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AIDING THE COMMON WEALTH GAMES WITH TECHNOLOGY

LEGAL BLUEPRINT OF INDIAN GEOSPATIAL INDUSTRY

INTERVIEWS
MANIDEEP SAHA
SUSMITA MOHANTY

are we there yet?

Globally, countries have made geospatial technology an integral part of their development process and enjoyed its benefits. Though market surveys claim significant growth in this domain, the question is whether India has made enough headway to make geospatial information and services available to its people. A reality check.

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CONTENTS

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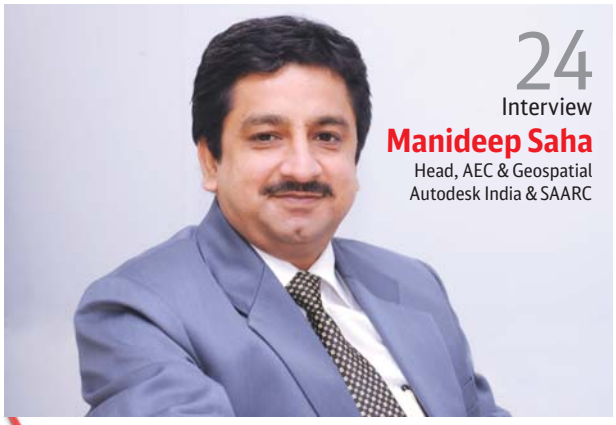

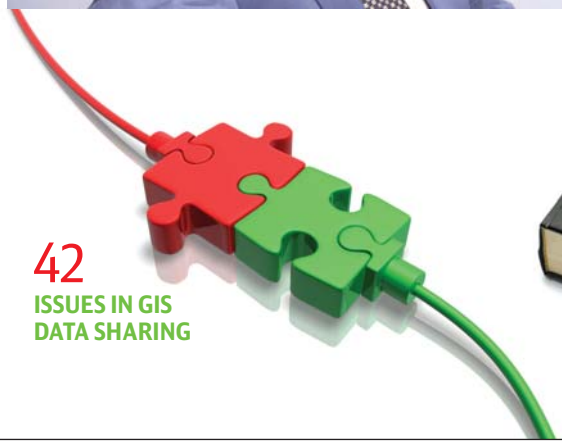

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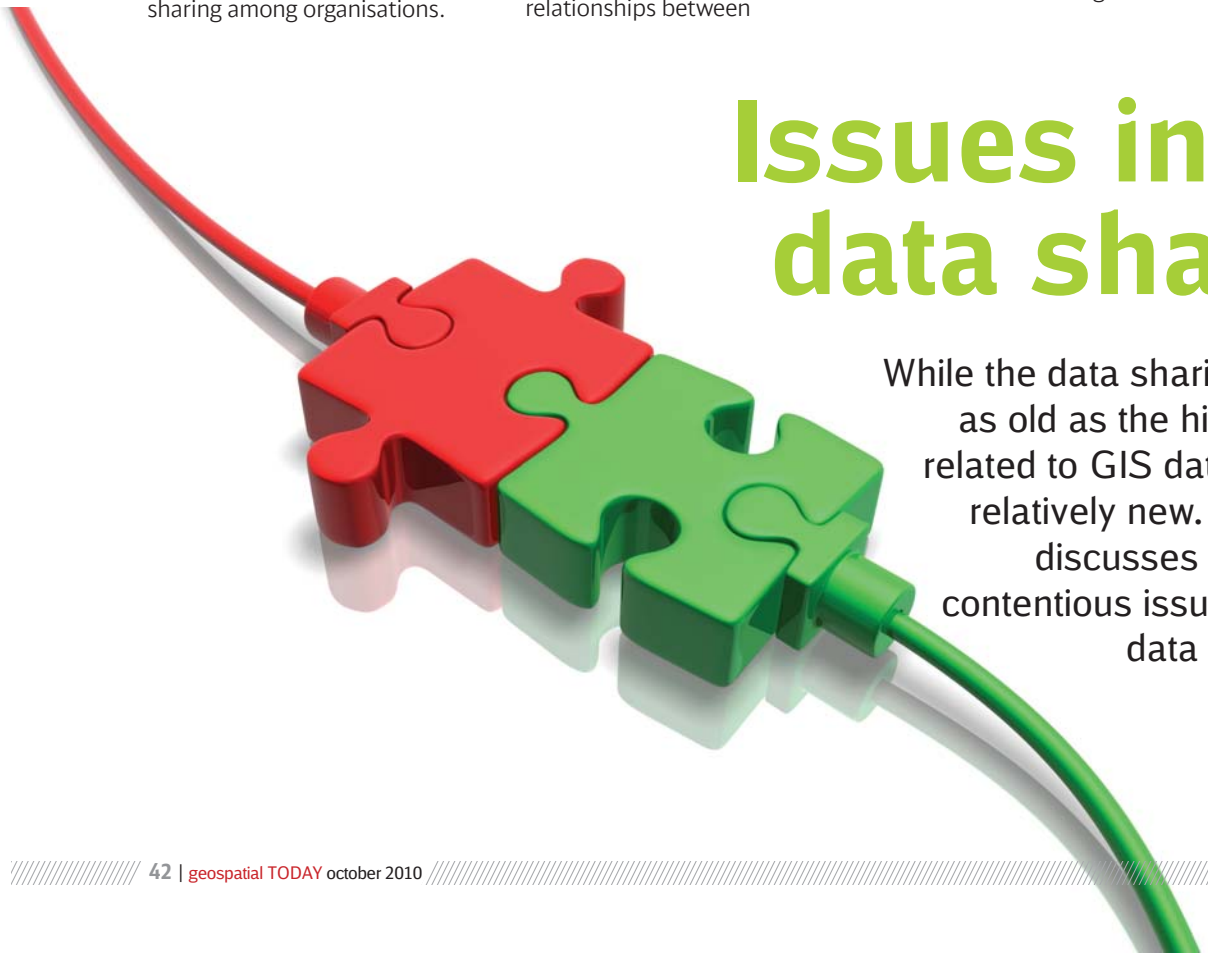
Issues in GIS data sharing

