

New Models of Collaboration: GIS Coordination in New York State

Ophelia Eglene
Sharon S. Dawes

Center for Technology in Government
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Introduction

Geographic Information Systems (GIS) are powerful tools to understand and solve problems associated with place and geography. GIS spatial analysis and display capacities allow a holistically organized view of a community and its citizens because they provide the ability to overlay and analyze interrelationships among disparate kinds data. GIS is used by local, state, and federal governments, as well as businesses, in a wide range of domains including economic development, environmental management, education, health, public safety, human services, infrastructure management, planning, zoning, real property records management, elections and redistricting, and disaster preparedness and response.

The features and analytical capabilities of GIS technologies continue to improve, while their costs have steadily declined. The most expensive part of a GIS program, however, is the creation of spatial data. Experts estimate that as much as 80% of the cost of any application is attributable to the expenses associated with acquiring and geo-coding information. Unfortunately, the most valuable and beneficial data sets (i.e., those created at the highest spatial resolutions) are the most costly to create and maintain. Therefore, only a relatively small number of government agencies make significant spatial data development investments. Agencies with smaller budgets, especially in local government, are generally the least able to undertake significant investment although they are in great need of spatial data for many service areas.

Since the information needs of different GIS applications overlap and data created by one organization can often be used by others, data sharing can help reduce costs for GIS application development and yield considerable benefits and efficiencies. Partnerships are needed to share in the creation and coordinated use of GIS data sets between governments and private entities at all levels. To achieve this purpose, the State of New York has implemented a NYS GIS Coordination Program, an innovative model for data sharing and partnerships.

I. Underlying Strategic Vision

The founders and advocates of the NYS GIS Coordination Program envisioned a future where existing spatial data sets would be cataloged and described in a comprehensive and standard way; where potential users could easily contact and negotiate with data custodians to re-use their data; where costly but highly beneficial projects to develop new spatial data resources would be undertaken by groups of organizations working together to create a shared asset; where GIS practitioners could readily share their problems, questions, and experiences with one another; and where GIS analyses of many kinds would contribute to improved environmental management, health care, social policy, education, land use planning, and commerce. In the early 1990s, however, New York State lagged behind most other states in term of GIS coordination. Nearly every other state already had a mechanism to support GIS coordination. In 1994, only four states were without a formal or ad-hoc coordinating body. Despite the lack of central coordination, New York State benefited from many geographic data resources, deep pockets of GIS expertise, and a number of localized coordination efforts. The value of these resources needed to be substantially leveraged by a policy-driven coordination effort at the State level. The central issue facing NY was how to organize and sustain a collaborative effort across all levels of government and with the private sector that would take advantage of the analytical power of GIS to improve government services, drive down costs, and stimulate economic development.

II. Program Description

The GIS Coordination Program in New York emerged in 1996 from the convergence of several parallel efforts that had been developing for several years. Historically, New York State had an active community of GIS practitioners and a vast array of geographic data resources, but no formal mechanism to support GIS coordination. There were significant barriers to GIS data sharing in NYS which were identified in a 1995 study by the Center for Technology in Government (CTG):

- **Lack of awareness of existing data sets**

The major barrier to GIS information sharing was the lack of information about data sets held by state and local agencies. Duplicate development of existing data sets which could have been shared was a common practice. At the local level, counties and smaller jurisdictions declined to start GIS projects for lack of funds to create the needed spatial data.

- **Lack of or inadequate metadata**

Being aware of the existence of data sets is irrelevant without descriptive metadata. Indeed, for a user to determine the suitability of a

particular data set for a particular purpose, specific information about its characteristics is necessary. This kind of "information about information" was seldom compiled.

- **Lack of uniform policies on access, cost recovery, revenue generation, and pricing**

The absence of clear statewide policies on data dissemination was a major problem in NYS. It resulted in great inconsistency in the way agencies dealt with dissemination of their data. Some offered open public access, others provided data sets at a premium price, at cost, or free of charge depending on the requester.

