

GEOGRAPHICAL INFORMATION SYSTEMS POLICIES AND PROGRAMS

HEARING

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT MANAGEMENT,
INFORMATION, AND TECHNOLOGY

OF THE

COMMITTEE ON
GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

FIRST SESSION

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JUNE 9, 1999
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GEOGRAPHICAL INFORMATION SYSTEMS POLICIES AND PROGRAMS

WEDNESDAY, JUNE 9, 1999

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON GOVERNMENT MANAGEMENT,
INFORMATION, AND TECHNOLOGY,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC.

The subcommittee met, pursuant to notice, at 1:02 p.m., in room 2154, Rayburn House Office Building, Hon. Stephen Horn (chairman of the subcommittee) presiding.

Present: Representatives Horn, Turner, Maloney, and Kanjorski.

Staff present: J. Russell George, staff director and chief counsel; Matthew Ebert, policy advisor; Bonnie Heald, director of communications; Grant Newman, staff assistant; Paul Wicker and Justin Schlueter, interns; Faith Weiss, minority counsel, and Early Green, minority staff assistant.

Mr. HORN. A quorum being present, the Subcommittee on Government Management, Information, and Technology will come to order.

We are here today to review the Federal Government's efforts toward standardizing and sharing Geographic Information Systems with other government entities and with the private sector.

Dramatic advances in computer technology and the Internet allow access to geographic information that was once very limited to topographic lines, reproduced on paper maps. Now, precise data can be displayed on personal computers, allowing users to tailor a vast array of information to their needs.

Today, students can use Geographic Information Systems to plot maps on their own classroom computers. Families who are moving to a new city can use this technology to locate schools, ATM machines, or examine the landscape of their new neighborhoods. Farmers can rotate their crops using government analyses of the soil. Federal, county, and city governments can analyze flood plains, population density, and natural resources. Private businesses can provide more efficient delivery services.

The collection of these geographic information is a multi-billion dollar business in the United States. Yet, sharing this information is often more difficult because many software applications still cannot communicate with others, requiring public and private organizations to collect duplicate information on the same region.

In addition, there has been no commitment among governments and the private sector to share this information. Data collected by

one local government may not be available to the Federal and State government planners.

Similarly, Federal data bases are not always available to State and local government planners, or to the private sector. Billions of dollars are being unnecessarily spent on this duplication.

We will discuss how Federal, State, regional, and municipal governments are using their Geographic Information Systems to manage programs and services. How is this information being used by the private sector is certainly another concern for all of us. We will examine how the Federal Government can help improve the compatibility of these networks and data bases.

In addition, we will discuss how the Federal Government might assist States, regions, municipalities, and the private sector in forming partnerships to provide Geographic Information Systems in a cost effective manner. We will hear from a number of well-known witnesses and leading experts in the geographic data industry. Governor Jim Geringer of Wyoming will discuss how Wyoming uses its Geographic Information Systems to manage programs. Secretary of the Interior Bruce Babbitt also serves as chairman of the Federal Geographic Data Committee, and we are delighted to have him with us today. This interagency committee promotes the coordinated use, sharing, and dissemination of geographic information on a national basis. We hope to learn more about the committee's progress in this effort.

The second panel includes county and city officials. These witnesses have used Geographic Information Systems to assist their local and regional communities in making critical management decisions on programs and activities.

Witnesses on the third panel represent the private sector. Their companies use Geographic Information Systems to increase productivity, reduce operational expenses, and create new products and services.

We look forward to today's testimony and welcome each of our witnesses. I now yield the ranking member, Mr. Turner of Texas, for an opening statement.

[The prepared statement of Hon. Stephen Horn follows:]

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“Geographic Information Systems Policies and Programs”

OPENING STATEMENT

REPRESENTATIVE STEPHEN HORN (R-CA)

Chairman, Subcommittee on Government Management,
 Information, and Technology
 June 9, 1999

A quorum being present, the Subcommittee on Government Management, Information, and Technology will come to order. We are here today to review the Federal Government's efforts toward standardizing and sharing geographic information systems with other government entities and with the private sector.

Dramatic advances in computer technology and the Internet allow access to geographic information that was once limited to topographic lines reproduced on paper maps. Now precise data can be displayed digitally on personal computers, allowing users to tailor a vast array of information to their needs.

Today, students can use geographic information systems to plot maps on their classroom computers. Families who are moving to a new city can use this technology to locate schools, ATM machines, or examine the landscape of their new neighborhoods. Farmers can rotate their crops, using government analyses of the soil. Federal, county and city governments can analyze flood plains, population density and natural resources. Private businesses can provide more efficient delivery services.

The collection of this geographic information is a multibillion-dollar business in the United States. Yet sharing this information is often difficult, because many software applications still cannot communicate with others, requiring public and private organizations to collect duplicate information on the same region.

In addition, there has been no commitment among governments and the private sector to share this information. Data collected by one local government may not be available to Federal and State government planners. Similarly, Federal databases are not always available to State and local government planners – or to the private sector. Millions of dollars are being unnecessarily spent on this duplication.

We would like to discuss how Federal, State, regional, and municipal governments are using their geographic information systems to manage programs and services. We want to learn how this information is being used by the private sector. We will examine how the Federal Government can help improve the compatibility of these networks and databases.

In addition, we will discuss how the Federal Government might assist States, regions, municipalities and the private sector in forming partnerships to provide geographic information systems in a cost-effective manner.

We will hear from a number of well-known witnesses and leading experts in the geographic data industry. Governor Jim Geringer of Wyoming will discuss how Wyoming uses its geographic information systems to manage programs.

Secretary of the Interior Bruce Babbitt also serves as chairman of the Federal Geographic Data Committee. This interagency committee promotes the coordinated use, sharing, and dissemination of geographic information on a national basis. We hope to learn more about the committee's progress in this effort.

The second panel includes county and city officials. These witnesses have used geographic information systems to assist their local and regional communities in making critical management decisions on programs and activities.

Witnesses on the third panel represent the private sector. Their companies use geographic information systems to increase productivity, reduce operational expenses, and create new products and services.

We look forward to today's testimony and welcome each of our witnesses.

Mr. TURNER. Thank you, Mr. Chairman. I would like to start by recognizing Mr. Kanjorski's hard work and his leadership on issues relating to Geographic Information Systems, including his work on the steering committee for the 1999 National Geodata Forum, which I understand is just concluding.

I want to thank also Chairman Horn for his support in conducting this hearing, and for the bipartisan manner in which he always conducts hearings of this committee. I must say, as a ranking Democrat, it is a pleasure to be on a committee where we have a chair who takes bipartisanship seriously.

I want to welcome Secretary Babbitt today. The Secretary of the Interior has been very involved in this issue, and we look forward to hearing your insights, Mr. Secretary. And I also want to welcome Governor Geringer from Wyoming. We appreciate you being here with us today. And Mr. Chairman, I would like to yield the balance of my time to Mr. Kanjorski in acknowledgment of his leadership and his hard work on this important issue.

[The prepared statement of Hon. Jim Turner follows:]

OPENING STATEMENT OF THE HONORABLE JIM TURNER
GMT: "GEOGRAPHIC INFORMATION SYSTEMS
POLICIES AND PROGRAMS"
JUNE 9, 1999 (v.5)

Thank you, Mr. Chairman. I would like to start by recognizing Mr. Kanjorski's hard work and leadership on issues related to geographic information systems (GIS), including his service on the steering committee for the 1999 National GeoData Forum. As I understand it, this forum just concluded, and many of the participants are here today. I would also like to commend Chairman Horn for his support of this hearing and for the bipartisan manner in which he conducts his hearings. It is a pleasure serving as the Ranking Member of a Subcommittee whose Chairman takes bipartisanship seriously.

I would like to extend a warm welcome to the Secretary of the Interior, the Honorable Bruce Babbitt, who will be sharing his insights on the current and future use of GIS technology. Secretary Babbitt serves as the chair of the Federal Geographic Data Committee Steering Committee, and as such is leading the federal efforts to encourage and develop GIS technology. I would also like to welcome Governor Jim Geringer of Wyoming.

