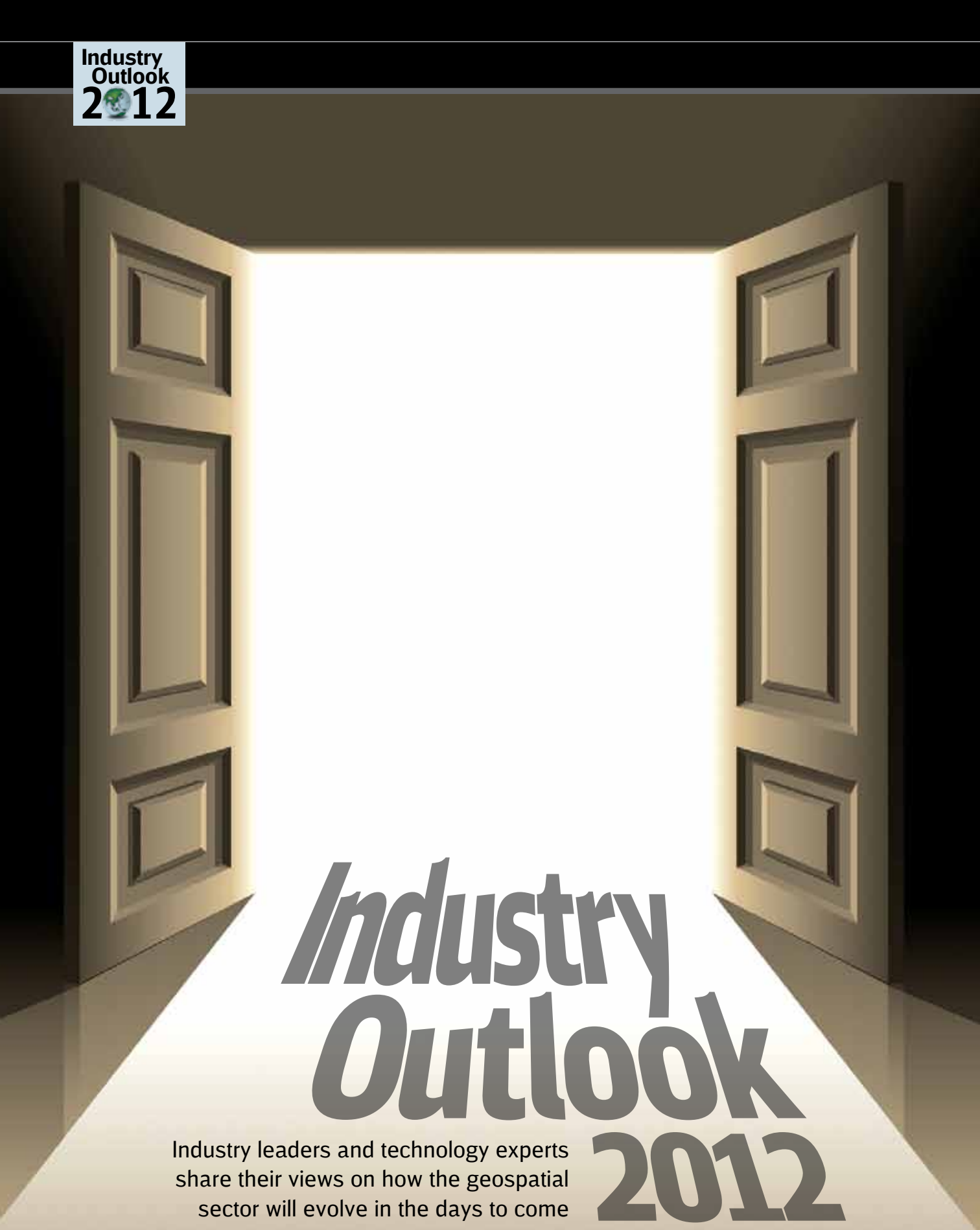


Industry Outlook 2012

Industry leaders and technology experts share their views on how the geospatial sector will evolve in the days to come

The year 2011 was quite an eventful both from technology application and innovation perspectives. Adding to the list of new technology adopters were social media applications that played a crucial role in mobilising revolutions and in disaster management. More number of utilities were seen catching up with the technology to enhance operational efficiency, while municipalities mapped cities for improving tax collection and better urban planning. Making its impact across diverse sector, geospatial technology proved to be a critical tool in exploration of precious mineral resources, tracking illegal mining, conservation of natural resources, monitoring climate change, upgradation of land records and in better traffic management. On the technology front, crowdsourcing and cloud computing have emerged as the major techno-trends that revolutionised the way data is collected, managed and analysed. Here is the broad outline of the industry trends that we may see in 2012:

According to projections made by industry leaders, the global GIS market is forecast to grow by 65 per cent over the next five years, recording a CAGR of 12 per cent. North America which accounts for almost half the industry's annual sales, has enjoyed a CAGR of 11 per cent for the last eight years, while Asia Pacific with a 8.7 per cent CAGR has surpassed Europe, which grew at 7.9 per cent compound annual rate. Going forward, the industry will grow faster in regions outside of Europe and North America. There is a trend towards providing easy access to geospatial information which will promote market growth across the globe.

Application

Public sector organisations will use the technology for better decision support while private sector will use it for market development, and these applications will foster the demand for access to accurate and updated geospatial information in real time. Enterprises will continue to adopt geospatial solutions to increase efficiency, visibility, transparency across business and for business intelligence purpose. In India, there will be continued demand for cadastral mapping, urban planning and mapping solutions under some of the flagship programmes funded by the government. A major directional change is the gradually increasing availability of large-scale maps to support these programmes. In the Twelfth Five Year Plan India is expected to invest around $1 trillion in infrastructure which will give fillip to the geospatial industry.

Demand for holistic geospatial solutions will come from utilities and telecom sector around the world for effective network planning and workforce management. Telecom operators are leveraging location-based services and high-quality digital maps to offer value-added services to their subscriber base. Investment will be made to provide solutions for initiatives such as smart grids, broadband roll outs, providing accurate navigation, security and disaster management. New government initiatives in urban planning, developing sustainable cities, power, land records, agriculture and forests will use geospatial technology as the base. LBS will extend its reach to rural areas and will play a major role in disaster and pandemic management. Consumer adoption of geospatial products and services, such as GPS navigation, mobile applications and Web mapping services will increase. Car manufacturers, especially in India, are introducing GPS navigation as a value-addition. Increased connectivity offered by mobile applications will enable greater level of interaction of users with solutions and devices.

Availability of live traffic information and services offering information on discounts/deals based on user location will enhance the value of geospatial applications to consumers. Use of commercial imagery for Earth observation and change detection will continue to grow, as commercial imagery remains cost-effective even in these economically difficult times.

Technology

The industry is moving towards managing information spatially rather than managing spatial information, and this will result in increased adoption of cloud computing, especially SaaS, which is expected to enhance the value of geospatial products and services to users. Enterprise GIS will continue to grow with SaaS delivery model. Integration of geospatial technologies into mainstream like ERP, BI, Design and e-Gov will continue. Availability of low-cost GIS solutions will usher grater interest in data mapping among the general business community. Mobile technologies with their capability to synchronise and streamline field operations are revolutionising the way people work. These technologies coupled with geospatial technology are playing a crucial role in empowering the common man, especially in India.

Another area evolving rapidly is the field of geospatial predictive analytics that enables users to analyse past events for predicting future events. Users from government, military and commercial sectors will demand for solutions that will go beyond responding to change, to anticipating it. More satellites will be launched offering positioning accuracy at centimetre level in mobile environment. Location-enabled sensors will become smaller, cheaper and more sensitive.

Point cloud related technologies are gaining importance, which will lead to further development of innovative tools and techniques for exploiting 3D point clouds. Demand or online data quality validation

and geosynchronisation services will increase, particularly in regions with ICT infrastructure constraints. Open-source technologies, open geospatial and location standards are gaining attention as they offer huge benefits in terms of cost savings in licenses, and more open-source technologies will make inroads in the days to come. There is a growing interest for developing OGC standards for geospatial business intelligence.

Impact of economic slowdown

Integration of geospatial technology across different sectors has helped in enhancing efficiency, increasing revenues and reducing costs. In the current economic conditions, developing innovative geospatial products that enable achieving the above mentioned benefits in a cheaper, faster and better manner is the need of the hour. While most of the large players may easily survive the slowdown, small players will need to adapt and evolve by embracing new technologies. The economic recession may also have an impact on the global spending on technology.