- **Lack of uniform policies on data ownership, maintenance and liability**

Ownership of transferred data was another problem. When one agency obtains a data set from another agency and modifies it, thereby adding value to it, the ownership of the new data set becomes ambiguous. Consequently, liability issues become more complex. Since New York State had no clear policies on this question, many agencies were reluctant to share their data freely.

- **Lack of incentives, tools, and guidelines for sharing**

While there were clear costs and possible liabilities associated with data sharing, New York offered no tangible incentives such as enhanced funding or helpful tools such as model data sharing agreements to encourage agencies to make their data available for use by others.

- **Absence of state-level leadership**

Each state agency and local government involved in GIS use acted independently of the others. Coordinated action could take place only on the margins when a few organizations saw cooperation as a means to reach their individual goals. The lack of statewide leadership also prevented New York from participating in and influencing a national movement to create a spatial data infrastructure. This situation put New York State at a competitive disadvantage with other states.

To demonstrate some possibilities for addressing these problems, the CTG Project, in cooperation with many state and local agencies, produced an Internet-based prototype spatial data clearinghouse that contained a metadata repository and search capability. The same year, the State Archives and Records Administration (SARA) entered into a contract with the National Center for Geographic Information and Analysis at the State University of New York at Buffalo and the Erie County Water Authority to assist in improving records management practices for GIS in local government. This project developed procedures and guidelines to assist local governments in planning their GIS activities.

In a parallel development, the State Legislature, persuaded by a series of studies and recommendations dating back to the 1980s, enacted Chapter 564 of the Laws of 1994 establishing a temporary state GIS coordinating council. This temporary council was charged with reporting to the Governor and the Legislature recommendations for improved coordination of GIS in New York State. The Council, comprising 57 members named by 28 separate appointing authorities, was chaired by the NYS Division of the Budget. It began its deliberations in the fall of 1995 and, drawing upon both the CTG and SARA projects in addition to the expertise of its members, made its recommendations in March 1996. The Council's highest priority recommendations included these: create a permanent GIS coordinating body with specific goals, duties and structure; establish a clearinghouse for spatial information; enact license agreement authority for local and state government; amend the Freedom of Information Law (FOIL) to authorize local and State agencies to set fees for commercial use of GIS data and to use those fees to defray GIS costs and expand public access to GIS information; limit liability for spatial data providers.

Another concurrent development was the creation of the Governor's Task Force on Information Resource Management, New York's first central information technology agency, launched in January 1996 and charged with a policy-making and coordination role for all information resources in State government. The Task Force was subsequently created in law as the NYS Office for Technology (OFT). The Task Force requested that a Statewide GIS Coordination Plan be produced based on the conclusions of the Temporary Council Report. A Special Purpose Subcommittee on GIS, chaired by the Office of Real Property Services (ORPS), led the establishment of a statewide integrated GIS initiative. To ensure that the plan represented the interests of all major GIS stakeholders, an advisory group was created comprising federal, state and local organizations as well as the private and academic sectors. The Subcommittee delivered the Statewide GIS Coordination Plan in May 1996. It recommended that a GIS Coordinating Body be created as a standing subcommittee of the Task Force to set policy on GIS data sharing in NYS and that a spatial metadata and informational clearinghouse be established at the State Library, based on the prototype developed by CTG.

III. Changes introduced in the service system

The first statewide policy on GIS was issued in September 1996. Technology Policy 96-18 established a framework for the development of a statewide GIS Program and created a broadly representative GIS Coordinating Body drawn from state and local government and the private sector. Working Groups and Advisory Committees were initiated to focus sustained attention on such issues as data sharing, education, communication, and private sector concerns. The Coordinating Body sponsored several initiatives designed to put the policy into action.

- **Data Sharing Cooperative**

The Data Coordination Working Group of the Coordinating Body developed an overall Data Sharing Policy for GIS which has been issued as Technology Policy 97-6. This policy directs that a NYS GIS Data Sharing Cooperative be established in order to provide an organized mechanism to share GIS data easily. It further directs that all NYS agencies join the Cooperative by signing the *NYS GIS*

Cooperative Data Sharing Agreement, created by the Legal Working Group. Through the Cooperative, public agencies gain access to GIS data of all the members at virtually no cost. Agencies do not need to own data to join the Cooperative; however, as Cooperative members, they are obligated to contribute corrections and enhancements that they make to any data set obtained through the cooperative. State agencies signed the Data Sharing Agreement beginning October 1997. A comparable data sharing agreement for local governments and not-for-profit organizations was released in February 1998 and all local governments were invited to join. Agreements with several federal government agencies have also been signed. Data sharing agreements between public agencies and consultants are currently under development.