This year's National GeoData Forum was sponsored by the Federal Geographic Data Committee, in collaboration with public and private sector organizations. It was intended to advance the National Spatial Data Infrastructure (NSDI), which is a national initiative created by President Clinton in 1994 to advance the development, use, sharing and dissemination of geospatial data. The

GeoData Forum focused on increasing economic, social, and environmental well-being by improving access to such data. I understand that over 300 elected officials, community leaders, industry leaders and individuals who are experts on this technology attended the conference.

Geographic information systems represent a powerful new tool for both the public and private sector, and GIS technology can provide new information by linking data in innovative ways. For instance, businesses and government entities at all levels are beginning to use this technology to increase their efficiency and improve their decision making. With GIS, local groups concerned with conservation, parks, and historic preservation can map watersheds to improve sustainable development or determine past and future land use. Additionally, nonprofit organizations can access and analyze data in new ways.

One innovative new use for GIS involves studying the relationships that exist between environmental factors and diseases. For example, the Silent Spring Institute has been investigating the incidence of breast cancer on Cape Cod in relation to environmental influences such as synthetic chemicals, pesticides, and land and water use. The National Cancer Institute also recently commissioned a federal GIS designed to map the incidence of breast cancer in Long Island and compare that information to data on potential environmental influences, and the director of the Long Island breast cancer study, Dr. Iris O Abrams, notes that the GIS is a “powerful emerging technology” that will be used to study the environmental causes of breast cancer.

While GIS technology has been in development for over 20 years,

researchers and government agencies are taking advantage of recent advances in computer hardware and software and the increased availability of health and environmental data associated with specific locations on the earth's surface. GIS could turn out to be one of the most important tools a government official or manager may ever possess. The challenge is assuring that the information is accurate and that it is accessible to those who need it.

Having said as much, I would like to welcome our witnesses and look forward to hearing from each of you on this matter.

Mr. HORN. Without objection, we are delighted to have our colleague from Pennsylvania, and we thank him for all the help and solid information he has provided with reference to this topic.

Mr. KANJORSKI. Mr. Chairman, I want to thank Mr. Turner, our ranking member, and recognize your bipartisan approach in examining this and other technologies. I believe this is the first time a congressional committee will devote its entire time to the new technology used in GIS activity and hope to have a record created today—by governmental officials from the Cabinet office of Secretary Babbitt on down through the Governor of Wyoming, and then interested specialists from professionals in the field, and finally, private industry—that will give us a picture that I think is both exciting and enlightening to the American people.

This is the dawning of a new age. It is pleasureable to be a part of it, although I concede I do not understand it. And I fear that some of my friends in that field think I do, and if I do, and what I know the rest of the Congress knows, we have got a learning process, an educational process, that we have to go through for our fellow members and for ourselves.

We have a key witness here in Secretary Babbitt—he certainly has taken in the Department of Interior the responsibility of establishing the organization of the Federal Geographic Data Committee under the national spatial data infrastructure. He has worked very closely with the vision and leadership of Vice President Gore; and they have really moved this tool to another level in reinventing government and community livability. I think that we will hear from their testimony today that setting standards and bringing together all levels of government and the private sector are not only important, but are essential, if this great tool is to be properly utilized, not only in the United States, but ultimately globally.

We have an opportunity here in the Federal Government to actually take a lot of information from the localities and from the other elements of government in our society and learn and interact in partnership with them. And then we have, in a partisan nature, the Governor of Wyoming. I had the pleasure of meeting with him today. He has a leading role in GIS implementation in Wyoming. He has taken this issue to the Western Governors' Conference and the National Governors' Association. I think it is so important that those of us in public life, regardless of what level, take time out from our normal chores of being politicians to be thinkers and innovators. And certainly, the Governor has been that.

I believe that GIS and spatial data will be driving forces in our rapidly growing knowledge-based economy and provide for the capacity to have electronic democracy. As I said in my speech on Monday at the beginning of the Forum, it used to be said that a picture is worth 1,000 words. With GIS, it will be said that an image is worth 10,000 words. This is going to give us an incredible capacity to identify, address, and rectify complex problems in all sorts of areas of our society that we have never had before.

Although I have prepared remarks, I just want to give you an example, Mr. Chairman, of how important it is to a State like Pennsylvania and to my particular district and the surrounding districts around me, which make up part of the anthracite coal region. We have had devastation in processes for 150 years. We have degraded

water, degraded land, and a depressed economy. Never have we had the tool or the opportunity to view holistically 2,000 or 4,000 square miles of area with the incredible amounts of information that is interrelated in that area that is necessary if you are really to do a holistic approach to environmental cleanup, economic development, infrastructure repair, or development. It is this type of system that we are using in my area of Pennsylvania now, with the hope that we will create a model for the rest of the Nation.

With all that said and done, and all the time and money that will be spent on these things, there are certain basic tools that the forum pointed out to me over the past 3 days and that I have observed over the last several months of my involvement in a deep way in this thing. As the government participates, in the Federal Government we must use our capacity to release data at the lowest levels of government which is generally more accurate and is very important to be part of this system. Whether we do it by the carrot or the stick it is essential that we create an atmosphere in this country that this data is available to everyone.

Second, we have to create standards for this data and certify the validity of the data because it will be piled layer on layer, and eventually no one will remember where it really came from or who has tested that data.

Finally, those areas of the country, such as mine, that are broken into many subdivisions, the Commonwealth of Pennsylvania has 2,500 municipalities, 90 percent of which are under 3,500 population will be left out of this technology if we do not encourage locally independent, regionally coordinated, multi-purpose GIS. Organizations must come together and gather hundreds of communities together so that they can participate or they will become the equivalent of our Third World.

Finally, when all this is said and done, I hope the government can participate in a big way, either with a foundation or non-profit organization or with the multi-layers of government and the private sector, in developing a concept of an institute for best practices. This gives us a real opportunity to reinvent the wheel once and not require so many people to reinvent it again. The efficiencies and the effectiveness, or as a tool for democracy and government and planning, will only give, as one of the Secretary's main assistants said today, it will actually bring into place Thomas Jefferson's dream of an enlightened citizenry and democratic society.

So, GIS is a tool. It is a medicine. It may be not a cure-all, but the nearest we are going to have to it in our lifetime. I hope this committee and this Congress pay close attention to the testimony we are about to hear today. Thank you, Mr. Chairman.

[The prepared statement of Hon. Paul E. Kanjorski follows:]

**SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION, AND TECHNOLOGY
OF THE
HOUSE COMMITTEE ON GOVERNMENT REFORM**

THE HONORABLE PAUL E. KANJORSKI

OPENING STATEMENT

**HEARING ON OVERSIGHT OF GEOGRAPHIC INFORMATION SYSTEMS
POLICIES AND PROGRAMS**

June 9, 1999

Chairman Horn, thank you for agreeing to my request to hold this hearing today on "Oversight of Geographic Information Systems (GIS) and Programs." I believe that this is one of the first hearings that the U.S. House of Representatives has ever held to focus exclusively on GIS and spatial data. Your leadership on educating and focusing Congress on critically important technology issues such as this one is commendable.

I am very pleased that the Subcommittee is holding this hearing today because GIS and spatial data are driving forces in the rapidly growing knowledge-based economy and "electronic democracy" that is profoundly changing American society. This advanced information technology really is a new communication language that is fundamentally changing the way government, private industry, and citizens make long-term strategic as well as everyday decisions. It is essential that Congress is well informed about GIS and takes an active role in working with the Clinton Administration, all levels of government, private industry, and citizens to support policies that will advance this important technology in the best possible manner.

I would especially like to recognize the vision and leadership of Vice President Al Gore and U.S. Department of the Interior Secretary Bruce Babbitt. Their policies for GIS and spatial data have made the federal government a true partner with all levels of government and private industry to ensure that the potential of technology is realized.

This hearing today coincides with the final day of the National GeoData Forum that is being sponsored by the Federal Geographic Data Committee (FGDC). The FGDC, in conjunction with an impressive steering committee of elected officials from all levels of government, public policy makers, and leaders in the GIS industry, has brought together in Washington, D.C. hundreds of GIS professionals from communities across the nation. The Forum is excellent example of Secretary Babbitt's strong efforts to reach out in a bipartisan manner to build a broad consensus about policies designed to move this dynamic technology forward.