With growing budget pressures, the focus will be on extracting more information from data collected. The bleak economic scenario will also lead to more collaboration to develop user-oriented solutions and this will give a boost to interoperability and open standards. The one silver lining here is that the economic slow down may also force governments and private organisations to increasingly adopt the geospatial technology not only to save costs but also to improve their efficiencies. This will no doubt provide the geospatial sector an opportunity to widen its swath in the coming years. Let's hope the year 2012 will be an important milestone in its evolution.

As we enter into 2012, *Geospatial Today* conducted a survey with industry leaders and technology experts in the geospatial domain to gauge how the sector will unfold in the near future. Here are their views:

OLA ROLLÉN
President and Chief Executive Officer
Hexagon

Industry Outlook 2012

How do you see the geospatial market evolve in 2012?

With advances in technology, we can make sense of captured data with clever algorithms for data fusion, feature extraction and integration with business intelligence. Storage, database and server technologies now support the handling of large volumes of data, making it possible to natively use geospatial data in its raw form and leverage the depth of information available in all these sources. In 2012, we will see mobile computing and technology continue to extend the use of geographic data and information, empowering billions of individuals to be publishers and users of location-specific data and information. Cloud-enabling geospatial applications and platforms will further extend the reach of these tools to users beyond the traditional GIS, remote sensing and photogrammetric arenas.

For the Hexagon family of companies, you will see an integrated approach for handling the entire geospatial information life cycle – from data capture to delivery – where the final product is truly actionable, real-time 5D information (X, Y, Z, time, information) delivered to the desktop, Web, mobile clients and millions of users through cloud-based offerings. Imagine this as an "information point cloud" where it is more than a point with 3D coordinates. Time and information are critical pieces of information, and then when associated with 3D data, truly establish a digital 5D information cloud that can be viewed, analysed and used to extract multidimensional information about our changing earth.

What could be the major upcoming technology trends?

You will continue to see greater computing power, costing less. The introduction of new technologies like graphic processing units (GPU), as well as improved 3D graphics and now 3D televisions, have improved and extended the utilisation of geospatial information to a broader global audience. I believe we will see these technologies continue to be commoditised in 2012. In the past, specialised monitors were required to view the world in 3D. The consumer market has now recognised the value of 3D in the home. Similarly, the geospatial market is now embracing cloud technologies, opening up tremendous possibilities for deploying geospatial applications, data and information to millions of users. With cloud technologies, you can be anywhere and access information about our earth.

Also, with higher resolution sensors, large volumes of point cloud data are being easily integrated with existing GIS databases; thereby improving capabilities for automatically identifying and extracting features on Earth's surface, and using that information to make critical decisions. This needs to be done in real time, and with sensors integrated with software workflows, we are now seeing this become reality.

What applications/sectors do you see catching up with the technology?

For transportation, laws are being passed to collect information on street assets. In the past, individuals would drive around and manually record information about the conditions of roadways and the associated assets with paper and pen. Now, with sensors placed upon a car accessing existing asset databases, we can drastically improve asset and inventory management for infrastructure. An individual can now drive one of these equipped "smart vehicles" to collect this data, enabling digital asset management in the office. This streamlined process is safer and more cost-effective, and provides a digital record that can be used for an unlimited number of applications across industries and user bases.

Another example of new applications bringing significant, useful change can be seen in public safety. Remote sensing, photogrammetry and GIS have traditionally been used for creating exterior maps for public safety organisations. However, maps alone are not enough. Life-critical applications like E911 need spatial knowledge and information about what is happening inside buildings and inside homes. We can take the same sensing technologies to capture data inside of buildings, and then view, manage, analyse and extract information related to this data (for police operations, fire, disaster response etc.).

How do you see the current volatile economic scenario affect the geospatial sector?

Over the last century, through good and bad economic times there has always been a need to understand our changing world. This was seen most significantly during the United States' Great Depression when President Franklin Roosevelt established the New Deal to create a number of sustaining land management projects that actually improved economic conditions, while also providing greater geospatial understanding.

Today, from a security standpoint, it is more important than ever to monitor borders to prevent armed conflict or illegal trafficking. For agriculture to support our growing and changing demographics, we must have a better understanding of how to maximise the crop yield potential. For emergency response, we must provide mission-critical information to a response team after a natural disaster in order to save lives. There will always be a need for geospatial information to protect lives, infrastructure and property.

In these economic times, there is greater emphasis being placed on making more with less. Geospatial technologies allow us to quickly monitor our Earth's natural resources through various sensing technologies, while also using intelligent geospatial technology to extract the right information that decision makers can use to improve predictability and vulnerability.

Finally, we cannot disassociate the activity occurring within world markets from the human, physical and social geography that are happening on the Earth's surfaces. All of these geographies share a common denominator – location. Geospatial technology is an enabling force that will help stimulate the world's economy.

The recent advances in mobile technology seem to be greatly influencing the geospatial sector. Your comments.

Absolutely – for example, with the release of the iPad 2, a camera sensor is now available to all users of this technology. Similar types of location technology are now available in other mobile devices, with embedded software to easily share this information. With this type of technology now in the hands of non-traditional geospatial users, there are greater possibilities of data collection and dissemination. Now, virtually anyone with a mobile device can take snapshots of our world, record the location and then use geospatial software to extract information and share this through the cloud and other connected mobile devices.

Similarly, we now have mobile phones that contain two cameras on a single device, giving us the ability to capture 3D scenes and to view the world as it was meant to be viewed – in 3D. With video and location information alongside mobile technology, we also have the opportunity to understand our world in 5D, adding time and associated information. This opens a tremendous number of applications to understand our world. Mobile technologies are an enabling force, and when coupled with geospatial technologies, allow us to fulfil a vision of understanding our changing world.

JOEL CAMPBELL
President, ERDAS

Industry Outlook 2012

Industry development in 2012

I think that over the course of 2012, integration will be the name of the game. Major technology providers such as Google and Microsoft have

expanded the public's awareness of geospatial intelligence and its array of benefits. As a result, businesses and consumers increasingly expect location-based content in their applications and services. Other industries will have to incorporate geotechnology into their current offerings to meet that demand, becoming players in the geospatial market on some level. Geospatial information and technology will be integrated with business systems and applications to strengthen their responsiveness to user needs, streamline workflows, and reduce costs. From our company's perspective, you'll see an expansion of the integration that Hexagon introduced to the market in 2011 with its sensor-to-the-internet approach to the geospatial workflow. I really expect that we will be showing some exciting changes along those lines at Hexagon 2012, June 4-7 in Las Vegas, Nevada.

Upcoming technology trends

The fusion of geotechnology with other products and services will be the overarching trend for the future. It will also be the most exciting one to watch unfold, as different industries roll out imaginative new practical applications for geotechnology.

LiDAR and other sources of point clouds, as well as all the related technologies, are currently dominating the market mindset. That trend will continue with the discovery of new real-world applications for the technology and the development of innovative tools and techniques for exploiting 3D point clouds, including those derived from LiDAR and terrestrial laser scanning systems. At Intergraph, we already have tools that can catalog and distribute point cloud data, and manipulate LiDAR data to create high-resolution digital elevation models (DEMs) and full vector contours. We also have LPS eATE, which creates dense point clouds from stereo imagery. This software tool works well for organisations looking to bolster their archives of point cloud data in a cost-effective manner or who need to create historical point clouds for comparison to more recent data.

3D is another trending technology – our sister company Leica Geosystems is already doing a strong business in laser scanning and creating 3D models for infrastructure. We are seeing more 3D models of the real world capturing areas where we can walk around, as well as providing more advanced capabilities for navigating and taking measurements. For example, in 3D we can take accurate measurements between points, which was not previously possible. So, I certainly see the continued emergence of 3D (and even 4D, adding the time component) to look at the state of the world at a given point in time compared to another. With 3D modelling, you can apply a geographic approach to CAD and design tools. This can be done in Intergraph's Geomedia today and we expect to continue evolving this capability.

Finally, I think The Cloud is going to be very important for all of us over the next three to four years. Given the vast amount of data and the cost to maintain the infrastructure to manage all the data, the idea of cloud computing is starting to catch up with people. We are seeing great advances in the simplicity of deploying cloud-based applications and solutions, which I expect will support growth into new market segments.

Applications/sectors catching up

Increased implementation of geospatial technology will be primarily evident in industries that are involved in "green" projects in any capacity, as well as public-safety and disaster-response organisations. Integration of geospatial technology into their current products, services and systems is really the only way for them to achieve their standards of excellence.

The utilities and communications sectors will increasingly turn to geospatial technology to assist in the setup of smart grids, and managing them to enhance their security and stability. One of the exciting areas for Intergraph, in this market, is the marriage of GIS and remote sensing for things like vegetation management and corridor analysis.