- **Designation of Primary GIS Data Custodians**

The Data Sharing Agreement defines two levels of custodianship. A Primary Custodian is a member agency which developed or owns a data set made available for sharing. A Secondary Custodian is a member of the Cooperative in possession of data acquired from a Primary Custodian. Each data set has only one Primary Custodian designated by the Coordinating Body. The designated agencies are responsible for the maintenance of these data sets as well as their distribution to other agencies needing to use them. The intent is to eliminate duplication of GIS data sets across agencies.

- **GIS Clearinghouse**

The NYS GIS Clearinghouse was created and established on the World Wide Web (<http://gis.ny.gov>) by the New York State Library. It includes a metadata repository describing GIS data sets held by many different organizations as well as information about how to obtain the data. It also has extensive information about New York's GIS Data Sharing Coordination Program, information on and links to GIS education and training opportunities, other state and federal GIS resources, GIS user groups throughout New York, and GIS-related listservs. In addition, members of the Cooperative can have direct access to selected data sets from the Department of Transportation (DOT), the Office of Real Property Services (ORPS) and the Adirondack Park Agency (APA). Recently, Cornell University created a linked companion data repository to house information from a variety of agencies too small to set up their own repositories. In addition, work is currently underway to make data from the Department of Environmental Conservation (DEC) available electronically.

- **Metadata Repository**

The Metadata Repository, a key feature of the Clearinghouse, was created to allow producers of geographic data to describe the data sets they have available so that potential users can identify existing data before they attempt to create new data sets. Data producers describe their data sets using the Federal Geographic Data Committee Standard for Digital Geospatial Metadata. It includes information about who produced the data, the geographic area covered, the data set category or theme, scale, accuracy information, and how to obtain the data sets. Users access metadata by doing a search online. A list of data sets is returned as the result of a search and the complete metadata record for each of these data sets can be viewed to determine the relevance of the data to the user's need. Users can then contact the data owners to obtain the data they want.

IV. Collaborators and their roles

While any individual or organization can become involved in the larger GIS Coordination Program working groups and make use of the public resources available from the Clearinghouse, certain privileges are extended to signed members of the GIS Data Sharing Cooperative.

Government and nonprofit organizations (such as universities) may become members of the Data Sharing Cooperative. Members of the Cooperative are required to list the data sets they own on the Clearinghouse inventory, and create metadata for these data sets and put it in the metadata repository of the Clearinghouse for members to search and view. They are also expected to contribute to the maintenance of the Cooperative's data sets by returning corrections and enhancements to the Primary Custodians, whenever they use data provided by another member.

Commercial businesses interested in GIS comprise a wide array of organizations offering GIS-related services including consulting, database development, training, and application development; organizations offering GIS products for sale such as software, hardware and data; and direct or indirect end-user organizations such as engineering and construction firms. These organizations may not formally join the cooperative, but they are likely to benefit from it in several ways. The Clearinghouse and Cooperative organize and describe GIS data sets for the benefit of all potential users. They also foster promotion, communication, and enforcement of standards related to the development and use of GIS software and data as well as improvement of communications and coordination regarding GIS activities in the State. Having so many different interests in the coordination of GIS activity in NYS, the private sector is represented in a specialized private sector advisory group and private companies are involved in the finance, data sharing, and legal work groups.

Three kinds of leadership are at work in the GIS Coordination program: state level leadership of the entire enterprise and its philosophy of data sharing and cooperation; agency level leadership in the active adoption of the cooperative and its goals; and leadership of individual experts who were chosen to sit on the Coordinating Body and chair the Working Groups and Advisory Committees.