In this regard, I would like to recognize Wyoming Governor Jim Geringer for his work to support the effort of FGDC as well as to highlight the importance of GIS among his colleagues. Governor Geringer has shown outstanding leadership in implementing GIS in Wyoming while elevating GIS issues at meetings of the Western Governors Association and the National Governors Association.

THE HONORABLE PAUL E. KANJORSKI
GEOGRAPHIC INFORMATION SYSTEMS POLICIES AND PROGRAMS

JUNE 9, 1999

The Vice President's National Spatial Data Infrastructure (NSDI) policy established the FGDC to coordinate GIS programs within federal agencies, establish national standards for data, and facilitate partnerships between the federal government, states, local government, and the private sector. This is an outstanding illustration of how Vice President Gore's "reinventing government" initiative has delivered on its promise to "make government work better and cost less" in a manner that has attracted bipartisan support.

I would also like to commend Secretary Babbitt for his leadership of the FGDC's efforts to make the NSDI a reality. I recognize that this is a very technically complex and organizationally challenging mission. Prior to the establishment of the FGDC, many federal agencies were implementing GIS in a "stovepipe" manner that created data that only met one purpose and was sometimes impossible to integrate with other information.

Before the FGDC's coordination activities, it was common for federal agencies to duplicate GIS and spatial data production being accomplished by various parts of the federal government. Moreover, until the establishment of the FGDC, the federal government engaged in little significant cooperation and partnering with states and local governments to implement this technology.

GIS has made it possible to visualize and understand complex relationships between people and places that are the building blocks of communities. Essentially, GIS and spatial data created by the NSDI will enable all levels of government to provide better services to the public in a more cost effective and efficient manner.

The implementation of the NSDI will create a seamless country-wide map of spatial data that will provide unprecedented amounts of well-organized information. Using GIS, this information will assist efforts to accomplish economic development, environmental restoration, "smart growth" land-use planning and sustainable development, disaster mitigation, and countless other activities that will enhance the "livability" of communities.

While the NSDI and FGDC have been highly successful in their efforts to date, it is clear that rapid advances in the GIS industry as well as the community of GIS and spatial data users have created both increased challenges and opportunities for the federal government. GIS is no longer a relatively obscure research or academic technology that is only accessible to highly-trained professionals.

Today, GIS is being rapidly implemented, or already in use, in tens-of-thousands of communities from coast to coast as well as throughout state agencies and the federal government. In addition to numerous civilian applications, the federal government uses GIS and spatial data to support critical decision making for foreign policy, national security, and defense.

The private sector is also making widespread use of GIS to support operational, production, marketing, and distribution activities. As a result, GIS and spatial data are making a significant contribution to the increased productivity and profitability of companies in every sector of the U.S. economy.

The GIS and spatial data industry itself is a very significant component of the information technology sector which is a driving force within the U.S. economy. The industry employs tens-of-thousands of people while producing an estimated \$10 billion in revenues annually. I am

especially pleased to say that American companies currently lead the world in the development and production of this critically important technology.

However, the success story of GIS and spatial data is not only beneficial to the government and the economy. The integration of GIS with the World Wide Web has made this technology easily accessible and usable for millions of citizens. There is an old saying that "a picture is worth a thousand words." I would update this adage by stating that "an image created by GIS is worth ten thousand words." I believe that providing citizens with access to this tremendous wealth of knowledge will be invigorating for our democracy as well as an engine for ingenuity and innovation.

I firmly believe that the federal government will be well rewarded for making a meaningful investment in this technology. For example, we have all seen that the federal government's investment in the Internet has yielded tremendous dividends for the economy and society in America as well as nations across the globe. I think that building the NSDI will have a similar, maybe even more significant, impact.

While the future holds incredible promise for GIS and spatial data, I am concerned that this potential will not be realized unless all levels of government and the private sector closely work to accomplish four goals.

- First, there should be more cooperation to form spatial data collection, production, maintenance, and sharing agreements that will make it possible to build GIS that can be simultaneously used by all levels of government as well as the private sector.
- Second, all levels of government and the private sector should adopt and implement national data standards and interoperable systems.
- Third, all levels of government and the private sector should work together to implement the concept of "locally independent, regionally coordinated multiple-purpose GIS" which will build the NSDI in the most cost effective and efficient method.
- Fourth and finally, I believe it is imperative that Congress becomes more engaged in efforts to promote "best practices" and provide the necessary resources to implement this technology in manner that will yield the greatest benefits for society.

In this regard, I have strongly urged my colleagues in the House to form bipartisan support for the full funding of the Community Federal Information Partnership (CFIP) for which President Clinton included \$40 million in his proposed Fiscal Year 2000 Federal Budget. The primary purpose of the CFIP is to provide communities with grant funding and spatial data that will leverage non-federal investment to meet local needs while also building the NSDI.

The work of a GIS professional named Tom Sweet, who lives and works in my congressional district, illustrates the leveraging potential of a modest federal investment in a community-based GIS program. Through the implementation of what Tom defines as a "locally independent, regionally coordinated multiple-purpose GIS" program, a total of nine counties comprising more than 4,500 square miles in Central Pennsylvania joined together in a unified effort to implement GIS.

With a \$500,000 federal grant from the Appalachian Regional Commission, Tom was able to carry out coordination activities through a regional economic development group to develop GIS that is simultaneously usable by both municipalities and counties within the region. Tom's coordination efforts ultimately leveraged more \$5 million in non-federal investment in GIS while producing highly accurate spatial data that can be by all levels of government and the private sector. Even if local communities were able to leverage only half as much investment as Tom was able to accomplish, a fully funded CFIP could annually yield as much as \$200 million for local GIS programs that would become the framework of the NSDI.

Knowing of the success of this concept in Central Pennsylvania, I encouraged the William G. McGowan School of Business at King's College and the Wilkes University GIS Center to join together to form a public-private partnership called the Pennsylvania GIS Consortium to build "locally independent, regionally coordinated multiple-purpose GIS" in Northeastern Pennsylvania. Recognizing the Consortium's vision for GIS and implementation of the "best practices" and standards, Vice President Gore chose the Consortium to be one of the six participating entities in the NSDI Community Demonstration Project.

The Consortium's first major effort in the NSDI Community Demonstration Project initiative is to design and implement a GIS-based environmental master plan for the Upper Susquehanna-Lackawanna Watershed which was designated by President Clinton as an American Heritage River. The U.S. Army Corps of Engineers is partnering with the Consortium to implement the plan. I believe that the results of this project will demonstrate to the nation a methodology for significantly increasing the productivity and efficiency of government while employing a holistic approach to ecosystem restoration and sustainable development. Most importantly, the project will enlighten and educate citizens in the region with information that will enable them to take control of their own destiny.

In fact, the Consortium has already begun to establish "technical assistance partnerships" with other GIS programs around the country that share this vision for the technology. The Consortium has formed partnerships with the GIS programs in Wayne County, Michigan and Tillamook County, Oregon. It is my hope that communities across the country will form these types of partnerships to share knowledge and expertise. I would propose that the FGDC establish a "best practices" institute in conjunction with organizations such as the Consortium to ensure that communities across the country can learn from their common experiences.

Mr. Chairman, we have a very distinguished group of participants in today's hearing. I am certain that this hearing will be interesting and informative. It is my hope that this hearing will open up long-term dialogue in Congress about the federal role for advancing GIS and spatial data.

Mr. HORN. Thank you very much for your comments on this. Let me just explain how we function here. When we introduce an individual, your full text is automatically in the record. We have had an opportunity to go through those texts, and we would like to spend most of the time on a dialog with the individual rather than just see them read the text. So, please do not read the text. Just summarize from the heart.

I know the Governor knows all of that and the Secretary knows all of that, but some of the other people might not.

No. 2, since this is an investigating committee, we swear in all witnesses, and we will try to move expeditiously because we know a number of you have appointments elsewhere, planes to catch, so forth. Governor, I am conscious of how difficult it is to get from/to Wyoming easily. There aren't too many non-stops.

But let me just say, if we can swear you in, we will begin with your testimony.

[Witness sworn.]

Mr. HORN. The clerk will note that the Governor has taken the oath, and please proceed. We are delighted to have you with us.