While the data sharing issues are as old as the hills, the issues related to GIS data sharing are relatively new. **Barry Wellar** discusses the nine most contentious issues facing GIS data sharing today



DATA SHARING AMONG organisations has been around "forever", whereas the topic of GIS data sharing is relatively new with its advent in the early 1970s. Further, it is a broad topic, as materials such as the proceedings and Journal of the Urban and Regional Systems Association (URISA) establish, with issues involving GIS data sharing in particular ranging over a number of domains, including political, institutional, legal, financial, commercial, technological, professional, methodological, ideological, and jurisdictional or territorial.

GIS capability entails new or different ways of acquiring, processing, disseminating, and displaying or applying spatial data, these new and different ways of "doing GIS" may themselves be the source of issues that constrain GIS data sharing among organisations.

Issue 1: Silo or enterprise approach to managing GIS data sharing operations

There are state and central governments which are still debating the relative advantages and disadvantages of the silo versus enterprise approach to both the hardware and software aspects of IT in general, including the GIS aspect. While some of that debate is legitimate, it is my opinion that much of it has been to do with power, prestige, and empire building on the parts of individuals and agencies wanting to "run the show."

There is a significant shift across the IT field, which has two implications on GIS data sharing. First, there is an upsurge in attention given to the matter of interdependent infrastructures, and the need to have enterprise-wide data on the state of the relationships between interdependent infrastructures such as transportation, communications and information technology, utilities and energy, safety, water, food, and manufacturing. And second, many of the types of infrastructure are location-oriented, and therefore involve geographic data and geographic information systems.

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As for the enterprise-wide approach, its success depends on active support by top-rank officials at all levels of government.

Issue 2: Charge for data or provide them for free?

The issue of whether public bodies should charge for GIS data or provide it free to organisations such as private corporations, community associations, and public interest groups was initially discussed in the early 1970s and it is still under discussion in some jurisdictions in 2010 as they enter the "GIS Age."

The increasingly popular decision at the municipal and regional levels is to provide GIS data as a free public good and service. The prevailing argument is that the development of the GIS database is paid for by citizens and businesses through their taxes, and there is no good reason to charge.

Issue 3: Data gatekeepers vs. data access facilitators

Some local governments act as though data are an institutional asset to be treated in a guarded manner, and sharing is not at the top of their mindsets. Conversely, some local governments regard facilitating access to public data as a core piece of the service delivery package to citizens and enterprises. While the gatekeeper philosophy may be appropriate in particular circumstances, the crux of this issue is that most GIS data sharing is transactional, and it is likely that relatively few citizens have intimate knowledge of their local government's data portfolios. Consequently, most citizens, and even businesses, have to guess what spatial data might be available, and then search for the appropriate data gatekeeper.

Greg Babinski, Finance & Marketing Manager, King County GIS Center, outlines how King County, Washington is resolving the data gatekeeper/ data access facilitator issue:

"The county government recently enacted legislation mandating development of an open data Web portal and requiring all county agencies to publish data to the portal. Several open data best practices underpin the approach: publish data in an open format; publish data in one place with sufficient information for developers to work with them; and seek input from developers to learn their areas of data interest. King County's Open Data Web Portal will go live by November 1, 2010. It will include substantial GIS data content. More information can be found at: http://www.kingcounty.gov/exec/data.aspx (Note link to Open Data Developers Workshop video)."