State-level leadership, provided by the Project Director at the NYS Office for Technology (OFT), gives guidance and direction to all government agencies involved in GIS activities. OFT is organizationally located in the Office of the Governor and was established to coordinate NYS information policies and resources. OFT successfully provided the state-level leadership necessary to implement the GIS Data Sharing Cooperative by designating a leader who acted as a steadfast champion for the cause of cooperation. By pursuing a strategy of incremental gains, practical goals with challenging deadlines, and wide consultation within the GIS community, a great deal has been accomplished in a

short time. It is important to understand, as well, that OFT is a new agency linked to the Governor. As such, it has no "history" to overcome, and state agencies, local governments, and private businesses alike perceive the GIS initiative to have the commitment of the State's top elected leader.

A second source of leadership was necessary to convince agencies to become active in the coordination effort and to join the formal data sharing cooperative. This leadership came from several state agencies who are the acknowledged leaders in the use of GIS: the Departments of Transportation and Environmental Conservation (DOT and DEC), and the Office of Real Property Services (ORPS). Many other state agencies waited to see how these GIS leaders demonstrate commitment before they would join. DOT, in particular, was a critical player as it had a historical policy and practice of selling its GIS data, even to other government agencies. New leadership within DOT became committed to the cooperative program and put its key data sets on the Clearinghouse for the free use of all Cooperative members. DOT also led the effort to create and advocate for the Data Sharing Agreements. ORPS engaged with DOT in a successful experiment in making data from both agencies available over the Internet. DEC, an early advocate of data sharing, is among the first agencies to develop complete metadata for its data holdings and to encourage their use. While many other agencies advocated for cooperation, and actively contributed to the effort, these three agencies provided essential leadership and credibility for the project.

Finally, individual leadership was required at all levels represented in the Cooperative. In order to address concerns of all parties having an interest in the GIS data sharing effort, the Coordinating Body appointed three advisory groups representing local government, state government, and the private sector. In addition, seven working groups were created to reflect upon, make recommendations, and develop sharable resources in the following areas: the clearinghouse, communications, data coordination, education, finance, legal issues, and standards. Each sector and level of government is represented in these groups. In order to provide strong leadership, the GIS Coordinating Body appointed recognized and respected experts as leaders of the advisory and working groups.

V. Problems encountered and solutions tried during development

• The Freedom of Information

A major concern of local governments, which prevents some from joining the Cooperative, is directly tied to the State's Freedom of Information Law (FOIL). FOIL was originally developed to guarantee citizen access to public records as a means of improving government accountability. However, it does not distinguish between information requested for accountability purposes and information requested for commercial purposes. Thus, new businesses addressing the "information age" market can acquire GIS data sets from public agencies through FOIL, then repackage and sell them at a profit, even to other public agencies. Some government agencies are therefore strongly opposed to advertising the availability of their costly data sets on the Clearinghouse, fearing commercial entities will obtain and profit from them without cost through FOIL.

In order to solve this long-standing problem, the Temporary GIS Council recommended that the Freedom of Information Law be amended to allow local governments and state agencies to charge fees for data to be used for commercial purposes. The proposed amendment to FOIL would allow the licensing of geographic information system records and enable primary custodians to license a GIS record prescribing the conditions under which the recipient of the record may use, distribute, duplicate, sell or resell it. It would also allow local governments and state agencies to charge a reasonable fee, not to exceed the fair market value of the record, when commercial use is intended. The revenue gained through these fees is expected to help local governments and state agencies defray the costs of GIS development and maintenance, as well as provide for expanded and enhanced public access to government information. This amendment is very controversial and has not yet been enacted. There is serious opposition by the private sector and one private sector advisory group member developed an online forum to discuss and debate the proposed amendments.

• Bureaucracy/local authorities barriers

Local participation in the data sharing cooperative has been slowed by local bureaucracies and legal authorities which must understand and approve the agreements. Many times the GIS user is very enthusiastic about the cooperative but the legal department or other administrative unit, which has not been involved in the development of the cooperative concept, needs considerable time to become familiar with the idea and to review the agreement. Ironically, some express skepticism because there is no cost to participants and they fear hidden costs lie under the surface. In order to overcome these barriers, OFT designed an agreement which is very user-oriented, with no cost and low risk to join, and an easy termination clause for those who may wish to withdraw.

