The Case for a
Minnesota State GIS Enterprise

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Minnesota Governor's Council on Geographic Information
Geospatial Architecture Committee

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The Minnesota Governor's Council on Geographic Information supports the creation of a statewide system for geographic information sharing and business integration, and endorses a design document that describes the framework for such a system.[1] *The Case for a Minnesota State GIS Enterprise* is a companion document that describes the practical benefits of creating the system.

The Problem

Minnesota state agencies are under budget pressure to improve efficiencies. Many analysts look at expenditures on Information Technology (IT) and wonder whether they might be reduced by improving cooperation among state agencies, or with local government business partners. The fundamental question is: *Why should one government agency duplicate a capability that has already been developed somewhere else?*

One typical reason is that individual information systems are often technically difficult to integrate in ways that allow data sharing. The nature of the IT industry virtually ensures that computing resources will be diverse. Even groups that actively seek opportunities to share resources often find the task difficult and expensive.

Another reason is that many managers lack confidence that IT services provided by other government agencies can be relied upon to meet their own mission critical business needs. Independence is much safer than dependency.

In essence, some portion of the state's existing IT investment is currently "locked up" and unavailable to the larger enterprise for lack of a reliable and organized system for sharing information.

It is, therefore, necessary when designing efficient shared systems among government agencies, to be mindful of two key objectives: a) simplifying and reducing the costs of the processes involved and, b) building trust within the network of service providers.

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[1] Minnesota State GIS Enterprise Conceptual Architecture Design,
Minnesota Governor's Council on Geographic Information, 2005
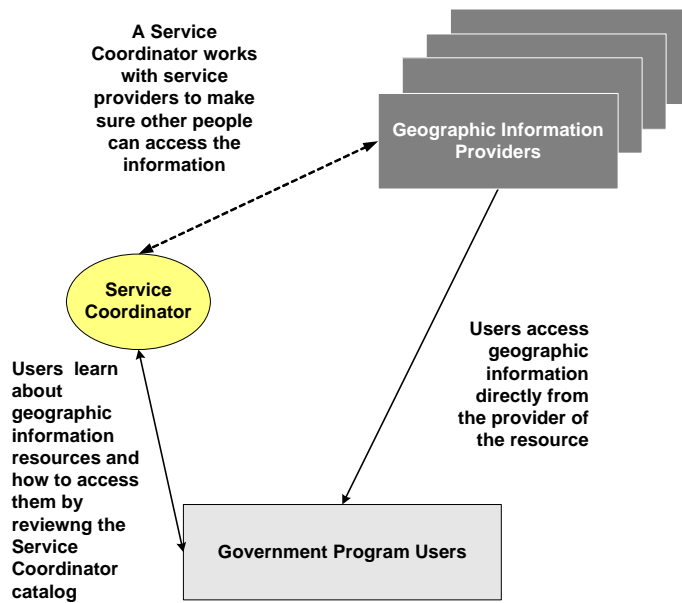(http://www.gis.state.mn.us/pdf/MNGISConceptualArchitectureDesign.pdf)

A Proposed Solution

Any attempt to integrate geographic information technology systems across Minnesota state agencies will require an approach that embraces both technical and administrative challenges. The Governor's Council is proposing a practical solution that builds on our current investments; allowing government agencies to pursue their individual program objectives while challenging them to make contributions of geographic information "resources" to other agencies. These resources will typically take one of two forms: 1) directly sharing data among agencies (including aerial imagery, natural resource data, transportation data, etc.), and 2) sharing software programs that other agencies can use over and over again (for example, a general purpose program that generates a mailing list of everyone living within a certain distance of a user-defined location).

Sharing such resources not only allows developers to capitalize on each other's labor, it also creates a framework for infusing geographic information into traditional business systems; a capability that is enjoying rapid growth in the Information technology industry (examples include, MapQuest address map generation and Google Earth windows).

This type of collaboration is not a radical idea. In fact, the idea of shared computing "services," is a common discussion topic in the IT industry. The typical approach establishes a central group of programmers and system developers that translate information coming from different agencies into standardized formats, allowing other agencies to capitalize on them. This is a fairly labor-intensive proposition with its own cost-benefit opportunities.   The Governor's Council is proposing a more modest approach that requires a much smaller investment, while still having a good chance of succeeding.

The figure below outlines a proposed solution. Unlike the typical approach, which features strong resource centralization, our solution is largely decentralized, with individual contributors assuming more responsibility for the success of the system.