Issue 4: Should GIS database design focus solely on agency needs or incorporate requirements of surrounding entities?

For reasons such as exigency/urgency, severe budgetary constraints, and lack of expertise, an argument can be made to focus solely on agency needs. And sometimes, agencies may adopt that posture because they have an "empire unto themselves" attitude. However, the geography that underpins GIS logically calls for designing real-world databases on such principles as interactions and interrelationships with surrounding entities. William Walter, GISP, Florida chapter of URISA, outlines a case situation resolving this issue:

Some local governments act as though data are an institutional asset to be treated in a guarded manner, and sharing is not at the top of their mindsets.

"The airport authority, essentially a small city, developed numerous layers capturing infrastructure information used for maintenance and planning activities. When planning for expansions and development-related activities, GIS information generated by the county is required to evaluate impacts on the surrounding community. Significant data manipulation efforts by the airport GIS Staff were required to match local government data with the airport database. Common GIS database design standards helped eliminate this issue. Once political issues were resolved, the airport authority obtained a copy of the county database design, and imported appropriate spatial information from their existing database into the county design. Now updates to both airport and county databases can be shared through direct transfer of information."

Issue 5: Data sharing agreements vs. informal arrangements

The pluses and minuses to the formal agreement vs. informal arrangement issue go back many decades and cover many kinds of topics, so the elements of the two sides of the issue are not new. What is new where the GIS data sharing issue is concerned, however, are the rapid changes in the ways that geographic data can be generated, analysed, disseminated, displayed and applied, courtesy of advances in GIS technology. And also new are the unknown, unforeseen or unanticipated ways that future GIS data sharing among entities can occur by design as well as by accident.

Cy Smith, Oregon Statewide GIS Coordinator, outlines the Oregon situation and approach to resolving this issue, and refers interested readers to http://gis.oregon.gov for details: "In the past, formalisation was seen as too difficult and legalistic, but several obstacles have presented themselves over the years that virtually require formalised data sharing agreements between organisations.

Local governments in Oregon and elsewhere often want data sharing agreements with state agencies before sharing data sets. They have three primary obstacles they need to resolve or overcome with these agreements: privacy/confidentiality; liability; and funding. We execute a model agreement that indemnifies the locals relative to the privacy and liability issues. We are in the process of collaboratively developing a categorisation matrix that will identify data as being in different categories based on greater or lesser privacy or liability considerations. The agreement language will be modified based on that categorisation."

Issue 6: Outsource GIS data sharing function or locate it in-house?

The outsource/in-house issue involving GIS data commenced in the 1970s and introduced many nuances, but concerns about costs, competency, value-for-money etc. are not new, nor are arguments about building capacity, having control over information, serving the public and not the bottom line etc. This issue is still alive in many situations in 2010 as well.

"Many state and local agencies rely on outside data sharing services, such as those provided by universities and GIS consortiums. While an effective means to share data, these services tend to generalise and modify data for consistency between similar datasets. This makes them a "Go To" resource for general data gathering, as data are pre-formatted for ease of display and analysis. However, in order to provide detailed, up-to-date and complete datasets, organisations should develop in-house data sharing capabilities which allow them to better control the content and currency of the information they are sharing," said William Walter, GISP, Florida chapter of URISA.

Issue 7: Data standards – Critical to successful data sharing or too complex to use?

This issue was part of the Urban Information Systems Inter-Agency Committee (USAC) project in the US during the period 1969-1972. During the intervening 40 years, there have been numerous adoptions and extensions of the original concepts, analyses, recommendations etc. in the US, Canada, Australia, and other countries. However, for many years, only grudging progress was made in adopting and implementing data standards within levels of government and between-level cooperation was often wishful thinking.

Moreover, adding the geographic factor did not galvanise action to achieve data standards, despite the seductive bells and whistles of GIS. A case in point in the US is the work over the past 20

If a GIS capability is technically limited, then its data sharing capability is operationally limited, and all the other issues are largely moot.

years of the Federal Geographic Data Committee (FGDC) in developing data standards for thematic bodies of geospatial data. Many of these standards remained largely under-utilised by the GIS community long after their adoption. Martha Wells, Spatial Focus Inc., indicates why and how things are changing.

"Events of the last 10 years refocussed awareness at the national and state level on the need for comprehensive address data that can be used across jurisdictional boundaries in cases of natural and man-made disasters (e.g. Hurricane Katrina, the 9/11 terrorist acts, and major multi-state wildfires). URISA (www.urisa.org/about/initiatives/addressstandard) undertook the preparation of an Address Data Standard for the FGDC, and this standard is now nearing full adoption. Many jurisdictions – local, state, regional and even federal – have been asking for and using the standard – a reversal of previous experience at FGDC regarding standards development and adoption."