Agribusiness will also be making greater use of geotechnology to improve planning, maximise harvests, and reduce the amount of money required to maintain crops in these lean times. Digital elevation models and remotely sensed data yield detailed information about drainage patterns and soil characteristics within a planting area, enabling more accurate planning and forecasting. Once the crops have been sown, proper analysis of remotely sensed data allows farmers to monitor soil moisture and crop health so they can more precisely gauge how much water and fertiliser are needed.

All of that said, I expect geospatial technology will become a part of almost every sector in some way moving forward. We can expect to see geotechnology implemented not only in these critical types of projects, but also in any products or services that save people time and money, and enhance recreation.

Impact of economic slowdown

We're seeing the geospatial industry fare better than most during these uncertain times. During shorter downturns, governments and companies may favour short-term solutions that involve simple reduction of expenses in the present and near future. In this protracted period of

volatility, they may be more likely to consider more permanent options, such as calculated expenditures that enable them to run leaner and more efficiently in the long term. Geospatial technology complements existing business systems and processes, enabling organisations to complete tasks better, faster and with fewer resources, ergo, more profitably.

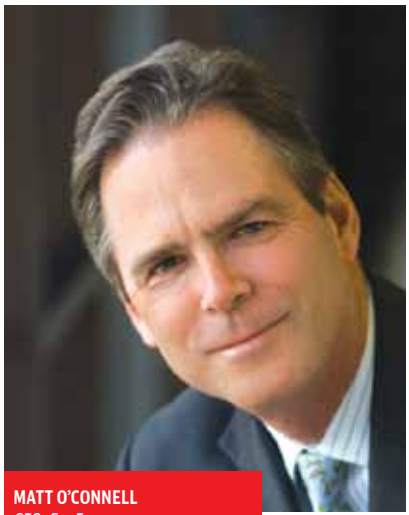
To respond to these changes in the market, it's important for vendors to provide offerings flexible enough to integrate with the variety of systems already in use. Intergraph has achieved this through adherence to open standards such as those from the OGC and ISO and skillfully engineering applications to use existing hardware resources efficiently.

Customers will also increasingly demand more efficient applications that fully leverage existing hardware, boost throughput, require minimal ramp-up time, and automated processing.

Influence of mobile technologies

As consumers increasingly expect location-based content in the applications and services they use, they will expect the same functionality regardless of whether they're working on the desktop or through a smartphone or tablet. To better serve this mobile market, we tapped into our developers' ingenuity with the iPad Challenge earlier this year. Through this contest, we now have several iPad apps in the works that feature creative uses of geospatial technology.

The geospatial industry is uniquely capable of enabling applications and services to be tailored to the user's location on the planet, offering greater relevance and utility. As a result, we'll see not only a continuation, but an expansion of this link between mobile and geospatial technology.



MATT O'CONNELL
CEO, GeoEye

Industry Outlook 2012

Industry development in 2012

The market will continue to grow. People have realised how valuable it is not merely to see their world but to see it in context: where is a person or thing in relation to other people or things or dynamics. Geospatial information helps people make decisions faster, more efficiently and more cost-effectively.

There has been a trend towards easier access to geospatial information. I'll speak about that a little later. That trend will contribute to the growth of the market. If you make it easier for more people to use technology, they will use it – Microsoft and Apple are perfect examples.

As budget pressures continue around the world, there will be increased attention on getting more information from the imagery and data that have been collected.

An area that is evolving rather rapidly is the field of geospatial predictive analytics. That's why we acquired GeoEye Analytics last year. Very basically, they combine imagery with other information that can be cross-referenced to a place, such as social media, history, cultural norms, and demographics, to help users analyse past events at a location to try to predict future events.

From government agencies, to the military, to a range of commercial entities, we need to focus on developing customised solutions that will go beyond responding to change to anticipating it. These solutions will equip our users with the tools to address their critical challenges to protect lives, manage risk, and optimise resource allocations.

Global budgetary pressures will also lead to more collaboration. We have been seeing, and we will continue to see, more and more opportunities for collaboration to develop or expand the geospatial solutions our users need.

We are very focussed on expanding through partnerships, such as our international partnerships with ScanEx and Japan Space Imaging. In the United States, we have had a very successful public-private partnership with the National Geospatial-Intelligence Agency (NGA) for many years. We are also expanding our commercial partnerships with Google and ESRI.

Upcoming technology trends

A significant trend that we are all experiencing is the move to cloud computing. Cloud computing makes it easier for users to access the information they need, and it facilitates collaboration. So it fits well with the trends towards easier access to geospatial information and increased collaboration. We support this trend, and we are a member of the Open Geospatial Consortium (OGC). A key design feature of our offerings is their compliance with OGC standards to enable us to be widely interoperable. Being able to access and share information via the cloud has really opened the doors to broader adoption worldwide.

For example, GeoEye has developed an on-demand Web delivery platform called EyeQ. EyeQ is a cloud solution that makes it easier for users to get

access to imagery anytime, anywhere. EyeQ started out as a solution for our US government users. We host information for the NGA that their users can access securely. But we are now signing commercial customers, including several leading engineering, construction and energy companies.

As mentioned above, there's a drive to extract more information from data and imagery that has already been collected. We're investing in geospatial technologies that are increasingly adapting to how the world works and evolves, rather than simply how the world looks. That's where we see another significant trend, and that's why we've expanded into predictive analytics with our acquisition of GeoEye Analytics. With these tools, our users are turning "sight" into "insight."

And finally, there is still a trend toward higher resolution. Our current satellite, GeoEye-1, has the highest resolution in the commercial world at 0.41 metres. Our next satellite, GeoEye-2, will have even higher resolution at 0.34 metres.

Applications/sectors catching up

We are seeing an increasing need for geospatial information services in emergency response efforts to natural disasters and man-made crises of all sizes, from global to local.

For example, many nations were interested in the possible effects of radiation after the tragic earthquake and tsunami in Japan earlier this year. Our imagery of the damaged nuclear plant in Sendai was not restricted by American or Japanese laws, so it could be shared easily. In fact, global audience saw our imagery of the disaster. *The New York Times* website developed an interactive media application based on our EyeQ platform that received millions of page views. We were able to help the world understand, and respond to, the magnitude of the disasters in Japan.

On a smaller, but no less urgent scale, GeoEye assisted the Virginia Fusion Center in the United States during Hurricane Irene in October 2011. We provided our unique combination of imagery, access and expertise to the Virginia Fusion Center for their preparation, response and recovery efforts around the storm.

We were glad that we could support our friends at Japan Space Imaging in their effort to help their wonderful nation begin to rebuild from the effects of the earthquake, tsunami, and nuclear accident. And we were honoured to receive a commendation from the Virginia Fusion Center for our work with them following Hurricane Irene.

In the commercial world, we see increasing reliance on geospatial information for planning and managing large projects. For example, we recently entered into an agreement with one of the world's largest engineering companies. They want to use our imagery and EyeQ to help manage construction projects around the world.

On the governmental side, we are seeing the same increase in use of geospatial information for managing large-scale infrastructure projects like dams, roads and railroads. Of course, governments continue to use geospatial information for defence purposes as well, and that area will continue to grow.

Impact of economic slowdown

Global economic turmoil is the biggest issue facing our industry. However, many of our partners, customers and users are reaching the same conclusion: commercial satellite imagery is cost-effective even in these difficult times (perhaps especially so).

Few governments need to use their nationally owned satellites 100 per cent of the time. By sharing the time among different customers, commercial satellite companies reduce the burden on any one nation. They effectively reduce taxpayer liability by commercialising excess capacity, above the capacity that has been ordered by our government. In addition, private companies are more cost-conscious, and certainly more nimble, than most government agencies. We can construct and operate satellites faster and for less money than they can.

We are fortunate that awareness of the value our industry delivers has been growing. Our customers know the advantages of doing business with us:

- Our industry delivers imagery and value-added products that provide cost-effective geospatial information and insight to decision-makers.
- Our imagery provides precise situational awareness and leads to more efficient decision-making, which, in turn, mitigates risk, and saves time and money.
- The amount of data is increasing, and we can help manage that data and make it accessible when it counts.
- Demand for imagery is increasing, and so is the demand for speed, accuracy and customer-friendly interfaces, all of which we provide.

Most industry experts believe that worldwide imagery demand for Earth Observation and change detection will continue to grow over the long term.

Influence of mobile technologies

Mobile applications are influencing almost every part of the technology world, and geospatial is no exception.

We believe that investing in and developing the technologies to put data into the hands of our users – literally! – wherever they are, whenever they need it, is extremely important. We need to make it easier for our users to access, use and share valuable geospatial information across organisations and industries, whether they are deployed military personnel or disaster relief workers. We saw this firsthand at a recent, major geospatial intelligence conference in San Antonio, Texas. The NGA's Director, Letitia

Long, had a live iPad demonstration during her keynote to demonstrate the many applications that the intelligence community has developed for its users in response to their increasing need for mobile access.