A Service Coordinator works with service providers to make sure other people can access the information

Geographic Information Providers

Service Coordinator

Users access geographic information directly from the provider of the resource

Users learn about geographic information resources and how to access them by reviewng the Service Coordinator catalog

Government Program Users

Minnesota GIS Enterprise Overview

The key lies in the establishment of a "Service Coordinator", which is actually a small business unit with a number of responsibilities. They include:

- Sponsoring the development and maintenance of standards that create a common "language" for presenting, requesting and receiving information between users and information providers. This helps to alleviate the technical problems of integration.
- Maintaining a catalog of resources. This is necessary so that users will know that a resource even exists.
- Working as a sort of "consumer advocate" that monitors and documents the reliability of each geographic information resource. The advocate works to ensure that all system participants are doing their jobs properly. This is important for building trust in the system.

One of the main selling points of this approach is that other government organizations are already using it successfully. The Federal Geographic Data Committee (FGDC) pioneered many of these concepts and established standards that give the Minnesota effort a head start. In fact, several Minnesota agencies contribute to the FGDC national system (including the Land Management Information Center, Metropolitan Council, MN Department of Natural Resources, Arrowhead Regional Development Commission, MN Department of Transportation, and MN Pollution Control Agency). These partners have

instituted a loose data sharing network – the Minnesota Geographic Data Clearinghouse – that implements many FGDC concepts. The Governor's Council proposes to build upon that current infrastructure. The described system is the next evolutionary step in Minnesota's development.

The Minnesota GIS Enterprise approach is also consistent with the strategic direction endorsed by the Minnesota Office of Technology, contributing GIS resources as "shared services" to the broader statewide system.

Benefits of Establishing the System

To be effective, the proposed system must help participants reduce business costs. Unfortunately, simply creating a system that allows business partners to share applications and data does not immediately reduce IT expenses. Rather, a new GIS Enterprise model could be more accurately viewed as an investment in the future where shared costs can be spread across the enterprise and duplication of costly application development and data processing tasks can be avoided. It is also an investment in a new type of business process.

These benefits are best illustrated through an example:

The Department of Transportation (DOT) is reviewing possible locations for a proposed construction project, and must conduct a preliminary study of the corridor. To build or improve a road requires that DOT staff interact with a variety of other agencies to ensure compliance with statutes related to environmental protection, wetlands conservation, endangered or sensitive species, cultural site preservation, surface water management, and other concerns regulated and monitored at the state and federal level.

Currently, transportation planners and engineers need to engage in a time consuming and labor-intensive process of seeking out locally-assigned government contacts, acquiring a diverse set of data from different state and federal agencies, and laboriously processing it into a form they can use. Once the data has been obtained the staff develop maps and reports that have to be individually compiled for review. They also have to maintain copies of other digital data, such as aerial imagery, that are in common use throughout the state.

With an integrated state system, DOT technical staff could create an application that, in "real time" acquires the latest information on:

- *impaired waters and sites of known environmental contamination from Pollution Control Agency;*
- *protected wetland locations and conservation easements from Board of Water and Soil Resources;*
- *protected lakes and watercourses, trout streams, endangered species occurrence, recreation easements, and state-managed natural resource lands from Department of Natural Resources;*
- *known cultural resource locations from the State Archaeologist Office;*
- *aerial imagery centrally hosted at Land Management Information Center.*

The same application could be programmed to request contact information for the appropriate agency-jurisdiction from a central staff directory, and make it readily available to the planners. The environment works in both directions in the sense that DOT information systems also contribute content to the overall enterprise, infusing other state agency business applications with mission-critical transportation data content.

In the first scenario, DOT staff go through a labor-intensive process and afterward file the results, where the information quickly goes out of date and will have to be recreated if the project is delayed. Anyone requesting the same information at other agencies must duplicate this work.

An integrated state system, however, capitalizes on the fact that retrieving environmental-administrative information is repeated *over and over again* in state government business processes. Agencies can realize time-savings and reduce business costs by having the most current data available in forms that can be easily used. They can also take advantage of a powerful framework for public information access, capitalizing on the latest technologies, and again saving valuable staff time by accessing data directly from authoritative sources.

Building the System

Building the system will require: 1) a financial investment and 2) a mandate to create the Service Coordinator capability described above. Ideally, the capability would reside in an existing state agency with some sort of coordination responsibility. For geographic information, the logical choice would be the Land Management Information Center (LMIC) within Minnesota's Department of Administration.

The initial investment would focus on developing standards to support data sharing, and creating a moderately sized database to store information about existing geographic information resources. Some amount of technical coordination would also be needed to

bring together an initial group of collaborators. On-going operational staff support would require only a modest investment, something considerably less than that required to continually recreate capabilities within individual agencies. As the system expands, some additional staff may be required to support the system when justified by positive cost-benefit ratios.

Conclusion

The Governor's Council on Geographic Information feels that Minnesota's State GIS community is ready to embrace a system that helps agencies exchange geographic data and integrate business processes. The desire exists. The proposed system is essential to realizing those aspirations, while operating within the context of the larger enterprise as defined by the Minnesota Office of Enterprise Technology. The system could also be implemented beyond the level of state government. Once in place, it could be extended to include local government and perhaps private sector partners.