The preceding GIS data sharing issues are political, institutional, legal, financial, ideological, organisational, and jurisdictional or territorial in nature. The remaining two issues involve technical matters, and I underline their importance. Simply put, if a GIS capability is technically limited, then its data sharing capability is operationally limited, and all the other issues are largely moot, which reminds us yet again of the "garbage in-garbage out" adage. I therefore hope the following comments help to promote more sharp-edged public discourse on the technical and operational issues

associated with GIS data sharing. For context purposes, Figure 1 illustrates a situation pertinent to issues 8 and 9.

Issue 8: Use shared data 'as they are' or facilitate data integration – The ontology factor

Mike Sawada, University of Ottawa, was asked to provide a brief 'Ontology 101' note describing the ontology factor as issue and outlining its resolution. "Semantic heterogeneity exists when different geospatial datasets give the same names to different real-world entities or different names to the same entities. For example, national road network data in Canada's GeoBase has 'ramp' defined as 'A system of interconnecting roadways providing for the controlled movement between two or more roadways.' (www.geobase.ca). However, in U.S. TIGER/Line data, a 'ramp' is defined as 'A road that allows controlled access from adjacent roads onto a limited access highway, often in the form of a cloverleaf interchange. These roads are unaddressable.' (http://www.census.gov/geo/www/tiger/tgrshp2009/TGRSHP09AF.pdf).

The question arises as to whether those features represent the same real-world entities. Further, as this example reveals, even when data authorities follow current interoperability standards, problems can arise when making use of the shared data due to inherent semantic heterogeneity in the two datasets. That is, using these datasets in a seamless application requires semantic integration, which involves mapping the concepts at an abstract level prior to integration of features. An explicit, shared vocabulary is necessary to produce such mapping, so organisations which want to share data need to obtain as much metadata as possible in order for semantic integration to take place."

Issue 9: Share data 'as they are' or improve data quality – The geometry factor

Strength of spatial data is that they have qualitative (text), quantitative (numeric), and visualisation (graphic) aspects. We see in issue 8, however, that the qualitative aspect can be problematic. Gordon Plunkett, ESRI Canada, briefly discusses why issues sometimes also arise when it comes to the numerics of GIS data.

"With the rise of data sharing, organisations are finding that their data are technically not suitable for other uses due to data quality issues such as geometric misregistration. Geometric corrections can be accomplished using techniques such as conflation, but this may lead to other data misregistration problems, such as features which have common geometries. For example administrative boundaries often share geometries with roads. When a road is moved the corresponding boundary may not move with the road, thus creating yet another misregistration. The whole conflation process can be expensive and error prone. Organisational managers need to weigh the benefits of making their spatial data correct to GPS accuracies' or leaving data the way they are."

The issues discussed in this article will be further discussed at the 2010 URISA conference in two sessions on "Current GIS Issues/Problems/Opportunities – Possible Solutions and Approaches". Details are available at: urisa.org/conferences/aboutgis-pro. I invite feedback on this article, as well as suggestions of GIS data sharing and other GIS issues that readers want discussed at URISA 2010.

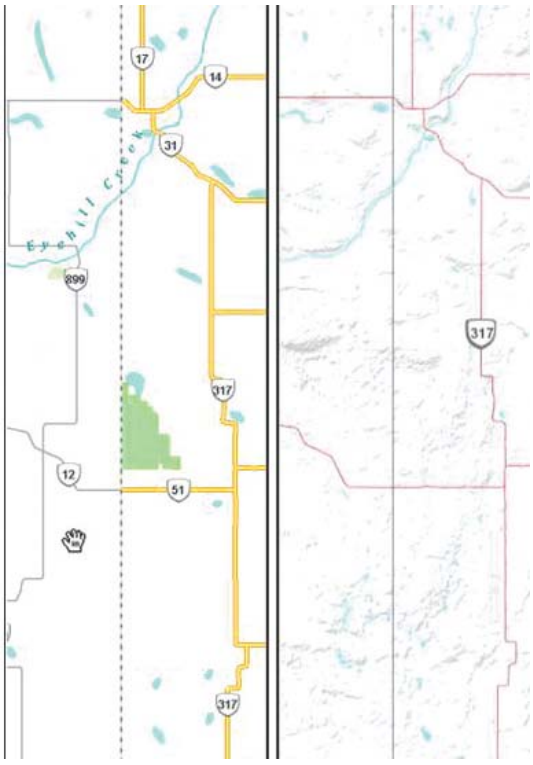

Figure 1: *These maps show the Alberta-Saskatchewan provincial border (dashed line down the center of each map) in Canada. The map on the left shows changes in type of road at the border because the definitions are different, but in reality there is no change in the roads at the border. The map on the right shows the same area with common road ontologies*

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