



SDI STANDARDS AND COMPETITIVENESS

IN THIS ARTICLE, OGC'S STEVEN RAMAGE LOOKS AT HOW GOVERNMENT POLICIES TOWARD GEOPROCESSING STANDARDS CAN PROMOTE THE HEALTH OF NATIONAL AND REGIONAL ECONOMIES.



Nations, sometimes as part of multi-nation regions, develop Spatial Data Infrastructures (SDIs) to help agencies address societal issues such as environmental management, disaster preparedness and emergency response. But SDIs also help nations and regions achieve competitiveness in Information and Communication Technology (ICT) markets and in the markets served by ICT.

Why is competitiveness an issue?

Spatial Data Infrastructures require significant investment, and those who back that investment need to justify the investment – and gauge its success – based on a number of factors. Most of the usually stated purposes of an SDI have to do with e-government: improving the ability of citizens, planners, managers and government workers at all levels of government to discover and access geospatially referenced data for decision-making on a daily basis and in the event of disasters. Money and lives are saved through improved operations, and money is also saved through the avoidance of expenditures on redundant data collection efforts.

However, an SDI can also enable the more efficient interaction of corporations, government and citizens in the collaborative and competitive development of the built environment, which includes construction, mining, agriculture and energy production and distribution, and in many other domains such as agriculture, shipping, and telecommunications. SDI thus improves national competitiveness, just as other infrastructures such as railroads, power grids and an educated workforce improve national competitiveness. This is true for both developing and developed nations.

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An increasing percentage of the world's workers are knowledge workers, and an increasing percentage of the value produced in economies is intellectual value. Markets and products, particularly knowledge products, are becoming more global. New media increase the importance of online transactions and online interaction between users and producers. New media and the growing use of Web services also increase the value of data, since the value of data increases when reused by more people. These general ICT trends contribute to the economic value of geospatial data, geospatial Web services and geospatial consulting services. And one must consider the value that ICT brings to other economic activities in terms of:

increased efficiency (doing what was done before by other means, but now doing it faster and cheaper)

increased effectiveness (doing a better job than before), and unexpectedly being able to do new things that were not imagined before.

This is a compelling funding rationale for SDI backers to show to governments, and there are ways of estimating this kind of return on government SDI investments. This article is too short to detail how such return on investment might be calculated. It is sufficient to say that from a government finance point of view, at least two kinds of gain should be considered: geospatially facilitated markets pay off first through

increased taxable revenues and second (through ICT evolution) as a source of new, improved geospatial resources for e-government.

But if national competitiveness is truly a major reason for governments to make SDI investments, should governments' new SDI investments be based on the same thinking that guided previous SDI investments?

The growing importance of technical interoperability standards

What may sometimes be left out of SDI policy discussions are the technical interoperability standards that make Web-based sharing of geospatial data and geoprocessing services possible. The governments of many countries have contributed substantially to the progress of the Open Geospatial Consortium (OGC), International Standards Organization (ISO) Technical Committee (TC)/211 and other organizations in the development of interface and encoding standards that make open, distributed geoprocessing a reality. As a matter of SDI policy, it is important for local and regional jurisdictions to fully embrace these standards as they move to Web-based upgrades to their information infrastructure. At all levels of government, procurement specifications should be explicit in requiring that proposed solutions and components implement OGC-compliant and ISO-compliant interfaces and encodings; this will drive the interoperability issue and help deliver

cost savings, as well as risk reduction.

Technical interoperability standards are not data standards or metadata standards, but standards that enable network-connected devices to find and then ask for and receive (or provide) geospatial data and processing services. These interface and encoding standards enable Service Oriented Architectures (SOA), online information services and publish/discover approaches that serve SDI purposes better than legacy approaches based on data standards and file transfers.

Local and sub-national governments as well as national governments have much to gain from investing in standards-based Web solutions that interoperate between jurisdictions. Much SDI funding has gone into creating nationwide framework data collections and national metadata standards. This has probably been a good investment, but it may be time now to invest in other things. The problems that SDIs help solve are mostly local or sub-national, and it is at the local level that new data is created in response to specific needs. New data is often preferable to old data, and the new standards that enable system-to-system interoperability bring with them new, more flexible approaches to dealing with dissimilar data schemas and diverse data types. A focus on local data follows a trend in government toward place-based solutions, which are more effective in many cases than national "one size fits all" solutions. Place-



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based policies are best served by distributed, not centralized geospatial resources.

The implications for national competitiveness derive from the fact that OGC and ISO technical interoperability standards are well integrated with the standards of the Internet and the Web. Standards-based SDI solutions are not so tightly bound to specific technology solutions. In an open Web-based environment, SDI solutions can mix legacy geospatial, GIS and remote sensing resources with popular map browsers or social networking platforms. SDIs will quite likely benefit in the future from unstructured Web searches as well as catalog searches that depend on metadata standards. Volunteered or "crowd-sourced" geospatial data is becoming important. More databases in which the data are only partially geospatial will become useful as SDI resources. As a result, more entities will be able to profit from government-provided data, portals, and Web services, and more commerce will occur, contributing to national competitiveness.

Interface and encoding standards make application development easier, and standards-based applications can reach larger markets than applications that are bound to proprietary infrastructure. All of these developments and others suggest

that the SDI of tomorrow will be more diffused into the overall national and international information infrastructure and e-government will be a relatively smaller subsector of the expanded SDI sector.

Implications for policy makers

For SDI policy makers, the Web-centered information environment is full of private sector innovations that present new possibilities for SDIs, but also new risks. National – and international – efforts to address the risks will hasten realization of the possibilities.

Most importantly, an informed and cohesive legal and policy framework for spatial data and services is necessary if the private sector is to be able to continue to innovate in applications of GPS, GIS, camera surveillance and sensor networks, and location services. These innovations raise serious questions of privacy, security, geospatial rights management, procurement regulations, and charging for government data. Some of the problems faced by the private sector geospatial community are also faced by NSDI stakeholders.

SDI policy makers should also promote a Web services standards framework that addresses requirements associated with geospatial rights, transactions and access.

The issues are complex because geospatial data products and services are often composed of data from multiple sources, which may have different rights and restrictions associated with them and which are increasingly accessed via chained services from different suppliers. The lack of a rights management framework is becoming an industry bottleneck.

Also, geospatial standards development deserves continued support. Internationally accepted open interface and encoding standards are fundamental parts of the Global SDI that are too important for any vendor to provide alone. Technology users have learned that participation in consensus-based, open membership standards development organizations is a cost-effective way to protect past investments in technology. It also helps them gain predictability that can ensure long-term usefulness of their future investments. The returns are high, partly through the investments they leverage: national and federal agencies influence other government agencies and NGOs, as well as technology companies, to make more significant investments than they otherwise might have made. By injecting requirements into a standards process, an agency or group of agencies can, with little investment, encourage the key market players to develop, test, validate and adopt specifications that promote interoperability that meets specific needs.

From the vendor point of view, and the national competitiveness point of view, standards make application development easier, and standards-based applications can reach larger markets than applications that are bound to proprietary infrastructure.

OGC provides the fastest, least expensive, most effective and most scrupulous way to develop, and ensure market adoption of, the particular geospatial interface and encoding standards that serve SDI stakeholders' needs.

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