**STATEMENT OF JIM GERINGER, GOVERNOR OF WYOMING;
AND BRUCE BABBITT, SECRETARY OF THE INTERIOR**

Governor GERINGER. Thank you, Chairman Horn, and thank you to the committee for taking the opportunity to highlight what is a very important issue, and I would say a very important concept, because it goes beyond the technology and deals with the very heart of the fundamentals of American democracy.

I compliment you for dealing with it in a timely way. We never know exactly when the best time is, and I've often said the difference between being a visionary and a fool can often be just a matter of timing.

There is a definite need to acknowledge how Geographic Information Systems will reshape our institutions, as well as our approaches to governing. It is with that in mind that I would like to submit my remarks, as you have noted already, for the record; to highlight a few of the principles that are involved, and then certainly respond—engage in a dialog with you.

The most fundamental issue I would like to stress, though, is that we are on the verge of moving away from a hierarchy of control that truly allows the information and the ability to make decisions to move down to the individual level. That is a concept that is embodied in GIS, and GIS in much more than just a geographic natural resource management system.

It is spatial—S-P-A-T-I-A-L—in the sense that it not only shows us the relationship between physical activities, but, more than that, it helps define the interrelationships of data, of knowledge, and decisions that result from that. It truly leads to what we would call enabling the citizen or empowering decisions.

Now, empowerment means being able to make decisions. Decisions can come from information, information that has been evaluated that can be synthesized and lead to knowledge that then becomes persuasive enough to lead to a decision.

We will talk today somewhat about how the quality of data will be critical to that, because a good decision made on bad data is still

a bad decision. If we are to enable our citizens, we have to provide information that is accessible, of quality, or at least the limitations are known, and are usable down at the individual citizen and the community level. We need to be able to enable achievement.

Let me quickly highlight a few principles and then talk more in general terms about the fundamentals that have been raised already.

First of all, as this is an investigative committee that will lead toward policy, I offer these principles to serve as a basis for your legislative, and even your appropriations, decisions.

First of all, when it comes to GIS, we need standards, yes. And these are standards that should be developed nationally, not mandated from above at the Federal level, but developed between and among our various institutions at the State and local level.

Federal agency involvement should be primarily one of national administration and coordination, and then beyond that, the enabling through training and grants and technical assistance to help develop that local capacity.

We have citizens of high potential and low engagement, and that's where the Federal Government and State governments can serve a purpose. So point No. 1 would be, yes, develop national standards with neighborhood solutions, and assign responsibilities at the most appropriate level.

Point No. 2, we need to work for collaboration and not polarization. The old model that we have in government too often prescribes the method of getting there. One thing that we know about technology is that it changes so quickly that, if we tried to standardize a particular process, we will always lag the opportunity that is available to us. We need to keep our focus on the end result, and let technology take care of itself, rather than mandating a particular approach.

We need locally based solutions. We need collaboration, and not litigation. And the interests that are involved should have the incentive to provide resources to support their own efforts, not just be looking to someone else for the money.

The primary cost would be borne by the affected public or the private entity using the GIS systems or the data. The Federal Government's role would be to provide regulatory incentives or competitive grants that reward innovation.

Point No. 3 is focused on results. Reward the results. Do not focus on the processes. The longer an institution is in effect, the more likely it is to focus on its own process than the end result it was created to achieve. Far too often, compliance with a nationally developed goal is measured by whether or not an affected party has rigidly followed a process, rather than measuring whether any substantive goal was achieved. We need to allow innovation rather than—solving problems has to take priority over mandated processes.

Point No. 4 deals with credible science. In order to establish proper priorities, we need to allow science to evolve to the knowledge that leads to a decision. Competing interests too often seek the science that will support their point of view rather than letting the underlying facts frame the choices to be made. We need to move away from debates about whose data is right, and instead,

agree that the data is correct and the content over values and solutions—much more constructive.

Point No. 5—and principle No. 5, I should say—markets before mandates. Let the marketplace determine the most appropriate approach. Governments are especially notorious, at every level, for requiring the use of specific technologies or processes to achieve what they thought was an end result. Prescriptive approaches only reward litigation rather than cooperation, and delay is the enemy of achievement. We should allow market-based approaches and economic incentives that can allow for more efficient and cost-effective results that will allow the timely use of data and Geographic Information Systems.

Principle No. 6 deals with that personal understanding that Mr. Kanjorski talked about—the Jeffersonian principle. The personal understanding of the issue is crucial to quality governing. Success in anything depends on the daily choices and individual perspectives of our citizens. While we talk about the formal structures of government, it is the informal structures that really allow governing to be done. These are the service organizations, the volunteer organizations, even the coffee clubs that meet on a regular basis. The formal institutions exist primarily to guide and to settle disputes. The informal ones are where government truly occurs. We need to start with our Nation's youth, so that all of our citizens are empowered to take greater responsibility for what they expect from government. Their personal responsibility, on their own part, as well as for future generations, allows them to take the data that will enable the decisions that will enable that capacity at the local level and actually need less government as a result.

Principle No. 7 says measure the benefits against the costs and assess the costs and benefits of different options. Many times the last ounce of marginal gain is achieved at a very high cost. Now, GIS can enable us to see the interrelationships of those things and help with making the final decision, and principally in measuring the final result against the cost.

Principle No. 8 is very important, and that is that the solutions that we come up with will go across political boundaries. When we talk, particularly about GIS and mapping—when I fly over America, when I fly over Wyoming, I see a State that is big enough for any point of view, and I cannot see on the ground where it divides Wyoming from Nebraska, Colorado, Utah, or even any other area that might define an international boundary. Those are limitations that we have imposed. Yet, systems require the awareness of concurrent jurisdictions and shared responsibilities. We will work best when we consider solutions to problems in the natural resource area on watersheds, regional issues, biologic, but then going into economic and social issues as well.

If there is one underappreciated area in the use of GIS, it is the fact that it can go far beyond natural resource management; that while that is the principle focus and that is where much of the GIS application began, anything that can be viewed in relationship to anything else is a candidate for GIS. You can describe it first in terms of geography, but then we can go much beyond that and link tables, data bases; and very soon—in fact, already—to update those tables and data bases real time, so that we have the information

available as we need it and make the decision based on actual, current information as well as any historical trend.

I will come back to the notion of empowerment, because I think that is a worthwhile concept to reinforce, and how we obtain information and where we are going and to focus on results. This is a GPS receiving unit. It is fairly common. It is one of the low-cost models, and it gives me information I can use, provided I know what I am doing with it.

A friend of mine was noting the other day, yesterday, that he knew exactly where we were, what altitude we were, the velocity at which we were traveling. And I said, "Bob, where are we going?" We knew exactly where we were, but we did not exactly know where we were going, because that data point had not been entered yet.

Mr. Chairman, we would assist our citizens in that empowerment aspect if we understood where we were going before we imposed all the restrictions. So if we create a body to administer the coordination, administration, training, and grant offerings through any kind of a GIS system, let us not create a body that dictates the outcome. We should decide that at the local level, the citizen level, the community level.

That access to data, then, also demands that we need connectivity to enable the achievement. If we are going to get to the Jeffersonian view and graduate to the next of democracy, we need to assure the availability of data.

There is a restriction, whether it be in our urban areas, the innercity areas, or the rural areas of America, where connectivity is not a fact yet, or at least broadband capability is not a fact. GIS systems take a large amount of bandwidth. So we need larger pipes. We need the opportunity to use it, and one thing that will happen as a result of your hearing, Mr. Chairman, is a national focus on how much more application can be made of GIS systems. Increased usage, then, reduces the cost.

But if there is an area where we need your assistance and our mutual assistance—State, local, government included—it is how we can collectively generate the market that will encourage the private sector to come in and install those systems, because I do not believe that government should own the systems that connect us. They should not have to own the systems that utilize the information. What we should be are the anchor tenants in the utilization of systems and data to enable our people truly to engage in democracy.

That would be the extent of my presentation to the committee, Mr. Chairman. I have listed in my remarks, the testimony offered to the committee, a number of applications in the public sector. It is not a complete and comprehensive list, nor is the one called private sector, because there are many applications far beyond, even which anyone of us are already aware. That is the point again to make: that data that shows relationships, or data that can be enhanced to show relationships through a GIS system, teaches visually something we would not grasp any other way.