We have gained tremendous insight into the mobile market through the development of GeoEye's "Elevating Insight" iPad app. We launched it in October, and it is available for free in the iTunes store.

Mobile users can all benefit from mobile solutions, including GeoEye's. Among the examples are disaster relief workers and managers of large construction projects who may lack consistent access to robust communications services. We think mobile applications will be very helpful in the educational area as well. We see tremendous opportunities to help people with mobile technology.

JOHN OECHSLE
Executive Vice President, Strategy and Product, Digital Globe

Industry Outlook 2012

Industry development in 2012

Currently the industry is focussed on the customer need for quick delivery of satellite imagery, whether for military, environmental, or humanitarian efforts. However, I see the analytics side of the satellite imagery industry growing increasingly in importance.

In 2012, I see the insight derived from imagery becoming more important than just the pixels themselves. The commercial satellite industry is able to deliver much more than what the naked eye is able to see. For example, DigitalGlobe's Analysis Center takes satellite imagery a step further by applying critical thinking and problem solving to turn images into answers. This data can then be used to support evacuation planning, disaster response, recovery, and rebuilding in regions worldwide.

Upcoming technology trends

One major trend I see is a move towards a cloud computing model. The geospatial world is highly data intensive, particularly when working with imagery. It is also moving much more toward mobile applications like on smartphones and tablet devices. Because these factors reinforce each other to fuel the creation of a rich set of cloud geospatial computing capabilities, it is natural to see even high-end geospatial applications beginning to take advantage of this. Simplifying the IT infrastructure has many advantages. For example, moving software updates centrally to the cloud instead of having to deploy many workstations will reduce the time and cost of implementation.

Impact of economic slowdown

Despite the current economic challenges, geotechnology is an area that continues to experience growth as new uses are found for the technology and products that are being developed. This growth, coupled with the need for new skill sets to progress with the advancing technology, is what will continue to create new opportunities in this industry. Furthermore, the fact that vast quantities of satellite imaging are being collected creates new opportunities to find meaning amidst all the data. Additionally, commercial satellite imaging is an efficient and valuable way to provide intelligence not normally able to be taken by ground crews. Our industry provides immediate and shareable images with warfighters, coalition partners, first responders and relief workers, who otherwise would not be able to see what satellites observe.

Imagery usage/application trends

A trend I see is that customers continue needing images at a faster rate and with more accuracy, which is getting more and more difficult as the earth is constantly changing at a rapid pace. This creates the need to create a more current, complete and accurate global model for the industry, and therefore, our customers. A new model is needed that is aligned with, and enables the shift to a centralised hosted system. This would have tremendous benefits for the entire industry. A global geospatial reference platform would eliminate the questions around complete and accurate images, giving customers worldwide a trusted, reliable and constantly updated visual source of information, accessed wherever and whenever they need it.

PHILIP O'DOHERTY
CEO, eSpatial

Industry Outlook 2012

Industry development in 2012

In 2012, I expect the geospatial market to continue to evolve along the same lines that it has in 2011. The three main

areas of evolution I foresee are:

- Continuing growth in enterprise GIS functionality available with SaaS delivery – from customers and consultants, and from a handful of vendors who are ready to take this next step.
- Greater participation from – and thus understanding and accommodation of – new participants to geospatial analysis, drawn from the wider business community.
- Further attention being paid to the importance of mobile technologies, and how the industry can both accommodate existing needs, and anticipate future requirements.

Upcoming technology trends

The two major upcoming technology trends I think have the power to really revolutionise the geospatial industry are SaaS and mobile.

SaaS is such a transformative technology – it's done amazing things for email, CRM, and even standard business applications like word processing and spreadsheets.

While SaaS is still very much in its infancy in the geospatial industry, our experience at eSpatial has made it abundantly clear that it's a game-changer.

Mobile technology is also becoming more ubiquitous. Again, the geospatial industry might be a little slower to embrace the technology – but it's the way that the world is evolving, and it will continue to have a significant impact.

Applications/sectors catching up

Wider availability of lower-cost GIS solutions will significantly contribute to interest in data mapping from the general business community. These users will have fairly diverse data mapping needs, and will be interested in low-cost commercial solutions that provide quick, actionable results.

I also believe that some vendors will catch up with the technology in 2012 – or at least take steps towards beginning to catch up. As interest grows – along with solid business results – more vendors will take the bold (but necessary) steps to embrace these technologies.

Impact of economic slowdown

The large, dominant players will easily survive, even with the challenges of the current economy. However, smaller players on the margins may not – unless they're ready to evolve.

I believe that the key to survival for these smaller players will be their willingness and ability to embrace new technologies, and the needs of the new kinds of customers who exist outside the geospatial industry.

Some will choose to do this by developing or re-developing their own software; others will seek strategic partnerships to leverage existing technologies and expertise in dealing with the growing business data mapping market.

Influence of mobile technologies

Mobile is a crucial technology for the geospatial industry.

From an organisational perspective, mobile is transforming the way people work – and where they work! Employees are increasingly using mobile devices in place of, or alongside, their traditional workstations.

From a data-driven perspective, mobile "feeds the need" – it's an invaluable source of geospatial data. Without mobile technology we wouldn't have such easy access to GPS data, pictures tagged with coordinates, and data generated by handheld remote sensors.

Understanding the potential and practicalities of mobile devices and technologies will be vital to future success in the geospatial industry.

STEVEN RAMAGE
Executive Director Marketing and Communications, OGC

Industry Outlook 2012

Industry development in 2012

I see continued growth in the rate of adoption of open geospatial and location standards – which is reflected by the current OGC membership of 440 organisations. The number of communities now implementing OGC standards is growing rapidly, and 2012 will be a very important year for awareness and understanding of the value of open standards. Open standards play a key role in the market because they are essential to both the integration and communication of geo-information. There are numerous international initiatives, such as Eye on Earth, GEOSS, INSPIRE, SISS and UNGGIM supporting geospatial data access and sharing through open standards.

I'm not sure how many longstanding, independent geospatial companies remain (that have not been acquired already), but I would say that there's more industry consolidation to come, if that's possible! With austerity measures increasing globally, there's also an increase in the number of highly qualified and well-experienced professionals who are now seeking employment in new or different areas. A number of these professionals have

created new organisations delivering geospatial solutions, which is also changing the geospatial landscape. Tight fiscal conditions bring the need to work together, and so interoperability and open standards will also receive a boost. Finally, the Open Government movement seems to have gained traction in some locations around the world. I have been participating in a number of discussions relating to linked data, public sector information reuse, open standards and other associated topics with industry colleagues. Location is certainly now recognised as a third currency along with time and money, and the actions around data.gov.xx are supporting this recognition.

Upcoming technology trends

I'm presuming many other respondents will discuss cloud computing and crowdsourcing and associated technology trends in detail, so I will not tackle those specific areas. However, I should note that the OGC membership is actively working in both these areas. Some of the work is based around online data quality validation, as well as geosynchronisation services, i.e. being able to update geospatial data in a disconnected environment. In regions that have ICT infrastructure constraints, such as developing nations, these are two trends represent some real opportunities to help manage and share geospatial data.

In terms of major technology trends, the main trend may actually be better use or further development of existing technologies. Location-enabled sensors is a good example – everything from cell phone compasses to home thermostats and airborne and orbiting imaging devices – are becoming smaller, cheaper, more sensitive, more often connected to the Internet and more integrated into a wide variety of products and services. Each has a location and thus the explosion in the number of sensors translates into a major geospatial technology trend. The OGC has a suite of standards called Sensor Web Enablement (SWE) to enable developers to make all types of sensors, transducers and sensor data repositories discoverable, accessible and useable via the Web.

The indoor/outdoor location connection is long overdue, due to both technical and institutional barriers, but both of these barriers are falling. There is a movement around Augmented Reality, which will potentially create demand for detailed information about both indoor and outdoor spaces. The OGC CityGML Encoding Standard is one of the technical advances that will play an important role. This standard is the focus of a national project in the Netherlands called 3D Pilot NL in which government organisations, in particular City of Rotterdam, have embraced this standard. Demand for use of CityGML is also coming from governments and financial sectors, such as insurance, that are calling for reform in real property assessment and mortgage tracking. Real-estate owners need something like CityGML for better building information that forms the basis for life cycle cost estimates. There is global demand for reduction in carbon emissions, and related to that is the Smart Grid's dependency on indoor location information. First responders are looking at standards like CityGML that can help provide better information about the buildings they enter during emergencies.

