge is to create sustainable growth outside the government market. The Google and Virtual Earth initiatives have created an awareness and interest among the public, and the industry needs to work out how to turn this interest into a sustainable business.

Regarding opportunities, the United States and Canada are the most attractive markets for MDA's geospatial products and services, and we're focusing on these areas in 2010. Europe and Asia are also important, particularly China and India. In terms of market sectors, we see the defense and energy sectors remaining strong users of remote sensing products and services. We also see strong civil market opportunities emerging around the adoption of remote sensing by less-developed countries that see remote sensing as an important sector for their industrial investment strategy. In terms of new civil markets, one interesting opportunity we see is an emerging demand for geospatial services to meet the demand of the carbon credit trading industry. The recent Copenhagen environmental summit is a precursor to the large-scale adoption of carbon credit trading as a legitimate tool for carbon reduction and management. As a regulated market emerges, the use of geospatial data to regulate the industry grows in parallel.

COPPLE: A significant part of the industry relies on government funding of some type to drive market growth, so the largest challenge remains the government's budget condition. State and local governments are still cutting spending to meet their budgets, and that will continue through 2010 and 2011. With government agencies facing increasing pressure to do more with less, Sanborn has developed several new services and applications from investments made in 2009. New tools for data production, data management and data integration are helping our customers better use their available funds.

A significant challenge for the upcoming year and future years remains new research and development for the industry. On the technology front, limited federal funding has led to a situation in which most of the satellite systems are now applications of existing technology. Previous restrictions on radar satellites allowed other countries to take the lead with SAR-based commercial systems. There's a lot of sensor development taking place in the airborne world, but most of it is commercially funded, and almost all of it relies on core technology developed or under development outside the United States.

As for opportunities, remote sensing technology and related application software continue to make it easy for users to understand information about location. The applications of the technology are almost limitless, with broad potential use. We continue to see increasing applications in agriculture, defense, emergency response, engineering, navigation and planning, as well as many emerging applications.

DEMARGNE: As with so many other sectors, the fate of the geospatial community is closely tied to the health of our economy. If the economy fails to recover quickly this year, some federal, state and local programs may be cancelled or postponed. That will be the biggest challenge for firms working in the United States. To survive this downturn, we'll continue to see new technologies streamline services, and firms will continue to consolidate and diversify their offerings.

Domestically, I see several opportunities for the geospatial industry in 2010, particularly with federal and national initiatives. The Digital Coast and the National Coastal Mapping Program—both driven by ARRA funding and the Obama administration's focus on better understanding and preparing for the effects of climate change—present real opportunities for the remote sensing and GIS community. Several "for the Nation" initiatives also present opportunities. Imagery for the Nation, first advocated by the National States Geographic

Information Council, is the most mature initiative, with clear support from the Federal Geographic Data Committee and various federal stakeholders, including USGS and the U.S. Department of Agriculture.

From a big picture standpoint, growing awareness of and appreciation for geospatial data is substantial among government agencies and engineering firms, as well as the general public. "Today, Americans take it as a given that they should be able to get instantaneous driving directions across a city, state, or the entire country," observed Representative Jim Costa, D-Calif., at a recent congressional hearing on federal geospatial data management. This is true and then some. Internet users with no prior geospatial knowledge can help improve public geospatial data through applications such as OpenStreetMap and the use of open data standards—something no one could have imagined a few years ago.

This trend is clearly going to continue, with the administration and Congress paying more attention to the use of geospatial data for better governance. Witness the implementation of the Geospatial One-Stop online portal (*www.geodata.gov*), an e-government program mandated by the Office of Management and Budget to provide government and the public with fast, easy access to geospatial data from multiple sources.

So now that we've reached this stage, we have a unique opportunity, as a profession and as a community, to make a difference for our society and our planet through the smart use of geospatial information and tools. If we want geospatial to get to that next level, we need more collaboration, partnering and dialog between users, providers and developers/researchers; we need to focus more on overall value than one-time costs; and we need to help users maximize their geospatial investments by applying geospatial data and tools differently to solve more problems and streamline more processes.

