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Open Geospatial Standards for Global Location Services

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Location Services networks and value chains require open standards.

What is the key technology enabler of Location Services? Standards. Like the Internet, the World Wide Web, e-Commerce, and the emerging wireless revolution, Location Services are part of a global communications revolution occurring in conjunction with a computing revolution. Communication means “transmitting or exchanging through a common system of symbols, signs or behavior.” Standardization means “agreeing on a common system.”

The Internet Engineering Task Force (IETF), World Wide Web Consortium (W3C), Open Mobile Alliance (OMA), and the Open Geospatial Consortium (OGC) are the main standards organizations helping competing technology providers and their users reach consensus on the common systems of interfaces, encodings and protocols that underpin the Location Services industry.

The Web opened people's eyes to "Metcalf's Law," which states that the "value" or "power" of a network increases in proportion to the square of the number of nodes on the network. If there are competing standards or if the interfaces and protocols are proprietary, communications are limited and networks are smaller, markets become fragmented and as a result the market or technology never reaches its full potential.

Therefore, in today’s information technology and communications world, instead of trying to "set the standard" with proprietary or de-facto standards, competing companies often work in standards organizations to create industry approved standards. Users also see the benefits of standards, so they fuel this progress by putting forward their interoperability requirements and by buying standards-based products.

Standards organizations coordinate to develop standards for complementary parts of the value chain for location services. IETF manages internet specifications. W3C manages World Wide Web specifications. The Open Mobile Alliance manages specifications for service interoperability across devices, geographies, service providers, operators, and networks. OGC manages specifications that enable systems, components and services to exchange all types of geospatial information and geoprocessing service -- maps, coordinates, route information, coordinate transformation services, etc.

This framework of standards both enlarges and causes diversification and enrichment of Location Services markets. For example, as a large market materializes for "nearby stores and shops" data, if that data is available through open interfaces, multiple providers will enter the market, competing to be the best or creating a novel offering to fill a unique or local niche. Standards result in more offerings and create opportunities for telecommunications companies and for the companies who provide products, services and data to the telecommunications companies. End users get more and better choices in location-based emergency services, location-based shopping information, location-aware games, location-responsive instant-messaging systems, internet based travel advisory and routing systems and other location services. Value chains form because no single company can provide all the pieces.