As we use technology, it should be so easy and so secure in its use that the public feels that they are using something and they are not even aware they are using technology. It is transparent to

the user. It is user-friendly, and it is widely acceptable to the point where people are motivated. Knowledge gained through discovery is the most enduring, and we can discover how we are individually enabled through GIS systems.

Thank you for your courtesies, Mr. Chairman. And I would respond to any questions.

[The prepared statement of Governor Geringer follows:]



STATE OF WYOMING
OFFICE OF THE GOVERNOR

JIM GERINGER
GOVERNOR

STATE CAPITOL
CHEYENNE, WY 82002

**Testimony of Wyoming Governor Jim Geringer
Delivered to the U.S. House of Representatives
Subcommittee on Government Management, Information and Technology
The Honorable Steve Horn, Chairman
June 9, 1999
Using Geographic Information Systems**

Thank you, Mr. Chairman, for your invitation to speak to you and the committee regarding your oversight of the federal government's policies and programs for Geographic Information Systems (GIS). I compliment you and the other members of the Committee for dealing with a very important subject in a very timely way. I share your enthusiasm for productive use of technology and data. I also share your concern that we must develop the right partnerships to share spatial data between and among states and the federal government and, additionally, include the academic and private sectors as well. I compliment Secretary Babbitt and the Federal Geographic Data Committee members for their innovative and timely work as well.

I was privileged to participate in the GeoData Forum this morning with the acknowledged leaders in technical application and policy development in the proper and productive use of GIS enabled applications. I strongly support the Forum's theme of "Making Livable Communities a Reality."

You have asked how we might proceed to develop effective public and private partnerships to create and use information through geographic information systems. I offer a set of principles that the Western Governors' Association have developed that can serve as a basis for your legislative and appropriations decisions.

1. Develop National Standards with Neighborhood Solutions - Assign Responsibilities at the Most Appropriate Level

Geographic Information Systems, the data that enables them and the metadata that qualifies them, need standards of interchangeability and usability. But the standards should be nationally developed, not federally mandated. Local and state governments should collectively develop national metadata standards. Federal agency involvement should be primarily national

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administration and coordination. GIS programs and the use of the data should not include prescriptive measures on how they are to be used. States should develop data clearinghouses and regional applications to achieve results. A community can tailor plans to meet local conditions and priorities, thereby ensuring broad community support and ownership of the result. National standards could be accompanied by competitive grants and technical assistance to develop local capacity.

2. Work for Collaboration, Not Polarization - Use Collaborative Processes to Break Down Barriers and Find Solutions.

The federal government in particular, relies on the old model of prescriptive enforcement that frequently leads to highly polarized constituencies. Successful GIS and results-centered applications are best accomplished through balanced, open and inclusive approaches where interested public and private stake-holders work together to develop locally based solutions. When we enable individual citizens and local communities to make decisions, we have collaborative approaches that yield greater satisfaction with the results. We then have broader public support with durable and productive working partnerships. Both private and public interests must have the incentive to provide resources to support these efforts. The primary cost would be borne by the affected public or private entity, with the federal government providing regulatory incentives or competitive grants that reward innovation.

3. Reward Results, Not Processes - Move to Performance-Based Actions

Everyone wants to do the right thing. This will best be achieved when government actions are focused on results, not processes. Far too often, compliance with nationally developed goals is measured by whether an affected party has rigidly followed processes, rather than measuring whether any substantive goal was achieved. We must allow innovative approaches to achieve standards. Solving problems must take priority over mandated processes.

4. Credible Science for Proper Priorities - Separate Subjective Choices from Objective Data Gathering

Competing interests too often seek the science that supports their view rather than letting the underlying facts frame the choices to be made. The collaborative process requires scientific evidence to arrive at policy decisions. With credible science, we can move away from debates about whose data is right and instead, contend over values and solutions.

5. Markets Before Mandates - Let the market determine the most appropriate approach.

We want to achieve the delivery of public and private services at the lowest optimum cost to society. Governments are especially notorious for requiring the use of specific technologies and processes to achieve results. Prescriptive approaches reward litigation rather than cooperation and delay is the enemy of achievement. Mandates cripple incentives for technological innovation, increase animosity between government, industry and the public and increase the cost of government services. Market-based approaches and economic incentives can result in more efficient and cost-effective results that lead to timely use of data and geographic information systems.

6. Change A Heart, Change A Nation - Personal understanding of the issues is Crucial to Quality Governing

Governments at all levels can develop policies, programs and procedures for delivering services. Yet success ultimately depends upon the daily choices and individual perspectives of our citizens.

Beginning with the nation's youth, all of our citizens need to be empowered to take greater responsibilities for what they have expected from government. They need to understand the importance of personal responsibility for themselves as well as for future generations. If we enable our citizens with data that enables decisions, they will understand that their direct participation is critical to the social and economic health of the nation. Government can enable local capacity to engage the people.

7. Measuring Marginal Benefits and Overall Costs - *Make Sure Decisions are Fully Informed*

The implementation of policies and programs should be guided by an assessment of the costs and benefits of different options. GIS can enable us to see the interrelationships of data and help measure the cost of attaining our results. The assessment of options should consider social, legal, economic, and political factors and enable a strategy for addressing the major costs.

8. Solutions Transcend Political Boundaries - *Today's Problems Need Regional Solutions.*

The challenges of governing today span political and agency boundaries. Solutions will often affect more than the geography of a single political jurisdiction. Federal and state agencies have concurrent jurisdictions and shared responsibilities. We work best when we consider watersheds, regional air quality issues, and biological and economic systems. Government agencies must recognize that good solutions come from understanding system interactions and interrelationships.

These are the eight principles that can be used to measure the effectiveness of any action you might take, Mr. Chairman, but they can be particularly effective for your consideration of geographic information systems, the data they will use, and the true potential of the solutions they inspire. The map out a course toward cooperative, community-based solutions.

The most prevalent current use of GIS is to aid natural resource management. Geographic Information Systems and data are critical to providing an objective, scientific base of information for natural resource and environmental decisions. With GIS, we can move away from debates about whose data is right and instead, contend over values and solutions.

Let's build on our successes to date and expand everyone's thinking beyond the notion that GIS just means maps, geographic features and natural resource policies. GIS *is* those things, but the potential for GIS is unlimited, since every service of any level of government can in some way, be associated with a spatial reference. The untapped potential for government means that any agency service that can be referenced to a location, can be categorized, tabulated by a characteristic or evaluated for its impact. For the private sector, we can neither imagine nor limit the extent of potential applications. Linking of tables and databases leverages single application programs to far greater usefulness.

I give my qualified, but enthusiastic, support to the effort to develop the National Spatial Data Infrastructure for broad public and private benefit. My principle qualification is that, as the NSDI is developed, it should be focused on citizen service and the democratization of information. In a Jeffersonian approach, GIS would promote us to another grade in democracy school. It gives equality and equity to each of us.

I support decisions that can be made at the community and regional level. Government's role is one of providing the resources, tools and information to enable our citizens to make good choices based upon reliable and qualified information.

Your actions from this oversight hearing should ensure that, whatever federal government structure comes of this effort, it should be a clearinghouse for quality, accurate, and easy to use information. We don't want a body that would dictate the outcomes of any application of the information nor would dictate the terms and conditions on the use of information other than that needed for proprietary or personal purposes. Government should not be the controller, but the enabler. Empower each of us as citizens.

Empowerment means being able to make decisions. Decisions come from information that has been evaluated and synthesized persuasively. Information that is developed or accumulated from several sources, must be objective and reliable. Quality data is critical. If we are to enable our citizens, we must provide information that is accessible and usable for the individual citizen at the community level.

Along with insuring access to data, we need connectivity to enable achievement. While GIS can use historical information, many applications need to be linked to the newest data that is applied as soon as it is updated. That means we need broad band connectivity within and among our states. Today, while high density population centers have adequate connectivity, the cost of installation and access is still too high in all other areas. But increased usefulness enables use which in turn, brings the cost down. Data backbones and increased bandwidth are best supplied by the private sector with government acting as the anchor tenant in using the system.

Mr. Chairman, the small device I'm holding is a commercial, off-the-shelf receiver for signals from the Global Positioning Satellite System, or GPS. The data processed by this GPS receiver can tell me exactly where on the Earth that I am. But unless I do something with that information, just knowing where I am is of little use if I don't know where I'm going. This GPS unit indicates that the Rayburn Office Building is at 38 degrees 58 minutes North latitude, 77 degrees, one minute West longitude. But so what? Even though this is spatial data in the most basic of terms, I need to link all the information, statistics and processes about this building, to enlighten its occupants and guide their actions.