• Reluctance to invest for the common good

Some state agencies saw little direct value in investing in "the common good" rather than in agency-specific benefits. In order to overcome unwillingness, the Coordinating Body designed multi-agency workgroups with leaders who pushed the participants to recognize their own self-interest was actually served by the "greater good." Leadership exercised by DOT, ORPS and DEC encourage other agencies to join the cooperative. Finally, the Coordinating Body did not make a fixed policy about the most decisive issue, selling data. The proposed FOIL amendments allow, but do not require, fees. Thus, state agencies can continue to choose a public release strategy which works best for them individually. Agencies can release their data without charge, charge all requesters (within the limits of the current FOIL), or release data freely within the Cooperative and charge users outside the Cooperative.

• A decrease in volunteerism

Volunteerism and enthusiasm, which were very strong in the first year, declined as the program became more formally established. Participants relied more and more on the OFT Project Director and the State Library staff who had proved very knowledgeable and

reliable. As these staff members became more comfortable with doing things directly, they began to accept more of the responsibilities that had formerly been on the agendas of the working groups. While the data coordination group continues to be very active, most working groups were not able to sustain their initial enthusiasm and some have become dormant after their initial charges were satisfied. As a result, the very small staff is becoming overloaded with some tasks.

Participation from the private sector is still embryonic and it will likely take some time before private organizations have a major role to play. As the private sector is composed of very diverse entities, it is difficult to find the right mix and level of participation and focus. The private sector advisory group has not been very active in the past year and met only once. (By contrast, the local advisory group calls itself into session and has sustained a high level of interest and activity).

In order to re-ignite enthusiasm and volunteerism, the Coordinating Body and staff are targeting a few initiatives that are likely to raise issues or generate resources that will get participants excited and involved. A lively debate around the FOIL issue is one likely topic for engaging people in an active way. Projects that showcase the value of mainstream GIS applications are also good candidates. Emergency management applications may be a subject to organize around since the cooperative use of GIS data and applications during the 1998 ice storm disaster demonstrated the value of GIS to top level decision makers. Another project that focuses on practical applications for economic development seems promising, as does a statewide initiative to develop a digital ortho photo program.

VI. Results to date

The NYS GIS Data Coordination Program is clearly a success, although some of its goals have yet to be fully achieved and challenges still lie ahead. Its focus, philosophy, and practical results reflect widespread participation by local governments, state agencies, and the private sector. More than one hundred individuals have volunteered their time, effort, and knowledge to this initiative. The Data Sharing Cooperative currently comprises more than 100 members and has a membership goal of 125 by 1999. New York State's program in GIS Data Sharing has been widely recognized as successful and innovative. The New York State GIS Clearinghouse has been selected by the Urban and Regional Information Systems Association (URISA) to receive the 1998 Exemplary Systems in Government Award in the National Spatial Data Infrastructure-Data Partnerships Category. (The predecessor prototype clearinghouse was honored for excellence in intergovernmental applications in 1996 by the National Association of State Information Resource Executives.) The Federal Geographic Data Committee (FGDC), the US national GIS coordination program, has formally recognized the NYS Coordinating Body and the Statewide GIS Program as a partner in the effort to create a national spatial data infrastructure.

The Program received a grant from FGDC to assist in the development of metadata for the Clearinghouse. It includes funds for training and technical assistance for state and local government staff on the creation of metadata. Finally, a member of the NYS GIS Coordinating Body, from DOT, has recently been elected to the National States Geographic Information Council (NSGIC) Board of Directors. It is the first time the State of New York will have a voice at the Council.

VII. Costs

The costs of the GIS Cooperative Program are minimal in terms of dollars and dedicated human resources. The equivalent of two full time employees are devoted to the Clearinghouse. In addition, the Project Director at OFT dedicates 50% of his time, supported by 50% of an additional staff member. There is also the equivalent of about six full time employees spread across the organizations participating in the Coordinating Body, Advisory Committees, and Work Groups. In addition, individual participants contribute bursts of effort at various times as issues they are concerned with come to the forefront. For example, people involved in the legal group gave many days of service in the development of the FOIL proposal, and members of the data coordination work group have invested extraordinary effort in the development of the Data Sharing Cooperative.