Applications/sectors catching up

Meteorology, hydrology, ocean observation and aviation are all areas in which progress has been previously slowed by the inability to share data. New OGC standards (or other standards that use OGC standards) based on today's ubiquitous Internet and Web protocols and encodings have suddenly given these domains an efficient and internationally accepted way to share, fuse, integrate, analyse and present data from diverse sources. The work around data exchange protocols, such as AIXM (aeronautical information exchange model) and WXXM (weather information exchange model), is extremely encouraging and exciting at the same time.

Momentum is building in the consortium for standards that support geospatial business intelligence. Business intelligence supports better business decision-making leading to new revenue opportunities, improved cost visibility, and better risk management. Location is important here, and so is integrating information from diverse sources, and thus OGC standards are seen as important enablers.

Impact of economic slowdown

I've addressed components of this issue in my first answer, but the fact that most governments and many individuals have less money to spend may not necessarily be bad for the market. Geospatial technologies can help organisations become more efficient. As suggested above, there is growing awareness that better information about real estate is critical to avoiding more mortgage crises. We are now working with an OGC alliance partner, OSCRE (Open Standards Consortium for Real Estate) in this area. We also have (re) insurance companies coming into the consortium since they have a stake in the mortgage business and in other businesses where risk can be better managed by means of better access to spatial information.

Influence of mobile technologies

The most obvious fact about mobile communication devices combined with location technology is that people and phones can report their location, and this is valuable in many scenarios. A newly adopted OGC specification called Open GeoSMS is a key advance for openness and interoperability for

the mobile sector, because "texting" is so widespread and because SMS itself is an open standard and a very large percentage of SMS messages involve location. Cell phones today, even the least expensive, can at least report to an application the location of the nearest base station antenna, and often the degree of accuracy is much better than that. The OGC is coordinating with ITU (International Telecommunication Union) regarding further standardisation efforts involving Open GeoSMS.

The combination of sensor Web standards and mobile technology is an important part of the story. The phrase "Internet of Things" captures the significance of this convergence. Smartphones now include thermometers, accelerometers, gravitometers, compasses, pressure sensors, strain gauges, light meters, and other types of sensors. GPS units are sensors. All of these produce geospatial data. Whether sensors are mounted on a moving device or not, they are increasingly likely to be wirelessly connected to the Internet. The main point is that location-aware devices, when connected to a vast infrastructure of data and services, provide unprecedented access to information about places. This increase in geoinformation supply and demand makes the previous century's geospatial technologies – GIS, Earth imaging, spatial databases and facilities management software – more important than ever.

For more than a year, the OGC has had an active "Mobile Internet" initiative, which has involved conference appearances, outreach to other standards organisations, and a ramp-up of OGC Technical Committee activities in this area. Mobile Internet devices play an important role in the Internet of Things, Augmented Reality, Smart Grid, urban 3D models, social networking location apps and other emerging technology domains. Location standards are a factor in all of these.

DALE LUTZ
VP, Software Development and Co-founder, Safe Software

Industry Outlook 2012

Industry development in 2012

2012 will be another year of continuing change in the Geospatial industry. The marriage of sensors with geospatial software from companies like Hexagon and others will offer new solutions to previously intractable problems. The almost certain entry of Apple into location-based services, data, and mapping will add a new energy to the otherwise fading popularity of the "neogeography" term. Additionally, ever more realistic 3D simulations and data, managed by ever more sophisticated software, will continue to move the expected experience of geospatial professionals.

Upcoming technology trends

2012 could likely be a year that sees an explosion of low-cost, web-enabled sensors, which report on a wide variety of properties, including their location. The "internet of things" will indeed blossom during 2012, and geospatial technology will be employed to maximise the utility of these new "connected" sensors. At the same time, an increasing adoption of cloud computing techniques and technologies will reduce the friction of creating immensely powerful geospatial solutions, able to process amazing amounts of data in very little time. Furthermore, cloud technology combined with cloud-hosted data as a service will provide a quick and convenient platform for fast deployment of spatial solutions. Expect to see such combined offerings from a variety of players. There will continue to be a trend towards non-platform-specific offerings. Companies will be moving toward offerings that work on multiple mobile and desktop platforms. A strong move toward separation of the front-end GUIs from the backend processing software will be fully underway.

Applications/sectors catching up

Traditional Desktop GIS will be working hard in 2012 to fully embrace the promise of cloud computation and the explosion of data volumes, as well as an increased availability and expectation for 3D datasets and visualisations. Many existing applications will have to be rearchitected to cope with the new data types, enormous data volumes, and the nearly limitless computing power that users will have access to. Some will, and some will not. Those that do will be able to leap into the next era of geospatial solution building. Those that will not make this jump will not disappear overnight, but will be stuck in the same solution areas that they currently reside in. It will be fascinating to watch it unfold, and also to see if any new players emerge during the transition.

Impact of economic slowdown

No industry is an island unto itself, and geospatial is no exception. Geospatial is particularly vulnerable as governments cope with exploding debt problems, as governments themselves are among the largest consumers of geospatial technology. However, within the sceptre of reduced spending lies opportunity for disruptive new ways of more efficiently accomplishing tasks to gain traction, so there will be opportunities for those companies able to adopt new approaches, fully

leverage the expanding technology and data environment, to bring great value to customers. Such companies will be able to flourish, particularly in uncertain times.

Influence of mobile technologies

The ubiquitous nature of advanced mobile devices capable of sensing and reporting a variety of measures, including their location, cannot help but alter the geospatial landscape. New applications will certainly leverage these devices, particularly in the area of providing location-based services, perhaps in surprising and as yet unimagined ways. It becomes even more interesting when mobile technology is connected to the cloud – suddenly lightweight moderately powered devices can accomplish workstation or even supercomputer tasks in a seamless way. And that combination is likely to have the biggest impact for geospatial users and developers. Exciting days ahead indeed!

MANISH CHOUDHARY
MD and VP, PBBI

Industry Outlook 2012

Industry development in 2012

Globally the market for Geospatial Information Systems (GIS) is forecast to grow 65 per cent over the next five years, representing a compound annual growth rate of 12 per cent, according to a leading research and advisory firm for industry, ARC. While in India, the geospatial industry is witnessing a growth rate significantly higher than worldwide average. Both public and private sector organisations in India are recognising the value of geospatial technology.

Geospatial technologies are instrumental in building vibrant and sustainable rural communities. This has and will be the key driver of geospatial market in India in 2012. The public sector organisations will continue to recognise the value of geospatial for decision support and the private sector organisations will use it as a tool for market development. India's reputation as an outsourcing destination will also play a key role in enabling the country to develop significant technical expertise in the geospatial arena. No doubt, there is a significant increase expected in productive capacity after 2012 as India's geospatial industry builds out capacity for new international and internal markets. Going forward, the growth of India's geospatial market will outpace growth rate for geospatial markets in the rest of the world.

While India's geospatial market potential has never been higher, realising this potential would be challenging. The industry is still struggling to communicate the true value which geospatial information holds. In order to drive the market in 2012, it will be crucial to overcome this barrier.

Upcoming technology trends

In the early years, geospatial technology was considered the domain of a relatively few techno-geeks. Today, it is part of everyone's life either through PND devices or cell phones. In just three decades geospatial has evolved from an emerging science to a fabric of society that depends on its products from getting driving directions to sharing interactive maps of the family vacation to tracking their products.

There has been an obvious boom within the geospatial market, and it is here to stay. The geospatial world is ever changing; today the industry is moving towards managing information spatially rather than managing spatial information. There is a growing consensus that the future of geospatial is tied to cloud computing and software as a service (SaaS). We can surely say that the future clearly belongs to 'GIS as a service'. Cloud computing and SaaS model would be the push that finally delivers GIS capabilities to a much wider corporate audience beyond its existing niche markets. There is no doubt that GIS can provide value to more users and organisations than the market it serves today. 'Cloud computing' will be an integral part of achieving this goal. The cloud will act as a unified source of information.

Applications/sectors catching up

There is tremendous scope for the penetration of geospatial technologies in various sectors to boost the economy as well as to improve quality of life in India. We are seeing a growing reliance on satellite imagery by government and users are increasingly demanding services that will help them make decisions using geospatial information and provide easy access to flawless geospatial information any time, on demand through Internet.

Verticals such as utilities, telecom and government are showing an increased demand for geospatial based holistic solutions. New government initiatives in urban planning, developing sustainable cities, power, land records, agriculture and forests will need strong geospatial technologies to strive.

