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Title: **Get a Return in Proportion to the Square of Your Investment**

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Calculating return on investment is often a challenge. One way to proceed is to think about how your investment might be leveraged by investments others have made or will make.

For example, countless individuals, companies and governments have made a huge collective investment in the global telecommunications system. When you buy a Web-ready desktop computer, the value of your purchase is leveraged by others' prior (and future) investments in the telecommunications system, including other Web-connected desktop computers and Web servers. Similarly, your purchase contributes to others' returns on their investments.

So what's the return on your investment in software with interfaces that implement OpenGIS® Specifications? In the National Map article in this issue of GeoSpatial Solutions, Ken Boyko of USGS says, “We’ll know we’ve ultimately been successful when agencies and GIS users begin to write their own viewers and applications tapping into the various services we provide. That’s the vision we have for the future.” In other words, your investment is leveraged by the investment the USGS has made in deploying software that provides open interfaces to USGS data and services.

Metcalf's law states that the "value" or "power" of a network increases in proportion to the square of the number of nodes on the network. Nodes on a network communicate through standard interfaces. So it follows that standard interfaces increase the value of existing and future investments in connected information systems. Data, once portable through tedious batch conversion, becomes portable with a click, and the return on investment becomes obvious.

Consider, for example, the case of a watershed association that has a web site but no GIS. Suppose the association wants their site to give visitors one-click views of a dozen different data themes covering the geographic extent of the watershed. It's easy to set up, if those data themes are available from The National Map (see page ___), the state GIS organization, and/or other servers that "expose" interfaces compliant with the OpenGIS Web Map Service Specification. Clicking the "Hydrography" button on the association's Web site sends an http request to a USGS map server. The request includes a few necessary bits of information such as the preferred coordinate reference system and coordinates for the watershed's "bounding box." A hydrography map appears in the browser window. Clicking the "Transportation" button on the watershed association's web site sends a similar http request to the state's GIS server, returning a transportation map that automatically overlays the hydrography map. The user doesn't need to know where to go to get the various maps: The maps' URLs are "hard-wired" into the HTML code of the easy-to-use Web site, so, for this simple application, the user needs no catalog, clearinghouse or previous knowledge about who provides the data.

The map images are presented by the data providers' servers as simple GIF, PNG or JPEG raster images, so the data providers are not giving away data, only views of the

data. Of course, a data provider's Web server could, through an interface compliant with the OpenGIS Web Feature Service Specification, distribute actual vector data to Web visitors (or allow data on the server to be updated by Web visitors). That's a little more difficult to set up, because a client program or service is required that can manipulate such data. But geospatial software vendors have implemented the open interfaces in products that make such Web-based, multi-source distribution and vendor-neutral update possible. These vendors, or integrators familiar with OGC's interface specifications, can also help users set up clients constructed of "services" provided on one or more Web sites.

Clearly, this new paradigm increases the value -- and in many cases reduces the cost of ownership -- of geospatial application and server software. And software purchasers now have more flexibility, because the market is full of choices that are viable, regardless of which software is used by their data sharing partners.

The new openness does bring new urgency to addressing challenges that face producers and users of geodata: pricing and ordering, security, privacy, lineage and certification, liability, freedom of information, intellectual property protection, etc. Organizations, agencies, and companies with a stake in these outcomes are pooling part of their information technology investments, sharing the cost of developing standards-based approaches in OGC. Those who share in the work of extending OGC's interoperability standards realize the greatest returns, through influencing the outcomes, understanding the issues, and networking with other Consortium members.

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