The technology costs are also minor. In order to establish the GIS Clearinghouse, a server and software already owned by the Library were reused. Disk space was borrowed or bought and some low-cost web tools were purchased.

VIII. Benefits

The GIS Data Sharing Coordination Program was designed to overcome barriers to GIS information sharing and provide a wide array of benefits to participants, as follows:

- **Catalog of existing data sets**

It is becoming increasingly easy for government agencies, citizens, and commercial entities to determine what GIS data sets are available and who is the primary custodian by visiting the Metadata Repository on the GIS Clearinghouse. The Coordinating Body has set goals for 1999 to develop and post metadata for 50% of all state agencies and 25% of all local governments. The GIS Clearinghouse allows easy searching for data sets of interest, thereby minimizing missed opportunities to use existing data sets.

- **Clarity about data ownership**

Each data set has a designated Primary Custodian, the agency which originated the data and remains responsible for its quality.

- **Improved data quality**

As use of Cooperative members' data sets increases, users are passing updates, corrections, and revisions back to the Primary Custodians. The result is increasing data quality. All cooperative members, as well as the public and private sector users of the data,

benefit from these improvements in data quality.

- **Standards and consistent practices**

The use of a standardized data sharing agreement makes the rules for sharing within the Cooperative consistent. All members of the Cooperative also agree to comply over time with standards for metadata, data exchange formats, and other characteristics.

- **Savings**

Cooperative members have access to all other members' data sets at no cost. Therefore, duplication of effort and investment in creating data sets already available from other agencies are minimized.

- **Community building**

The Coordination Program and the Clearinghouse encourage members of the GIS community to share information about their projects, education programs, conferences, and experiences. The Work Groups and Committees provide a venue for long-lasting professional relationships built around common interests and mutual goals.

- **National presence**

The emergence of the NYS GIS Coordination Program has made it possible for New York to participate actively in national efforts to create and promote a national spatial data infrastructure. It has allowed New York to apply for and receive federal funds to enhance the program and created opportunities to work with and learn from other states on issues of mutual concern.

IX. Remaining Questions

The problems described in Section V above continue to need attention and the strategies currently employed seem well suited to their eventual solution. Time will tell how effectively they work. There are, however, two important questions, one long-standing and one recently emerged, that need to be tackled in the coming months and years.

- **Making a business case for GIS investments**

For the most part, the cost-benefit of sharing existing spatial data is easy to make and understand. It is not difficult to show how the re-use of existing data saves time and money that would otherwise be spent to acquire and prepare new data for GIS applications. This case, however, presumes that the initial decision to invest in GIS applications has already been made. In many instances this is correct, but in many others the first decision to employ GIS requires a business case that shows how GIS applications contribute to the effectiveness, timeliness, or economy of some other governmental or business activity. The same case needs to be made in order to engage in any major spatial data development projects to create data that does not already exist. This is a difficult challenge that neither the New York Coordination Program, nor other governmental programs, nor academic researchers have been able to meet satisfactorily. The costs are readily apparent. But, since so much of the benefit of GIS applications flows from the ability to do new things, there is seldom a set of baseline data from which to measure improvement. This issue will continue to be a challenge to engaging new partners and developing new spatial data resources.

- **Making the transition from a mostly volunteer effort to a formal program**

The New York Program has largely satisfied pent up demand for a formally endorsed and supported GIS Coordination mechanism. Since it is no longer a "cause" for many, it is more difficult to sustain the volunteer effort that helped define and launch it. Since it works well, most participants have come to regard it as a traditional program that needs its own organizational home, staff, and other resources. It needs continuing leadership and enough staff to "hold the center" of the collaboration among many players whose primary objective is not collaboration itself, but the work of their own organizations that the collaboration facilitates. Relationships still need to be forged, especially with the private sector and additional local governments, and these take a considerable amount of one-on-one personal contact and follow up by staff who are dedicated to nurturing and supporting the collaboration.

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[Top of page](#)

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