The GPS has become inextricably linked to GIS. I had the privilege back in 1974 of helping to develop the launch vehicle that put the first GPS satellite into orbit in 1978. At that time, GPS was deemed to be useful only for navigation as part of military operations, particularly naval vessels. No one predicted 25 years ago what additional applications would spring from the ability to determine the location of a person, a place or a map feature that could in turn, be linked to a wealth of economic, social, environmental, recreational, or transportation databases, to name a few. Our challenge is to enable people to make sense out of the data so that they can make decisions.

Change is the by-word of the day. All too often, change, technology, and complexity are synonymous, to many of our citizens. If we are to enabling GIS to serve our citizens, we must understand that technology, best applied, will be transparent to the user. Technology will take care of itself, if we focus on the end result, not the process of getting there. Our citizens will accept change, even profound long-term change if it brings optimism, of being secure in the outcome. People want systems that are easy to use or inviting in their application.

Last night I decided to look up the geographic coordinates for the United States Capitol by way of checking the U. S. Geological Survey data on the Web. Much of the geographic information that the federal government has on line is not really user friendly, nor is it intuitively applicable. I ended up finding the coordinates on two private web sites. Part of your challenge Mr. Chairman, will be to ensure that geographic information systems and data are available in terms that anybody can understand and apply. Just as you don't have to be an engineer to drive a car, neither should you have to be a techie to use spatial data. My experience has been that the private sector has developed more effective presentations and applications of GIS data than government has.

More than any time in history, governments are being asked to work faster, more efficiently, and be more responsive to their citizens. Government can put spatial information on line and automate many existing processes. That alone may increase service to the citizen, but we must substantially change how services are delivered. People need more access to, and more control of government services. Otherwise, we won't improve the quality or the efficiency of government. Simply put, don't just automate functions, TRANSFORM them! Single use applications of data are but the beginning. Understanding interrelationships make information powerful!

In order to enable direct participation, government must empower citizens. Rather than having a government that dictates the result and the process of getting there, why not let the people do that? When we give each individual the option of making life better by their own choices, they can choose how to make better lives for themselves, both socially and economically, with a corresponding decrease in need for government. Our federal government should be driven by and for the people.

The states are not employees of the federal government. We have governing responsibilities under law that can not and should not be set aside, at the state level and at various levels of local government. I remind you that the federal government was created by the states, not vice-versa. In the public lands states such as Wyoming, we clearly have shared or concurrent jurisdiction with federal agencies. For instance, while the U. S. Forest Service and the Bureau of Land Management oversee much of the physical land management issues in the West, they are not the overall resource managers. The states have primacy over wildlife management, air quality, water quality, solid waste disposal and water rights management on those very same lands. Our shared responsibilities require a full partnership to properly discharge our individual responsibilities. That calls for integrated decisions and shared data. We need standardized

approaches to data, with nationally developed standards and government administration. We don't want federally developed standards, but standards that represent our collective wisdom nationally

The progress made so far by the National States Geographic Information Council, the Federal Geographic Data Committee and the National Association of Counties does begin to address geographic information systems and data issues, but many regional issues, particularly those unique to the West, are not adequately addressed. The Western Governors' Association has initiated a regional GIS Council to coordinate member state activities to facilitate regional and multi-state efforts. We intend to endorse or develop data standards as needed. We are including local governing bodies, tribal authorities, federal agencies as well as our state activities. Your support of regional efforts would be welcome.

We definitely need to improve the understanding by and insure participation of federal agencies for state and local spatial data coordination and development. Wyoming and our federal in-state partners recognized the need for coordination and data sharing when we began entering into various data-sharing agreements. The first was signed between the State of Wyoming and the Bureau of Land Management back in 1996. Since then, we have signed data-sharing agreements with the Forest Service, the Geological Survey, Bureau of Reclamation, Natural Resource Conservation Service and the Army Corps of Engineers. The good news is, we've entered into at least six data sharing agreements over the past three years. The bad news is, we couldn't just sign one agreement with the federal government. As a state we have to work with each individual agency of government. That bothers me. Don't we have but one federal government? We should, Mr. Chairman, but we don't. We have allowed a culture to develop wherein each agency of the federal government has its own set of rules and regulations for the delivery of services and they seldom recognize the interrelationship of their data and decisions. The strength of GIS is to understand how databases can be linked and understood relationally. Why can't government be the same?

Our data systems are still structured on a model suited for a time that is past – not one prepared to meet the challenges of the future. The traditional data-and-decision model has a legion of government agencies, each at the center of an issue, often acting independently of each other, each dispensing their internally derived information or services, with citizens restricted to whatever information is doled out. The interrelationship of issues demands that we have coordination and cooperation between and among agencies. Our citizens are captive to government discretion. Our services at any level of government should not be agency driven but citizen drawn.

Our present federal process of resource management denies communities their democratic right to participate in decisions that affect them socially and economically. We don't have to continue that process. We should concentrate on making information available so that communities have the greatest opportunity to participate in decisions. Let them use Geographic Information Systems and related data to make decisions for themselves.

The Centers of Excellence in Rural America project jointly run by North Dakota and Wyoming is an example of empowering people at the community level. By providing connectivity and training, we are enabling people to enhance economic opportunity, provide better health care, improve education and preserve the high quality of life associated with rural America.

No individual person as the head of a federal agency should get to make a decision contrary to the will of our citizens. We have a system and a culture that perpetuates the old notion that data can only be gathered in an hierarchy where only a few at the top have access to the right information. Thus, only a few are allowed to make the substantive decisions. GIS flattens out the bureaucracy. Government is most effective when it provides information for people to make decisions for themselves.

Our focus should be on enabling people to do more for themselves through improved access to services and information while accepting greater personal responsibility to direct those services. We are overwhelmed with data and inundated with information. We don't necessarily need more information. What we need are tools that enable us to make decisions, to distill information down so that a decision can be made. We are overwhelmed with information. Information is just disconnected until it enables a decision. Then it is powerful.

Geographic Information Systems, properly used, are the most significant applied technology since the advent of the World-Wide-Web and the Web Browser. Geographic Information Systems are also far more applicable than to just natural resource management. In the future, the applications that affect the economy, social programs, recreation and education will be far more widely used than mapping geographic and geologic features.

People will accept technologies such as GIS, when they are able to use them to solve every day problems, first in their communities, then on a national scale as they develop confidence. Remember the saying "Knowledge is Power?" Power is not in the hand of the keeper of knowledge; rather, power is in the hand of the one who applies it.

Our success in applying Geographic Information Systems to issues won't be measured by how much we spend but whether we achieve a desired result. Any proposal to continue to finance a national spatial data infrastructure, whether at the public government level or through the private sector, will depend upon our ability to define end results. Our institutions must deliver data that enables decisions that, in turn, deliver those results. Our society and our culture must change in order for GIS to achieve its full potential.

But you don't just tell people "go use GIS and come back with the results." People need to be trained and leadership encouraged by example. Sharing data is great, but you have to go through a series of quality control steps to assure confidence in the results.

Mr. Chairman, you indicated interest in seven areas that you asked be covered. In abbreviated form, my responses are as follows:

1. What are Public Sector uses of GIS by federal, state, local government:**Water**

- Planning Programs
- State administration of water rights
- Interstate administration of compacts and decrees
- Water Conservation
- Quality - Total Maximum Daily Loads

Oil and Gas Leasing

- Production records
- Sales
- Conservation and regulation

Wildlife

- Habitat Management
- Hunting licenses
- Population management
- Endangered Species
 - Habitat Conservation
 - Evaluation for species listing

Land Use Planning

- Open Spaces
- Zoning

Range Management

- Grazing
- Grasshopper infestation
- Noxious Weeds

Crime Statistics

- Burglaries
- Larcenies
- Neighborhood safety ratings

Education

- Class assignments in earth science

Taxes

- Property tax assessment
- Minerals
- Distribution of state and local revenues

Transportation

- Construction
- Maintenance
- Accident frequency and type
- Underground utility management
- Traffic counts and management

Public Health

- Demographic data
 - Low income recipients and health status
 - Integrated services
- Juvenile Justice
- Type and frequency of violations
 - High or low incidence neighborhoods

2. Examples of Private sector uses of GIS :

Mineral Exploration

- Oil and Gas
- Coal production and mine reclamation

Siting a Retail business

- Customer preference based upon demographics
- Customer residence by neighborhood

Agriculture

- Site specific farming
 - Fertilizer
 - Pesticides
 - Soil conditions
 - Yield, productivity
 - Range, pasture management

Weather forecasting

Property management

- Residential
- Commercial

Banking

3. Economic issues

Businesses that wish to be competitive have to use information more effectively and as soon as it is updated. The economy can benefit from GIS by developing enhanced productivity, enabling decisions regarding production or marketing, and by making information a commodity. The economy benefits further by a reduction in government controlled services when the individual citizens are able and motivated to do more for themselves.