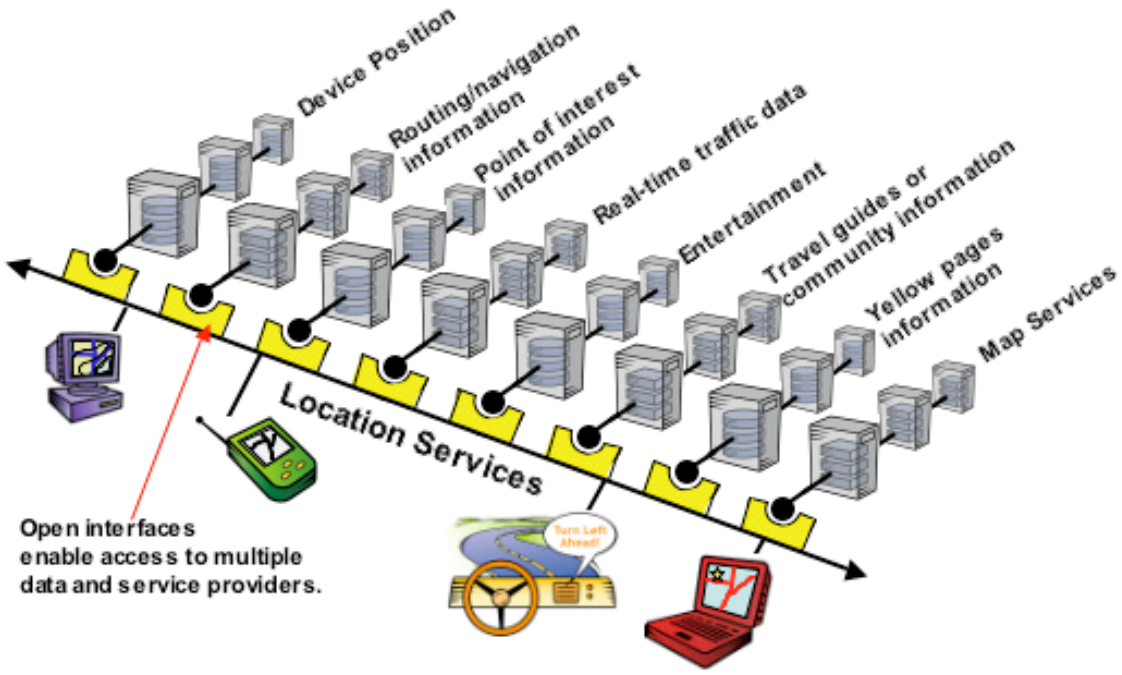

Figure 1: Open interfaces enable access to multiple data and service providers, expanding and enriching the market.

Location Services - a part of the Global Spatial Data Infrastructure

No country can escape the wireless revolution. The benefits drive demand, and, as the number of subscribers grows, economies of scale help device manufacturers and service providers further expand their markets. In the developing world, wireless networks offer an alternative to costly wireline infrastructure, which expands opportunities for location services. Around the world, the proliferation of location aware cell phones, PDAs, laptops and in-car internet devices is evident.

Also noticeable is the global growth, and the weaving together through standards and best practices, of "Spatial Data Infrastructures" (SDIs). The Global Spatial Data Infrastructure (GSDI) is the sum of all the spatial data, geoprocessing systems, standards, practices, knowledge, rules, and training involved in producing and using digital geospatial data. The GSDI Association was created as a forum to promote the worldwide adoption of compatible policies and technical solutions that support relevant standards and specifications. Geographic information systems (GIS), aerial and satellite imaging systems, GPS, cell-based location systems, surveying and mapping systems, RFID chips and readers, databases with sophisticated geospatial capabilities and other technologies all are part of an infrastructure for creation and exchange of location based information. The applications can serve both developed and developing nations.

ISO and others have developed standard "metadata" schemas for describing spatial data sets. Metadata standards, critical for Web-based catalogs that enable registration, discovery, evaluation and use of spatial data, are being implemented by spatial data stewards around the world. OGC's members have developed the interface specifications for such catalogs as well as many of the other technical interoperability specifications that help implement the virtual GSDI. By these efforts, the infrastructure becomes increasingly valuable to more and more people, most of whom will never encounter the acronym, "GSDI".