JOHNSON: The remote sensing industry in the United States and around the world has focused much of its research and development capabilities on defense efforts. Now the key for the industry is to describe and transfer these capabilities to global applications related to the environment, food security, water management, etc. The greatest challenge for many companies in the remote sensing industry will be to learn how to repackage their capabilities away from a defense focus and business development effort and enter more of a "commercial" and "federal civilian" marketplace. The way business is conducted, as well as the contract mechanisms, are different in the commercial space vs. the defense space.

Today there's more opportunity in the remote sensing industry than ever before. From new applications in "Cloud Computing and Software as a Service" to new markets opening with the development and operational delivery of small satellites—from cubesats to nanosats—the opportunities are unlimited. These smallsats could provide the perfect data sources for applications such as carbon emission cap and trade monitoring and global food security monitoring. Large aerospace companies are shedding some of their remote sensing companies, and this will have an impact on the development of high-grade commercial remote sensing offerings that were developed in a defense environment.

LIMP: In 2010, as in past years, U.S. higher education will be challenged to continue developing educational strategies that aren't siloed. Educating users/consumers of geospatial methods and technology requires students to be broadly exposed to GIScience, remote sensing, photogrammetry, LiDAR and many geospatial disciplines. An educational focus on a single domain or software package will diminish students' effectiveness as these areas merge and evolve. Alternatively, training students to create future tools and methods means that closer integration and emphasis is needed between mathematics, computer science and geomatics. Although there are some exceptions, European and Canadian universities are leading in these areas. U.S. institutions need to respond to these future challenges more effectively or lose a major competitive advantage as geospatial elements become more embedded in our society.

This may be a pivotal year for *Earth Imaging Journal* readers. The future of remote sensing is linked to the continuing availability of trained university graduates. This requires strong K-12 education and efforts such as the Obama administration's "Race to the Top" and "Education to Innovate" programs. We have had personal experience with this. During the last decade, our center has worked with the EAST Project (*www.eastproject.org*), and we have seen how innovative curriculum—often with remote sensing, GIScience or GPS as core elements—motivates students and improves their performance in other classes (see *www.eastinitiative.org/EASTWhitePaper901(Research).pdf*). Programs like EAST train students in specific skills and, more importantly, develop 21st century skills such as collaboration, problem solving and higher order thinking.

WILT: We must stay flexible and keep adapting to a constantly changing market. Our customers tell us they want timely, accurate location information, and they want easy access to it via the Web. As a result, we're moving from just selling pixels to providing information services. The trend is toward distributing and disseminating information, where data and applications reside in cyberspace rather than on company servers or desktop hard drives. We hope these services will eliminate our customers' need for investment in specialized infrastructure and resources and allow them to seamlessly integrate and manage their data so they can make smarter business decisions, all in a collaborative environment.

With increasing foreign competition, the U.S. remote sensing industry must be able to offer customers the most accurate and highest resolution imagery possible. Our customers want even higher resolution imagery than what GeoEye-1 offers, which is 41 centimeters to the U.S. government and half-meter resolution to commercial markets. On behalf of our industry, TechAmerica's Space Enterprise Council and NOAA's Federal Advisory Panel recommended the U.S. government relax its resolution restrictions.

Regardless, this will be a milestone year for the U.S. geospatial industry. Under a new program, EnhancedView, NGA is expected to award new contracts to one or more U.S. companies licensed to provide commercial remote sensing services. EnhancedView is part of a larger satellite imagery strategy announced by U.S. Director of National Intelligence Admiral Dennis Blair last April.

The first part of the program provides for the U.S. government to purchase and operate two exquisite-class intelligence satellites as part of the new electro-optical satellite-imaging plan approved by President Obama. The second part directs the Department of Defense and the intelligence community to increase the use of imagery available through U.S. commercial providers by purchasing imagery capacity roughly equal to two new commercial imagery satellites.