Impact of economic slowdown

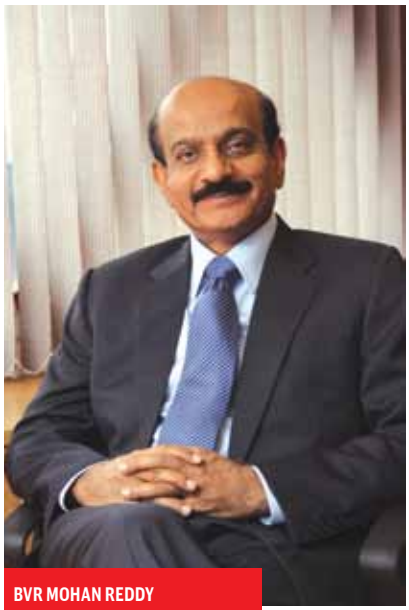
We need to understand that convergence and integration of geospatial technology with

mainstream technologies like IT, telecommunication, Internet has enabled the harnessing of geospatial information and technology for improving the productivity and efficiency of enterprises across different industry domains including energy, mining, oil and gas, telecommunication, infrastructure, transportation, water, agriculture, local governance and business enterprises. In other words, geospatial industry is developing solutions and applications which are very critical and useful for the growth of major industries driving global economy, and in a way, contributing directly to the economy.

With its proven ability to increase revenues, reduce costs and improve efficiency, the geospatial sector in India will continue to grow at a rapid speed. Also, with the current economic conditions in mind, it is imperative to develop innovative geospatial products that are cheaper, faster or better.

Influence of mobile technologies

Technology is an enabler that is meant for public welfare, and there is a need to reach the normal man on the street for him to be empowered. The telecom and geospatial sector are both capable of empowering consumers globally and in India. With the rapid growth of the Indian telecom sector, telecom companies are realising the potential for geospatial technology. A lot of these companies have already started leveraging GIS technology to address the telecom industry's challenges, including deploying FTTH, mobile workforce management, and improving network planning and provisioning processes. There is definitely an increased collaboration among the two sectors. It will be interesting to see how this can be taken to the next level of taking geospatial technologies directly to consumers as value-added services (VAS)/ software as a service (SaaS). This will lead to added growth of both the sectors in India.



BVR MOHAN REDDY
CMD, Infotech Enterprises

Industry Outlook 2012

Industry development in 2012

In spite of the global economic uncertainties and turmoil, I am of the view that the recovery will increase globally for the geospatial markets as there will be an increased technology adoption in some of the industries like utilities, telecom, government, infrastructure and public safety. Some of this technology adoption and investments in the geospatial industry will ride on the back of global initiatives around smart grid, broadband roll outs, accurate navigation needs, security and disaster management initiatives and a need to be location-aware by organisations with the objective to serve customers better in order to remain competitive and profitable. The traditional mapping requirements will continue to be there although such requirements will not see much of growth and will have challenges of commoditisation.

However, there will be transformations in the way we have done business traditionally. The advanced economies will look at ways and means to promote local employment to the extent possible at optimal cost. This will lead to the need to develop sustainable onsite / onshore delivery models – global delivery capabilities. There will be an increased demand for improvement in the service delivery levels and transformational outsourcing which offers a clear ROI to the customer. The mantra will be not only to "delight the customer," but also the "customer's customer" either through cost savings and/or improved service, feature levels. There will be an inclination towards new and innovative business models that offer tangible returns and an competitive edge – like outcome-based pricing models or BOT / BOO business models. In short, business proposals will be largely evaluated on the 'value' being offered.

The network industries like utilities and telecoms will have an increased demand for engineering solutions which improve their operations and efficiency of the networks. This also translates into the need to engineer the large amount of network data and content that is essential for improving their network effectiveness. Similarly, other industries that deal with huge amounts of data for their efficiency and business success will need to transform and optimise this data into critical information using effective content engineering solutions. Infotech has been following a clear strategic direction and focus based on these market trends to support core markets through adopting and leveraging skills around Network and Content Engineering solutions.

In case of "Network Engineering", the focus is helping us deliver a broader set of service offerings including Telecom Engineering, OSS, Smart Grid and Meter Data Management services coupled with Infotech's core geospatial and IT competencies. Gas and Electric utilities, and wire line and wireless telecommunication companies are

the primary markets for these services.

The "Content Engineering" business builds on Infotech's success in the government, mining and commercial mapping markets. By leveraging many years of experience in managing large and complex geospatial databases, this business is poised for further growth by offering scale, process and quality excellence that help to transform partial and/or inaccurate data, into value-added content

Upcoming technology trends

The areas that are getting attention and market traction are those which offer solutions using open-source technologies as they offer huge benefits in terms of cost savings in licenses. We will continue to see more and more open-source technologies making inroads. Similarly, mobile solutions is another area that is fast catching up where more and more network-centric industries are adopting solutions around this. Concepts like "Cloud Computing", "Software as a Service" (SaaS) and Mash-up applications are also catching up in the arena of geospatial solutions. The Cloud GIS might provide a widespread acceptance with the growing expertise in developing easy-to-use interfaces and large-scale cloud infrastructure that has the potential to create a compelling value proposition for a wide variety of potential customers.

Another very important technology trend is the evolution of technologies that can automate the conflation of landbase and network data for utilities and telecoms. With the continuous improvement in the mapping technologies, positional accuracy improvement has become a large problem for a number of global network-centric organisations. Infotech has taken a lead to proactively offer a solution to this problem globally through our tested technology, TruShift, that has helped a number of organisations successfully deal with this problem.

Applications/sectors catching up

The application of geospatial technology has expanded across various domains and one can see demand for various kinds of application of this technology. Government and private organisations both invest significantly in infrastructure development and keep looking for ways to optimise returns. Geospatial technology provides the means to keep an accurate track of their assets and infrastructure. Geospatial technology has also proved to be useful in providing efficient governance and there are a large number of government applications that are being used for achieving this. In addition to government, the technology also finds numerous applications for industries like commercial mapping, utilities, telecom, transportation, defence, public safety and so on.

In terms of the domestic market, there will be continued demand for cadastral mapping, urban planning and mapping solutions under some of the flagship programmes funded by the government. Projects related to the various R-APDRP and Fibre rollout programmes will also continue to be there, although there are serious question marks on the sustainability and success of the current R-APDRP geospatial projects under execution. Another activity that is gaining speed is the development of road navigational databases for India and I hope 2012 will see launch of accurate and reliable navigational databases in India.

Impact of economic slowdown

The global economy is growing slowly as a result of which the global technology spending might as well slow down in the year 2012 as concerns over worsening global economic conditions increase. However, this is more relevant in the context of the growth of the advanced economies and the emerging ones might still achieve a decent growth rate.

As of now the global geospatial markets seem to be coming out from the recession towards growth in 2011 and will hopefully grow further in 2012. While the global economic scenario might not be looking very conducive for an overall growth in all the sectors, the growth of geospatial industry and business should be satisfactory. Some of the core consumers of geospatial technologies like the government, internal / external security organisations, utilities, transportation, infrastructure and telecom will continue to invest in geospatial technologies for various reasons ranging from efforts towards cost cutting to increased efficiency to accurate mapping of assets and infrastructure. As per the current indicators, the business forecast for North America, Asia Pacific and India look quite good while there could be some challenges in Europe in wake of the Eurozone crisis.

Influence of mobile technologies

Organisations have realised the potential of extending geospatial applications by leveraging the mobile technologies that help them streamline and synchronise their field operations. Enterprise field solutions have tremendously benefitted network engineering industries like utilities, telecoms and the oil & gas in improving their field productivity, reducing operational cost, improving customer services and reliability. Now most of the Field Force Automation, Field Services Management and Asset Management applications have a mobile component integrated with a geospatial interface that is fast becoming a mainstream focus for enterprises worldwide as they look for the next opportunity to improve services and reduce operational expenses. I see this as a fast emerging opportunity for the geospatial industry.

RAJESH C MATHUR
Vice Chairman, ESRI India

Industry Outlook 2012

Industry development in 2012

Geospatial market has been growing very well for the past couple of years on the back of major national projects like R-APDRP, NLRMP among others. I would expect this trend to continue for the next 2-3 years at least. In the Twelfth Five Year Plan the investment in infrastructure is expected to be around $1 trillion which will give fillip to the geospatial industry. GIS will be one of the enabling technologies for most of the infrastructure projects like transportation, urban development etc. National GIS, NLRMP and other national projects will further fuel demand for geospatial technology and services. However, business from R-APDRP will start tapering off next year.

