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## Meeting Global Human Needs with the Geospatial Enterprise

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# Meeting Global Human Needs with the Geospatial Enterprise

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## **All the technology in the world is of no use if it doesn't solve problems.**

Crisis management and recovery work is an important issue in the mapping and geospatial industry, with emphasis placed on real-time access to critical information. World events have mandated the need for a spatial data infrastructure that is readily accessible, from a local to a national level. A crisis situation that results from a natural disaster, such as a hurricane, flood, tsunami, disease epidemic, major fire, earthquake, or a tragedy such as 9/11 is always unfortunate. Though damage may be extensive in these events, some loss and casualties can be avoided if a plan to address the catastrophe is quickly developed and implemented. When lives are at risk and seconds count, instant access to critical information can mean the difference between life and death for one or many. Subsequent decision/support efforts are aided by fast communication and the availability of accurate, up-to-date spatial and situational information.

## **In Times of Crisis**

Accurate, up-to-the-minute weather and traffic conditions for emergency evacuation, predicting the spread of disease, tracking sensitive freight movements, and detailed maps from highly sophisticated digital imagery for homeland security purposes all take advantage of the significant move to open enterprisewide infrastructure.

For example, South Carolina, by virtue of its location on the eastern coast of the United States, has experienced deadly hurricanes through the years. The state's Department of Transportation realized that real-time access to rapidly changing weather, traffic, and road conditions was imperative to critical decision making. Web access to statewide geospatial technology now helps support emergency evacuation decisions. When evacuation routes are congested by traffic or closed because of high winds, emergency management personnel query the system to find alternate routes. At the same time, predicted storm tracks can be overlaid on the route maps to prioritize areas to be evacuated.

Another timely example of the need for open enterprisewide infrastructure is the spread of diseases such as Severe Acute Respiratory Syndrome (SARS), West Nile Virus, and others. These worldwide epidemics have increased the urgency to link health issues and geodata. Identifying the specific areas in which the disease is concentrated, where the first cases were detected, and how many cases have been diagnosed, plays an important role in containing the epidemic and saving lives. China is only one of several countries using geospatial Web technology to profile diseases and assist in critical decisions that have a local and a global impact.

The industry demands reliable, accurate, accessible, and standardized data at its fingertips – whether it is for critical decision making or day-to-day management.

## Everyday Needs for a More Livable World

Each day, spatial information plays a part in making your life easier. Strides in technology have integrated open geospatial solutions into virtually every aspect of daily living. Environmental issues, such as ocean mapping, munitions detection, utility asset management, and archeological data collection and management, take advantage of the ease with which we move from the desktop to the Web to field devices and back to access information.

With today's technology, representatives working in the field are no longer isolated from the enterprise, but have accurate, reliable data at their fingertips. The effort to remove unexploded ordnance from Hawaii's island of Kaho'olawe is a good example of the value of remote access. Along with many natural resources, Kaho'olawe has great historical and cultural significance. Removing abandoned munitions is a major facet of returning the island to its original unspoiled condition, and geospatial technology is instrumental in this project. An easy-to-use online mapping system gives field crews and office personnel instant access to information housed in the main office.

The Austrian utility BEWAG has made geospatial technology a part of the everyday management of its assets to better serve customers. The company's geospatial resource management solution enables BEWAG employees to make live connections to multiple GIS data warehouses simultaneously. Smart tools enable users to capture and edit spatial data, providing data interoperability between departments enterprisewide.

Mapping important archeological finds and managing the results of 40 years worth of work at Masaryk University in Brno, Czech Republic demonstrates the importance of geospatial technology in our past and present. Accessing many different data types is an important issue; therefore, interoperability is a crucial part of the solution's success. Researchers use the university's geospatial data management solution to store, query, and retrieve a variety of data types instantly. They can also spatially correlate relationships between artifacts and their discovery locations, enabling them to better understand how the artifacts were used in daily life or special rituals.

People around the globe enjoy a quality of life made better by something they may know little or nothing about. But geospatial technology makes many lives and jobs a little – or a lot – easier.

## The Power of Open Architecture

Technology trends have seen Web services emerging with the demand for quick access to enterprise data, with interoperability and standards playing an important role in serving up data – regardless of the format. Vendors should no longer worry about standardizing data formats or updating data conversion routines when other vendors change formats. With interoperability, users will not be held captive to proprietary formats and proprietary GIS applications because data servers can access and manipulate data in its native format. Legacy data no longer requires migration, translation, and conversion. The power of open architecture allows users to bypass these functions. Sophisticated n-tier architecture allows organizations to provide a variety of data and access to groups across the enterprise, via an intranet or the Internet. The result is live connections to real-time information – the heartbeat of any successful enterprise.

Interoperability, a word used extensively throughout the geospatial industry, is a growing trend rather than an unconditional reality. Much closer than we were a few years ago, groups and associations such as the Open GIS Consortium (OGC) and the Global Spatial Data Infrastructure (GSDI) organization are still carving out standards-based specifications and

promoting a national data infrastructure in which sharing information is easy and in real time. GML, COM, CORBA, Java, XML, and other technologies have provided increasing degrees of interoperability across platforms.

Extensible Markup Language (XML) has emerged as the standard for the exchange of data between heterogeneous systems, primarily because of its simplicity, which allows users to design ways of describing information, usually for storage, transmission or processing by a program. As a text-based system to encode data, it is completely platform independent. When an application receives an XML file, it also receives descriptions about the data's structure, enabling a program to easily determine how to process the data. This characteristic makes it especially suitable for use on the Web, where cooperation is required between large arrays of dissimilar software components.

The Open GIS Consortium has adopted XML as the means to communicate geographic information within heterogeneous databases and software programs. The fact that XML can be configured by nesting data elements to create a hierarchical data structure is well known. Such a set of tags and nest structures provides a simple structure for communicating geospatial features on the Web and is known as Geographic Markup Language (GML). GML works to provide standardization to GIS and mapping users. It is critical for successful deployment of a variety of emerging markets, such as mobile location-based services and e-commerce.

The GSDI organization works on a global basis to promote common standards and interoperability for data, processes, and systems. Still an undervalued asset, geospatial technology must be merged with information technology so that the two can work together. Removing proprietary barriers and migrating stovepipe solutions are an essential part of the metamorphosis to an interoperable environment. The industry will have to make a solid investment in standards through metadata, data access, data warehousing, data management and storage, data distribution, and application interoperability. This will result in a solid return on investment with the ability to make better decisions, enjoy more choices, increase productivity, and take advantage of easier, less expensive data sharing.

Clearly, it is time to stop thinking about platform, data format, and data type compatibility and begin thinking about how to *integrate* legacy data to build a true enterprise infrastructure within an organization to solve real problems.

To have meaning, technological capabilities must meet human needs – understanding causes of drought and famine, predicting the spread of disease, plotting and identifying land mines with pinpoint accuracy, monitoring homeland security, transporting people to work each day, making sure heat and electricity are available to all, mapping the oceans, and allowing us to respond to natural disasters such as floods and crises like 9/11.

All the geospatial technology in the world is of no use if it doesn't solve day-to-day and critical problems. The geospatial community – public and private sector – must work together to remove any and all barriers to success.