There are also tremendous opportunities in the online community, which has educated the commercial sector as to the value of timely, accurate location information. We see growing demand in the energy, transportation and infrastructure sectors. We believe even agriculture

will find that satellite imagery, at half-meter resolution, is a cost-effective means of monitoring crops, especially when combined with aerial imagery. Overseas, we're excited about the growing commercial opportunities in emerging markets like China, Russia, India and Brazil.

What presidential decisions related to the remote sensing industry have you particularly liked and/or disliked so far?

DEMARGNE: Clearly, ARRA has impacted the geospatial industry in a positive way, both directly and indirectly. It has helped save and even create jobs at Fugro EarthData, again because we serve a large number of federal clients. Other companies whose business comes primarily from the private sector may have been more impacted by the weak economy.

The administration's strong focus on science and the use of the scientific process to support decision making is great news for our profession. Because a broad range of scientific fields, from ecology to economics, benefit from the use of geospatial data and tools, this decision is already translating into tangible work for the geospatial community.

I also believe that the popularity of President Obama overseas has had an influence on the ability of U.S.-based companies to develop their business internationally. Foreign governments are more willing to open their doors to U.S. investment and companies compared to a year ago. Through Fugro's unique global presence, with offices in more than 50 countries, we intend to capitalize on this favorable situation as much as possible.

JOHNSON: It's too soon to comment on any decisions and their impacts on the remote sensing industry. Government budget cycles for 2011 and 2012 will "tell the tale" of real impacts on the industry.

In May 2009, however, President Obama signed the Weapons System Acquisition Reform Act (S. 454), which includes tighter regulations on contractor conflicts of interest. Agree or disagree with it, this act will have an impact on the remote sensing industry because it is having an impact on the defense industry. How these regulations are interpreted and enforced will affect how business is done with the remote sensing industry.

LIMP: I'm sure others will mention ARRA, so I'll comment on two other presidential initiatives. The Aug. 4, 2009, Presidential Memo M-09-27 has two objectives that affect *Earth Imaging Journal* readers: "Increasing the productivity of our research institutions, including our research universities and major public and private laboratories and research centers" and "Enhancing our capabilities in space, which are essential for communications, geo-positioning, intelligence gathering, Earth observation, and national defense, as well for increasing our understanding of the universe and our place in it."

A second memo, M-09-28, issued one week later, requires all agencies to begin to structure their budget requests on a "place-based" basis and emphasizes that future federal budget and policy development will be structured this way. "Place-based policies leverage investments by focusing resources in targeted places and drawing on the compounding effect of well-coordinated action. Effective place-based policies can influence how rural and metropolitan areas develop, how well they function as places to live, work, operate a business, preserve heritage, and more." If this approach does become central to future federal efforts, the role of remote sensing and geospatial data and methods will be a key element in how this is accomplished.

WILT: We are pleased that President Obama has accepted the recommendations from Admiral Dennis Blair and Defense Secretary Robert Gates and approved the Two-Plus-Two plan, or the Imagery Way Ahead. The commercial component is great for our industry.

We're also pleased that the president's administration is reviewing his predecessors' space policies (Clinton's PDD-23 in March 1994 and Bush's NSPD-27 in April 2003) under Presidential Study Directive-3. We're encouraged by news from the White House National Security Council; we believe their review results will align with those published in the previous directives, which have supported our industry.

We're also impressed by the degree of familiarity the new administration has with geospatial information. Our CEO, Matt O'Connell, serves on the National Geospatial Advisory Committee, a federal advisory committee that advises our government on geospatial matters. Three administration officials recently met with the committee. Their depth of knowledge, familiarity and enthusiasm for the industry impressed committee members, who are industry specialists and leaders. They all seemed to understand that our industry has tremendous capacity to fuel economic growth and create new jobs.