Upcoming technology trends

Geospatial technology is undergoing a paradigm shift with new platforms emerging for content and service delivery. Web and Cloud are gaining traction for content and services hosting and delivery. Open APIs will enable users to integrate their content through applications to the data available in public domain. On the client side, mobile devices are becoming increasingly popular for accessing data and extracting services. In our country with an installed base of more than 800 million mobile phones, we can leverage it to extend the reach of geospatial technology to users not yet exposed to it. This new pattern of GIS implementation should also lead to emergence of new business models for accessing content and services, for instance subscription-based or per use basis. Another interesting technology trend is Geodesign, the application of geospatial technology in the design process.

Applications/sectors catching up

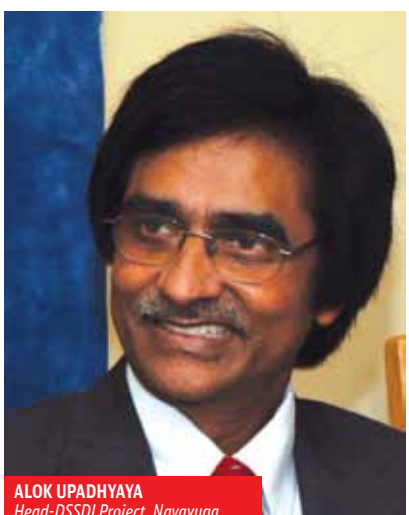
Technological developments will provide solution architects and application developers exciting opportunities to build innovative implementation patterns. For instance, Web and Cloud will be a very powerful platform for government-to-government content and service delivery. It would be highly suitable for building National GIS and State GIS in a federated architecture. Same approach can be adopted for government-to-business scenario as well. As for government-to-citizen, Web/Cloud coupled with mobile clients would be a sound service delivery platform, especially for land records, municipal and other citizen-centric services. Geodesign tools will find application in the AEC domain.

Impact of economic slowdown

Government accounts for more than 50 per cent of the domestic geospatial solutions and services business. Government investments happen in a planned manner and are generally not sensitive to economic downturns. On the other hand, investments in geospatial technology and services form an integral part of large government projects in land records, urban planning, infrastructure, security et al. These are national priorities and should be insulated from economic volatility. However, services business in the international market may be adversely impacted by the economic uncertainties in the Western hemisphere. This should make Indian geospatial services providers to increase their focus on the domestic market which is more stable.

Influence of mobile technologies

Mobile is emerging as a powerful platform for delivery of content and services. In India with an installed base of more than 800 million mobile phones, the application developers have the opportunity to build innovative solutions to leverage this platform. This will help us in providing access to geospatial technology based services like land related transaction processing, municipal services etc. to the remotest parts of the country. It will also help the administrators in assisting farmers in a number of areas including crop planning, storage of agriculture produce and logistics for movement of the produce to the *mandi*.



ALOK UPADHYAYA
Head-DSSDI Project, Navayuga Engineering Company Ltd

Industry Outlook 2012

Industry development in 2012

Over the last few years, geospatial market has witnessed a series of innovations/breakthroughs, driven by the IT sector such as client/server to Web enabled; proprietary to

interoperability; large computational power at decreasing prices; departmental to enterprise solutions; and static to mobile. This paradigm shift is allowing and encouraging new players as significant revenue models have emerged around geospatial content. Year 2012 will see an acceleration of this trend despite recent downtrend and turmoil from which most of the world economies are yet to recover.

Available market research indicates that the geospatial industry continues to grow faster in regions outside of Europe, North America and Asia Pacific. North America which accounts for almost half the industry's annual sales, has enjoyed an 11 per cent compounded annual growth rate for the last eight years, while Asia/Pacific with a 8.7 per cent CAGR leads Europe, a region that grew at a slower 7.9 per cent compound annual rate. Overall, the geospatial industry depends very much on its base markets in North America and in Europe; however, strong growth in Asia/Pacific, particularly in China, India and other emerging economies of the world should help ensure that the industry's growth continues strong into the year 2012.

Upcoming technology trends

Smart Phone Technologies

Growth of smart phone technologies running powerful browsers, support for HTML 5 and JavaScript, and many other features, has changed the landscape of mobile development. Apple's App Store, Google's Android App Store and Windows Phone Marketplace are about to surpass the one million app mark in 2011. Many of these applications have significant geospatial content, a trend that would gather momentum.

Centimetre Positioning In Mobile Environment

Committee on Earth Observation Satellite (CEOS) agencies plan to operate over 200 satellites in next 4-5 years whereby centimetre positioning in a mobile environment may be achievable.

Cloud Computing

Cloud computing will become the predominant means of software service delivery. Open source will become a more significant factor in both software and data accessibility and availability in few years from now.

Unmanned Aerial Vehicles for Data Acquisition (3D models in 30 minutes)

Unmanned aerial drones (UAV) technologies introduce low-cost alternatives to classical data acquisition methods. The UAV-based Pix4D cloud service accepts a stream of related photos from which it generates a 3D model of small areas in as little as 30 minutes. Pix4D took 50,000 photos of its host city – Lausanne, Switzerland – and created the world's highest-resolution 3D model of the city in short time span.

Crowdsourcing

A huge growth in active and passive "crowdsourcing" will offer a tangible benefit to the user sharing their information. Sensing the popular demand, Google has been releasing technologies that are quick, inexpensive, and easy to bring 2D maps/geospatial content/3D citywide maps to a range of mobile devices. This trend would accelerate.

Applications/sectors catching up

Applications catering to smart phones

Growth of smart phone technologies running powerful browsers, support for HTML 5 and JavaScript, and many other features, has changed the landscape of mobile development. Unique challenges are screen size, disparate platforms, different means of interacting with the devices, all these factors mean rethinking your approach to map development. Most of this expansion has been on the Web, and has resulted in some revolutionary new conduits for GIS data. Spatial applications like Google Earth, Bing Maps, Google Maps, Yahoo Maps have inspired a new group of users, traditionally seen as non-GIS, non-CAD users, with the desire to easily browse and understand spatial data – often in real-time. Google has responded by creating releasing technologies that are quick, inexpensive, and easy to bring maps to a range of mobile devices which are likely to service millions of users all across the globe.

SDI for cities

Cities like Paris and New York have a more mature and comprehensive implementation of a megacity SDI, managed by dedicated resources. New York has developed an intranet that could be used to access spatial data held across multiple units. Buenos Aires has invested in providing access to spatial data as part of its public websites, reporting information about aspects of city administration such as land tenure, use, planning, environmental and disaster management information. Norwegian SDI provides a model for an application of spatial data infrastructure enabling citizen participation in policy and decision-making for city management. Government of Delhi has operationalised "Delhi State Spatial Data Infrastructure" effective November 15, 2011 for all line departments to ensure use a common spatial data. Use of SDI to more efficiently manage, access and use spatial information across megacities is at different stages of implementation. Yet most cities have no strategic framework to guide and implement their SDI. This reflects the difficulty of the task to create an SDI within megacities that are organisationally complex and involve a large number of stakeholders with diverse sets of spatial information.

Emergency/disaster management

Emergency responders and government decision-makers require real-time access to relevant and

accurate information in order to exercise their responsibilities. The ability to manage these emergency tasks also depends on the sharing of mission critical data between agencies and across jurisdiction boundaries. While there are significant challenges to achieving data interoperability, multiple efforts are being pursued by Central/federal and local agencies to design and implement advanced information sharing applications. Unmanned aerial vehicles (UAVs) technologies introduce low-cost alternatives to classical data acquisition methods that can be used in high risk situations (natural disaster sites, mountainous and volcanic areas, flood plains, earthquake and desert areas, and scenes of accidents) without endangering human lives and in inaccessible areas.

Impact of economic slowdown

Worldwide sales of GIS/geospatial software, services and data estimated to be $4.4 billion grew at 10.3 per cent in 2010. For 2011, project sales in the GIS/geospatial space are likely to touch $5 billion with an annual growth rate of 8.3 per cent, a decline of about 2 per cent. As Google Earth, Google Maps, Yahoo Maps and consumer navigation systems, such as TomTom, bring awareness about the changing revenue model around GIS/GPS enabled apps, the use and scope of geospatial analyses is likely to grow dramatically.

In the Indian context, the major directional change at this point of time is gradually increasing availability of large-scale maps to government departments for design and engineering applications such as R-APDRP projects. This is encouraging greater use of GPS to survey public assets (urban as well as rural), updation of cadastral maps and development of applications specific to departments concerned. Municipalities are realising the relevance of creating the GIS data base of all building owners with a view to capture tax defaulters and increase the revenues. While the global players are stepping in with readymade applications/ solutions, Indian geospatial industry has the opportunity to develop applications specific to Indian maps/ GIS data to increase productivity, efficiency and revenues of government departments. DSSDI project has opened the possibilities for GNCTD and set the trend for other Indian cities. Recent global downtrend has led to shuffling of resources both at management, production as well as application development/R&D arena. New teams/consortiums/JVs have been formed with a view to offer competent solutions to large value projects. Several foreign players have joined hands with Indian companies into execution of projects which is providing a new play field with tremendous business potential in years to come. Indian Industry is likely to emerge stronger and in better shape than before in 2012.

