

Guest article: It's about location

Traditionally, geospatial data identifies the geographic location, boundaries and characteristics of natural or constructed features of the earth. Geospatial information serves as information for defense such as targeting, traversing terrain, and mission planning. Civil applications use geographic information as the foundation for route planning and navigation, disaster simulation and response and such critical decisions as where to build a new plant and how to mitigate fire risks. Uses of geospatial data continue to increase as data becomes more accurate and dependable and collection becomes more cost effective. Daratech recently estimated (www.daratech.com/press/releases/2009/091908.html) the GIS / Geospatial market at just over \$5 billion. Software, data, and hardware make up the largest sectors of the market.

Use of geospatial data has historically been the domain by government agencies; now the data is a critical element in the corporate and consumer markets as well. Representative uses of geospatial data and applications include:

- Asset management (roads, bridges, utility infrastructure, etc.)
- Business decisions (business expansion, location analysis and marketing)
- Climate / weather reporting
- Disaster simulation and relief
- Education and school curriculum
- Environmental monitoring and reporting
- Flight simulation
- Land development and planning
- Location-based services (route planning, navigation, emergency response)
- National defense
- Natural resource planning (forestry, mining, energy, agriculture and marine)
- Public safety and security
- Transportation (intelligent transportation systems) - land, sea or air.
- Land planning

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There are many other uses emerging as mapping is rapidly becoming the basis for a new form of social media. The development of Google Earth and Microsoft Virtual Earth and the associated geographic applications for the web has created the development of a new way to organize information and to discover knowledge using geographic location. This is rapidly changing the market and use of geographic information. Geographically organized local information is creating new sources of personal information for navigation, energy use, real estate, and a host of other applications. Software applications are emerging that enable the accelerated growth by a new class of users who are not experts in geographic information and do not have a discipline in the underlying technology to create the data.

New applications emerge daily such as the use of maps to display the funding expenditure information on Recovery.gov (www.recovery.gov), the web interface now in use by the City of San Francisco for energy information. One forecast estimates the five fastest growing applications are land planning, agriculture, public health, oceanography, intelligence gathering.

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To meet growing needs, both software and data are required in quantities not imagined a few years ago. Remote sensing of the earth performed by aerial and satellite based sensors has been increasing at significant rates. Once exclusively owned and operated by the world's premier intelligence agencies, there are now optical satellites carrying high resolution sensors (able to distinguish an object of 1 meter or better). The number of these satellites will easily exceed 15 in the next few years. Radar equipped satellites that are able to image the Earth day and night and in all weather conditions will number up to a dozen within the same time period. Massive amounts of world-wide data from these sources will be available to anyone. According to the Paris-based firm, Euroconsult, global sales are expected to reach \$1 billion in 2009 and then quadruple by 2018. (www.euroconsult-ec.com/news/press-release-33-1.html)

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While the non-government markets have not yet grown to a size to sustain the satellite companies, national priorities in a number of countries provides a funding source to sustain the capital investments required. Many are predicting that the satellite operators will have to move to a model of selling more than just imagery to sustain their operations.

In addition to the satellites, there are hundreds of aerial platforms equipped with the latest technology that are also collecting laser, optical, and radar data of the Earth. Companies like Hexagon, Intergraph, Microsoft and Optech are all selling the latest in sensor technology and developing new technology to capture more and more data about the Earth. The market for aerial based data is also growing rapidly as the cost for this imagery source has decreased significantly over the last few years, due to advances in technology, and the quality has increased significantly. Imagery resolution of 3 inches is now available and being used by municipal governments. Laser based data (LiDAR) can perform elevation measurements of 12 centimeters that allow risk assessments from potential flooding to be more accurately quantified.

With this wealth of data, is also an explosion in software to use all the data. From massive computing systems to personal navigation devices to the cell phone new applications are emerging daily. Companies like Layars (layar.com) are creating augmented reality browsers incorporating geospatial data on the latest phones for:

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- Real estate
- Health care
- Transportation
- Tourism: Places to stay
- Tourism / Tours / Guides
- Leisure and entertainment
- Games
- Weather
- Retail
- University / Schools
- Local search & Directory service
- Social networks & communities

Just as explosive is the growth in 3D and visualization. The SPAR conference, held in Denver this year, was alive with customers, hardware vendors, survey professionals, geotechnology experts, and many others. As in most spatial data market events, one thing was clear. Eye candy rules and 3D data was on display in almost every booth. New software and hardware vendors were out in force. In the near future, a total geospatial solution will be represented and visualized in 3D. Google and Microsoft have brought 3D raster data sets to the masses. However, visualization



for the sake of visualization is not a market. Eye candy is fun to look at, but is not a sustainable sell.

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What was clear at the conference is that integration of technologies is yielding impressive results for customers seeking to change their workflow and deliver results more efficiently. The integration of airborne LIDAR, along with ground and mobile LiDAR, with GPS/RTK and traditional survey creates products that have significant utility across many markets. Where software applications have been developed, there are instant uses such as building design, tax assessment, emergency response, event planning, targeting, offshore construction, oil and gas, transportation infrastructure, automotive and aviation.

Whether you call it actionable intelligence or just more information, data is just data and is of no enhanced value to a customer unless it conforms to standards and is usable. These standards that must exist to ensure customers know what they are buying and have a way to measure quality. The customer community requires applications and data that allows the change of workflows and improves the efficiency of decision making or they are not interested. In addition to the traditional standards and specifications City GML and Building Information Modeling (BIM) standards are now emerging to form specification baselines to eliminate the confusion of deliverable products that now exists in the 3D world.

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All this data is creating huge demands for efficient processing, storage, and distribution as well as advanced information extraction techniques. On the data side, production methodologies have to be developed to efficiently build the required data sets at market prices that are attractive to the customer. The market will increase in size as the applications for use of data increases. There is opportunity for the software providers in the production applications and the end user applications. On the user side, new applications are clearly emerging to take advantage of these rich data sets. Everything from large server applications to iPhone applications are being announced daily. The GIS and CAD communities are changing as the market is changing. GIS software now includes image processing capability while CAD now incorporates new sources of 3D information. The evolution of the market has the potential to blur the distinction of these two technologies going forward. With even more technology in development, we've only seen the beginnings of the use of geospatial information.



SPECIALISTS IN SATELLITE, MEDIA AND TELECOM INVESTMENT BANKING

By John Copple
The Sanborn Map Company, Inc.

Sanborn is the oldest mapping company in the United States and one of the largest mapping and geospatial companies. Mr. Copple has extensive background in the international market and applications for geospatial information. Prior to joining Sanborn, Mr. Copple was Chairman and Chief Executive Officer of Space Imaging, Inc. the first operational satellite imaging company.

Contact: 719-235-1737



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