4. What government functions can improve GIS networks?

Two central themes emerge. Develop information once, share it many times. But the best approach is distributed centers of information. That means information has to be able to flow fast and often. Bandwidth and connectivity are already limiting factors. Rural and inner city areas will be the most challenged, yet will likely have some of the greatest need for information and decisions.

5. Partnerships at all levels.

Wyoming signed six data sharing agreements with various federal agencies beginning in 1996.

Data needs to be described in terms of its quality and limitations. It also must be kept current. Information should be made available to all levels of government, the private sector and academia. Develop data once, use it many times, in as distributed fashion. The states, with local government participation, should collectively develop the standards that the federal government can administer.

6. Locally independent, regionally coordinated, multiple purpose GIS

Don't constrain the collection, dissemination or use of spatial data and systems. Just as the GPS was originally deemed usable only by the military, its true power came when it was made available to the innovative and creative people of America. Likewise, the Internet was a clunky, cumbersome connection fancied only by academia and researchers until someone came up with Browsers. Information was instantly democratized. Some type of user fee should be charged, particularly if public domain data is assimilated into systems that are sold or where services are provided for a fee. Develop a royalty fee structure that recognizes the value added by the public domain data.

7. Can or should the federal government assist state and local governments to implement systems?

GIS is data driven, intensively so. Large amounts of data are used and need to be shared. That will require enhanced and universal bandwidth. Government can help stimulate the connectivity, by wire, fiber, satellite, or other wireless, by being an anchor tenant on systems developed by the private sector. You can also help to foster the capacity to develop, access and use data and GIS technology, including hardware, software, metadata standards, clearinghouses, and development of local and regional councils. Provide assistance grants to reward innovation at the local level and that foster local capability to use GIS systems and provide training.

Mr. HORN. Well, I am sorry you have to leave—I understand that you need to go catch an airplane—because I would like to have Secretary Babbitt, a former Governor, also join us at the table and have a dialog. So I do not know what your schedule is, but I want to ask you—I do not want you to miss it.

Governor GERINGER. I have a 3 p.m. flight out of Dulles.

Mr. HORN. Out of Dulles? [Laughter.]

Well, as an expert on getting to Dulles, you are in good shape. It will take 35 minutes.

Governor GERINGER. Got my GPS, too. Well, Mr. Chairman, I will excuse myself, then, so you get on with the people here who know far more than I.

I compliment Secretary Babbitt on his initiative with the forum that was just concluded. I look forward to a great relationship with your committee and the agency.

Mr. HORN. Let me just ask a fast question, as you are leaving here.

How effective, in your judgment, as a Governor—and I know the Governors have probably discussed this—is the coordination across the different levels of government in implementing a national data infrastructure? Does that worry people as Big Brother or something, or what is your feeling on that?

Governor GERINGER. Mr. Chairman, there would be an unwillingness to yield to something that is viewed as being managed and dictated as somewhere else. We can call above—it could be somewhere else. I think the way to overcome that is to put enough information and systems in the hands of the people to where they think of it as their system; that what we are doing, through government, is guiding the standardization, the quality, the definition of the data, so that everyone can use it.

GIS is the next step beyond a web browser. The Internet has been in existence for a long time, but it did not become effective and democratized until there was a web browser. GIS is the next step beyond that, because it shows relationships. That will be the key to whether or not the public feels threatened.

Mr. HORN. What incentives do you think are needed to help build Geographic Information Systems' capabilities and to speed up the implementation of the national spatial data infrastructure? Do you have any feelings on the types of incentives?

Governor GERINGER. I would say the No. 1 incentive is just pure advocacy. We should encourage people through demonstration and example how effectively it can affect every aspect of their life in a positive way, and not just through government.

Incentives to engage people at the local level would be competitive grants. It should not be outright subsidizing, but it should be offered in terms of a competitive grant to enable that local leadership that is going to be vital. This has to be thought of as a community tool, an individual tool, not something that government is imposing; and the type that it would encourage that would be most appropriate.

Mr. HORN. So, it is really any data base that the community found was a real need, they might well develop that, and then the system at all levels would be functioning and open to all; is that sort of a conclusion on that?

Governor GERINGER. Definitely, Mr. Chairman. It could be a healthcare issue; it could be an open spaces issue. It could be a realtor looking for quality neighborhoods. Anything that you can visualize in picture format, or a decision that can be drawn from an interrelationship, is a candidate for GIS. So we should not prescribe that only these areas would qualify for a GIS grant. We should say, submit your proposal, and we will evaluate that—the criteria of innovation, community involvement, and personal empowerment.

Mr. HORN. Do any of the Members have questions for the Governor?

[No response.]

Mr. HORN. OK. Well, thank you very much, Governor. We appreciate you taking the time.

Governor GERINGER. Thank you, Mr. Chairman. I certainly appreciate your courtesies.

Mr. HORN. OK, we will have the former Governor of Arizona, and the current Secretary of the Interior. We welcome you to the committee.

If you would raise your right hand?

[Witness sworn.]

Mr. HORN. The clerk will note the Secretary has affirmed.

I might ask you, Mr. Secretary, that if you have any comments to make about the Governor, and the ideas that are being percolated in some of the States, based on your own experience, we would certainly welcome them.

Secretary BABBITT. Mr. Chairman, committee members, I very much appreciate the chance to come here, and the leadership demonstrated by yourself and Congressman Kanjorski in taking up a topic which, so far as I can tell, has never stirred the heart of a single citizen of the United States, and which to this day remains happily unknown to the American community. That, of course, is going to change, and I think this is a very timely hearing.

Now, I appear here as the chairman of the Federal Geographic Data Committee. It is an interesting committee. I have now been chairman—I am going into my 7th year as chairman of this committee. As chairman, I have no power of any kind—[laughter]—except to come to lengthy meetings on a quarterly basis to talk with a rag-tag band of dedicated people from Federal agencies who really care about this stuff.

And for 7 years, we have been under the radar to the point of being totally invisible. We have, I believe, in 7 years, generated two articles in the general press, both of which during those 7 years appeared I think on about page 39 of every newspaper that I saw. That, too, Mr. Chairman and committee members, is about to change. And with your help, I believe can change in a very productive way.

This issue was focused in my mind in January 1998, when the National Academy of Public Administration, which had been commissioned by some of the participating agencies to study this process, issued a report. I commend this to the committee members and everyone else who is interested in this product, and some of the people who participated in it will be testifying today.

The importance of this report, particularly in chapters four and five, is that the Academy study says, you are reaching the limits of this pick-up ball game approach to the organization of the Federal Geographic Data Committee, and the participation, which they say, has really been quite good in terms of the university GIS people, the State parties, and all of the others. But the clear message in this report is we need some legislation to put this together and make a congressional statement about the importance of this.

There are two or three proposals in here that I think are ripe for legislative consideration. I am not sure I would have said that in January 1998. I certainly would have said it in 1995 or 1993. But I think we are there.

The first recommendation that I would focus you on is the committee's conclusion that we need framework legislation to define the Federal effort. The FG—the Federal Geographic Data Committee—as I have already said, is an entirely voluntary kind of tea party. We need to get some starch in this organization now. And we need some direction from Congress about mandates, not to other partners, and not out in the outside world, but internally within the Federal Government.

We are spending billions of dollars on GIS issues all over this government. And I think we have reached the limits of our ability to jawbone, and that it really is an appropriate time for the Congress to look at this and say, OK, we would like Federal agencies to do as follows, and then write the prescription. I would make I think an enormous difference.