Imagery usage/application trends

Multi-constellation GNSS launched by India, China, the European Union, Russia, United States and possibly others will mean that over 100 satellites will be available for high accuracy positioning in next 4-5 years. The control of US over high-resolution signals is likely to be withdrawn/ removed. Using signals from these satellites, centimetre positioning will be routinely achievable in a mobile environment in atleast the developed countries.

It is expected that 10-30 m resolution data will be publicly available and free. Sub-metre resolution imagery from satellites will also become available, although for limited commercial use.

The trend started by Google of providing free Web mapping service applications (for non-commercial use), including the Google Earth, Google Maps website, Google Ride Finder, Google Transit, and maps embedded on third-party websites via the Google Maps API are expected to grow. These services offers street maps, a route planner for traveling by foot, car, bike (beta) or public transport and an urban business locator for numerous countries around the world. 3D Model of Venice is already up and loaded on the Google Earth and so are many more cities.

ARUP DASGUPTA
Independent Director
Scanpoint Geomatics Ltd

Industry Outlook 2012

Industry development in 2012

With the ongoing recession I do not perceive any major evolution. Even governments are cutting their expenditure on satellite imagery. I think activities will be maintained at present levels.

Upcoming technology trends

The cloud will dominate as well as mobile apps. Integration of geospatial technologies into mainstream like ERP, BI, Design and e-Gov will continue.

Applications/sectors catching up

As mentioned above, I foresee more of convergence with existing systems. E-governance is a major area of convergence. Given the bleak economic scenario, I think the e-governance activities will dominate.

Impact of economic slowdown

I do not see any major developments. Status quo will be maintained. No new initiatives.

Influence of mobile technologies

LBS is the killer app as it draws volumes in terms of users. Extension of LBS into rural areas and also into key sectors like disaster management, search and rescue, epidemics and pandemics management will be the future. Of course commercial apps like POI finding and routing will be the bread and butter. Information here and now – sums it up.

RAKESH VERMA
Managing Director, MapamyIndia

Industry Outlook 2012

Industry development in 2012

The geospatial market has been growing rapidly over the last few years, and we expect the market to continue growing rapidly in 2012. MapmyIndia itself has seen over 600 per cent growth in the last three years, and we are very bullish about the upcoming year. Consumer adoption of geospatial products and services, such as GPS navigation devices for cars, mobile applications and Web mapping services has grown tremendously as consumers are travelling far more, and are looking to enhance their daily life with such conveniences. Enterprises are adopting geospatial solutions to increase visibility and transparency into the functioning of their organisations, and are using geographical business intelligence to help make better decisions as they look to either enter the Indian market, grow their presence in the Indian market, or increase efficiency in a hyper-competitive marketplace.

Government agencies and organisations are looking to leverage high-quality digital maps and geospatial solutions to substantially improve governance and provide citizens with a more transparent understanding of development issues in their areas. It is an exciting time to be part of the geospatial industry, and see how it is quite literally accelerating India's ascent to the top of the world, powered by strong infrastructure and empowering tools based on digital maps and geospatial technologies.

Upcoming technology trends

We see dynamic, connected, cloud-based technologies significantly enhancing the value of geospatial products and services to consumers, enterprises and government. In the core mapping area, MapmyIndia has already been at the forefront of innovation by launching high-quality, detailed digital maps down to house address level as well as full 3D maps which provide an immersive, augmented reality experience. In the future, we see the availability of live, dynamic information such as real-time traffic conditions on roads, events as well as discounts/deals available at nearby places etc. helping in enhancing the value and benefits of these maps to consumers. For enterprises as well, we see cloud-based geospatial solutions helping them tremendously by enabling them to collect and monitor live information of their sales force, vehicles, distribution network, retail sites etc. across India, analyse it for decision making, and do continuous planning for future business improvement.

Applications/sectors catching up

The leading car manufacturers in India have all already introduced or are in the process of introducing GPS navigation into their product offerings, driven by demand from end consumers on one side, and by the ability to offer much more value-addition in the car with the help of GPS navigation devices in the car. MapmyIndia launched in-dash navi-tainment systems this year, which have been extremely well received in the market, and we are seeing car manufacturers to offer built-in integrated in-dash navigation & entertainment systems in their cars. Telecom operators too are leveraging location-based services and high-quality digital maps both for their value-added services offerings as well as in ensuring their networks can handle the rapidly growing demands of their subscriber base. We see government agencies across the board look to adopt geospatial technologies to enhance governance.

Impact of economic slowdown

The current volatile economic sector has affected consumption across industries, and probably has made consumers and enterprises defer purchasing decisions slightly. But on the whole the outlook in our sector is quite bullish.

Influence of mobile technologies

Mobile technology is influencing the geospatial sector in a good way. Connectivity allows for a whole new level of interaction with devices and solutions to its users, and we are rapidly introducing connectivity into our range of products and solutions to consumers, enterprises and government agencies. MapmyIndia's introduction of CarPad, our connected navigation tablet for the car, and also the launch of MapmyIndia ShowNearby, our location-based places application for Android, iPhone and Blackberry are a few examples of how we are leveraging mobile technology to benefit consumers and move the industry forward.

AMIT KISHORE PRASAD
Founder, MD & CEO,
SatNav Technologies

Industry Outlook 2012

Industry development in 2012

Today the term geospatial market has taken on gigantic proportions because almost every business area incorporates location and spatial information into their products or services in order to offer greater value to their end customers. The year 2012 will continue along the same path, and geospatial technologies will soon become an all-encompassing feature in anything we do.

Upcoming technology trends

Pushing relevant information to a consumer based on his present physical location is going to be the key in the coming days. When he is in the market place, finding him a nearest parking, directing him to the nearest store that has a huge discount running that day or helping him find his loved ones without having to make a call are all going to transform the way products and services are used.

Applications/sectors catching up

We expect mobile applications, especially those with GPS data integrated into them as key components of any app development in future. Sectors such as retail will benefit immensely from targeted marketing which will reduce spend and direct energy as well as money towards only the most potential customer on any given day.

Impact of economic slowdown

The economic scenario both in India and worldwide is quite unpredictable today. Whether it is the price of the dollar or of the consumer confidence to go out and spend more money, everything is going through its periods of ups and downs. The geospatial sector always runs the risk of getting classified as a discretionary spend item, so if companies don't offer immense value for money products, they run the risk of getting sidelined.

Influence of mobile technologies

Mobile technology has achieved only a fraction of its actual potential since most of them still don't use the geospatial angle in their products and services. As the two segments get more closely integrated and GPS becomes a common feature on every mobile in the market, a burst of new products and services will then keep flooding the market at a frantic pace. GST

Bentley solutions bag top honours at Construction Computing Awards 2011

Bentley Systems Incorporated announced that its solutions including GenerativeComponents and STAAD.Pro V8i with Advanced Analysis received top honors at the Construction Computing Awards 2011 (also known as The Hammers). The awards ceremony was held last month at The Hotel Russell, Russell Square, in London. GenerativeComponents was named "Editor's Choice" and STAAD.Pro won in the "Structural Analysis Product of the Year" category. In addition, Bentley was named runner-up in the "Construction Computing Superbrand of 2011" category, and its Bentley Navigator V8i was named runner-up in the "Collaboration Product of the Year" category.

The Construction Computing Awards showcase and acknowledge technology, tools, and solutions for the effective design, construction, maintenance, and modification of commercial buildings, residential and social housing, and civil engineering projects of all sizes. The winners are selected by *Construction Computing* magazine's readership, which includes IT professionals in construction, product, project design and service companies, and a panel of influential industry experts that judge the project categories.

David Chadwick, editor, *CAD User and Construction Computing* – UK, said, "Throughout the year, certain products, projects, and organisations stand out as candidates for the Editor's Choice award, and this year I selected GenerativeComponents. Bentley's unique parametric design software has inspired architecture professionals to design a wide range of building projects in a way that was once thought unimaginable. One example is the Sir Francis Crick Institute – the GBP625 million biomedical research center designed by HOK and PLP Architecture that's being erected behind the British Library in London.

I also congratulate Bentley on winning the 'Structural Analysis Product of the Year' award and being runner-up in two other categories. It's clear that our readers recognise Bentley's contribution to infrastructure technology, and its entire team should be lauded for this well-deserved recognition."