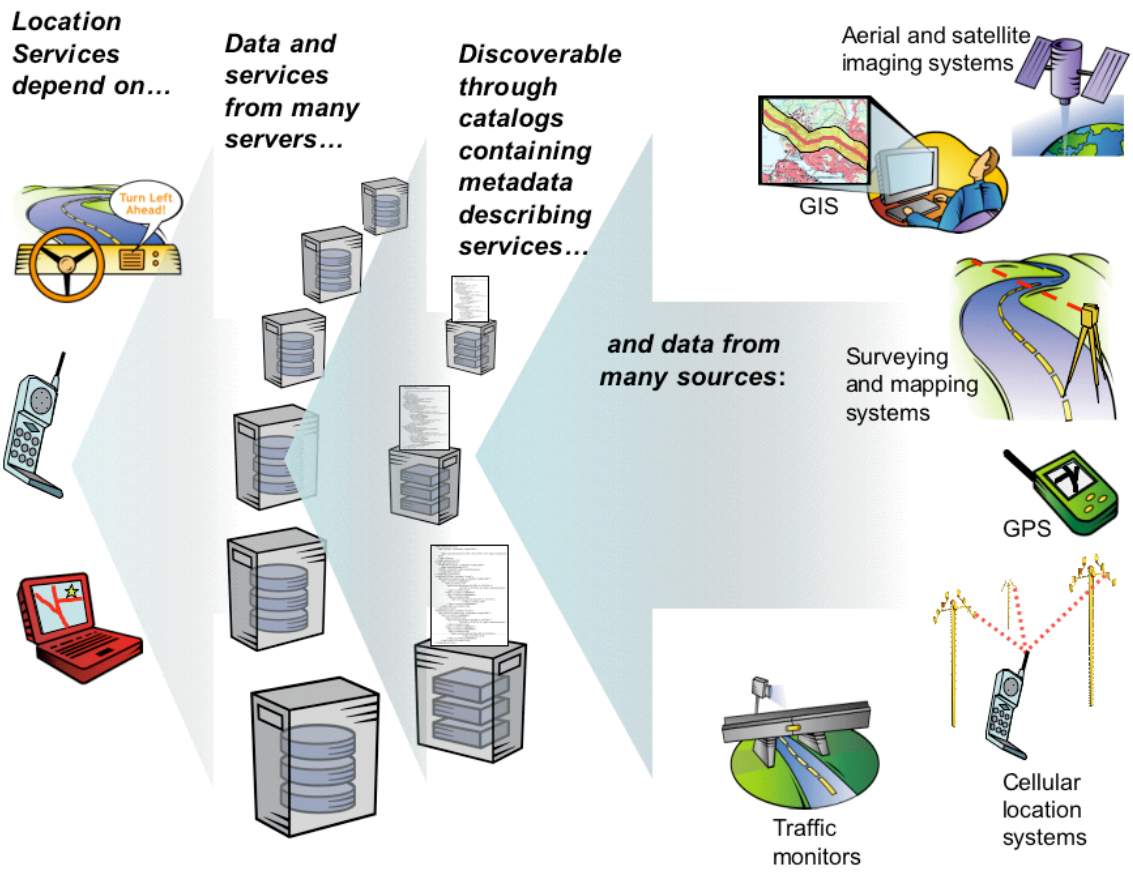

Figure 2: A Spatial Data Infrastructure is a complex and rich set of resources supporting a wide variety of activities, including Location Services.

The growth of SDI is important for Location Services because Location Services depend on information about "where," and "where" information is extraordinarily diverse. For instance, an in-phone GPS can generate coordinates, but these basic data are much more useful if the coordinates can be correlated with information about what's at or near that location. Applications may call for a device's lat/long coordinates and also data such as:

-- street address data in a business yellow pages
-- data describing buried pipelines and wires
-- weather warnings
-- the parts of a wheat field lacking a particular soil nutrient, based on a satellite image
-- calculations of time and distance traveled for a delivery truck
-- locations of fire hydrants
-- bird migration paths
-- data about cell tower signal strength over geographic regions, or wi-fi hot spots
-- 3-dimensional representations of cityscapes
-- a service that calculates best routes based on current traffic congestion
-- a service that calculates cheapest/best routes based on toll/no toll routes

In the developing world, location aware devices and open interfaces promise to support improved data sharing, research, decision making and outreach involving social, economic and environmental topics such as disease management, famine and disaster relief, agricultural production, public works and wildlife management.

Spatial data and services, along with wireless networks and portable devices, are the building blocks for Location Service Applications. Sometimes a street map display is all an application requires. But maps are just visualizations of data. Many location services use the data but don't need to provide a map.

OGC's OpenLS Specification

OGC's OpenLS Specification specifies standard content and structure for key abstract geospatial data types (Route, Route Instructions List, Location, Position, Area of Interest, Point of Interest, Street address, and rendered Map) and for open interfaces for core services that use these. The services include:

- Route determination: Determine route and navigation information between locations.
- Location utility: Geocoder (get X,Y coordinates from street address) and reverse geocoder (get street address, intersection, place name or postal code from X□,□Y coordinates).
- Presentation: Create display information showing map, route, point of interest, and/or route instructions.
- Gateway: Get position of a mobile terminal “from the network”.
- Directory Service: Search for Points of Interest.

Location Service developers have many software products to choose from that implement this standard, such as Autodesk's LocationLogic, ESRI's ArcLocation Solutions, MapInfo's Envinsa location platform, products from Ionic Enterprise and others.

Conclusion: Participate in standards development!

Business, government and consumer applications of Location Services are beginning to reach the market. This progress is driven by internet and device technologies, falling costs, abundant data, and an increasingly coherent set of standards that enable development of value chains at the intersection of the wireless, internet and spatial markets.

Organizations with an interest in Location Services value chains have a stake in open specification development and promotion. Both providers and users of Location Services share an interest in early deployment of services that conform to standards and that meet application requirements. What is the best way to ensure progress and help shape it? Participate in consensus based industry standards consortia and promote the consistent application of best practices that contribute to the evolution of the GSDI.

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