The second proposal in here is a very interesting one, and I would urge you, Mr. Chairman, and committee members, to quiz the private sector and State and local governments about this recommendation. The report suggests that there should be a National Spatial Data Council. Now this is stepping outside the Federal family. And the report would have that body chartered by the government, by Federal legislation, but operating outside of government, as a quasi-governmental, essentially private, non-profit organization, which would operate with all of the partners at the table, searching for consensus and standards. I think it is a very significant proposal. There is some division of opinion about it, but I think the committee should look at that very carefully.

Third is a proposal in this report to consolidate within the Federal Government the geodesy and geodesic functions of the government. And this stuff gets pretty technical. But underlying the kinds of things the Governor spoke about is a very basic issue of cadastral survey, geodesy, geodetics. This is basically about how it is this information process is tied the Earth, and how it is that we establish reference points that relate to the shape of the Earth, and how this all works down at the point of contact with the globe. These functions are scattered all over government right now, and there is some very interesting proposals here.

Now, Mr. Chairman, last, I realize that this is not an Appropriations Committee, but I would respectfully suggests that the members of this committee could play an important role internally in the budget process, and I would—rather than going through that—ask you to weigh the comments of some of the other witnesses, particularly, I believe the representative from the National Association

of Counties. But what we have for the coming year is effectively a budget cross-cut, put together by five or six agencies to do the kinds of things that Governor Geringer described, in terms of competitive grants to kind of jump start this process.

Mr. Chairman, committee members, I would be happy to rest. I do not have an airplane to catch. I just got off an airplane, and I would like to get out of here and go sit under a tree somewhere. [Laughter.]

[The prepared statement of Secretary Babbitt follows:]

STATEMENT OF BRUCE BABBITT, SECRETARY OF THE INTERIOR, BEFORE THE HOUSE COMMITTEE ON GOVERNMENT REFORM, SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION, AND TECHNOLOGY, JUNE 9, 1999.

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to appear before you today to discuss the importance of spatial data and geographic information systems technology for the efficient, effective and equitable management of government and business. I am pleased that the Congress and your Subcommittee have taken an interest in this subject. Since the establishment of the National Spatial Data Infrastructure (NSDI) there has been bipartisan support for improved use of geographic information. A succession of reports over the last decade from the National Academy of Science and the National Academy of Public Administration (NAPA) have called for development and full implementation of the NSDI. These reports have also documented the evolution of Geographic Information System (GIS) technologies and the growing importance of geographic information to society and to our nation's economy.

Within the Federal government, agencies have been using GIS and geographic information for many years in program areas such as natural resources and the environment, agriculture, transportation, emergency management, land recordation and census. In recent years the use of this technology has continued to grow into areas such as housing, criminal justice, biodiversity planning, urban growth and development, and business management. In my role as the Chair of the Federal Geographic Data Committee (FGDC), I have been in a position to witness some remarkable changes in the way governments, academia and the private sector think about,

manage and use geographic information and related technologies. And, in my capacity as Secretary of the Interior, I have seen firsthand how high quality geographic data can positively influence the management of our nation's resources.

I believe that there is a movement taking place that is changing the way we do business and is beginning to bring people and organizations together in ways not seen for many years. This is the idea of place as an organizing principle for how we look at issues, how we make decisions and how we manage government and business activities. Place-based problem solving is something that communities have been attempting to do effectively. However, in the past, the information and technologies to support that decision making was not readily available to communities and citizens. Computer systems were not accessible to local neighborhood organizations and citizens, data were stored in file cabinets or in records systems that were very difficult to access and different departments within and between levels of government were each working on their own set of issues. Things have changed and data, technology and government approaches are converging to give communities the ability to work together across sectors to address issues and solve problems.

The work that the Federal Geographic Data Committee (FGDC) and its stakeholders across all sectors are doing to implement the National Spatial Data Infrastructure is crucial to place-based decision making. In simple terms, the NSDI is a collaborative effort to build a geographic or "spatial" infrastructure like the transportation network, or telephone service or electrical power lines. The infrastructure will serve citizens, communities and agencies as a geographic

information resource where common practices and standards will facilitate improved data sharing and use. This data infrastructure will help make data available to address social, economic and natural resource and environmental issues and to reduce a large amount of the duplicative data collection that now exists.

To demonstrate the potential of the NSDI to improve the lives of citizens, we have undertaken six NSDI projects in communities as varied as Baltimore County, Maryland, and Gallatin County, Montana. These community demonstration projects are focused on solving livability issues such as crime, suburban sprawl, and environmental degradation. Early results from two of these projects are noteworthy.

The citizens of Dane County, Wisconsin recently approved a \$30 million referendum to purchase and protect open space. The county's ability to use geographic information and computers to develop visualizations of how the landscape would change under various planning options allowed the citizens to see the potential effects of sprawl, and led to their support for protecting open space through this referendum.

In the Tijuana River Watershed on the U.S.-Mexico border, the development of a geographic information base for the area has served as a catalyst for the development of a network of partnerships focused on improving quality of life. These partners, from government and non-government institutions on both sides of the border, share the need for a common, accessible representation of geography, which the NSDI demonstration project helps accommodate. This

ability of a common geography and communal information system to help achieve a collective purpose speaks powerfully to the need for the NSDI. The NSDI serves as a catalyst for developing effective partnerships across jurisdictional boundaries.

Congress has been supportive of the idea of an NSDI, but more support is needed. As the NAPA report says "In order to help achieve the geography-related public purposes of federal, state, local and tribal governments, and public utilities more effectively and efficiently, the federal government should ensure full and rapid implementation of the NSDI in a cost-effective and cooperative manner." The time is right to speed up the rate of implementation of the NSDI. The Nation's communities are calling for greater assistance in dealing with issues that affect their economic, social, and environmental well being. Many of the problems transcend local jurisdictional boundaries and are best addressed by place-based approaches that require consensus among many stakeholder groups. Communities are looking for leadership, information, and support from the Federal Government. In many cases, ready access to coordinated geographic data from all levels of government and private industry is essential for communities to identify key issues and take necessary actions. Congress can help in several ways.

The first is by supporting the Community Federal Information Partnership:

The Community/Federal Information Partnership (C/FIP) is being developed by the 16 federal agencies that make up the FGDC in cooperation with organizations from State, local, and Tribal

governments, the academic community, and the private and non-profit sectors. The initiative will have two integrated components:

- ◆ A competitive matching grant program to help promote the widespread availability and use of geographic data for community problem solving. This component will increase the capacity of communities to create and use geographic data in decision making.
- ◆ Support for Federal agencies to make their geographic data more readily available to communities. This component will help ensure the full and rapid implementation of the NSDI in a cost-effective and cooperative manner.

The Community/Federal Information Partnership is included in the President's Fiscal year 2000 budget and requests approximately \$40 million for The Departments of the Interior, Agriculture, Housing and Urban Development, Commerce, and Transportation and for the Environmental Protection Agency.

This initiative is gaining support from Members of Congress and is strongly supported by organizations such as the National Association of Counties, the National States Geographic Information Council and the National Association of State Universities and Land-Grant Colleges.

A second way is to continue to urge partnerships and sharing of resources among the major governmental users of geographic data. The early results from six NSDI Demonstration Projects have shown that different levels of government can work together. The Community/Federal

Information Partnership should be more than a budget initiative. Community/Federal Information Partnerships should become common management practice and should play a key role in building the National Spatial Data Infrastructure.

In closing, I would especially like to commend Congressman Paul Kanjorski for his leadership in the recently completed GeoData Forum and for his strong interest in, and support for, Geographic Information Systems. I look forward to working with you and other members of the Subcommittee on multi-sector efforts to help our communities share and use geographic information to address and solve their problems.

Mr. HORN. You would have to leave the Capitol grounds, as some said. When our group came in 1992, they said, "hey, do you know they have got one tree of every type in America on these grounds." We cannot escape the allergies. [Laughter.]

So, we are all sneezing this time of year, one way or the other.

Well, let me just pick up that last point on a council and the representation. We have got some other ones that come to everybody's mind—the Governors' Association, the big city mayors, the small city mayors, the counties, the State legislatures, the international city managers, and on down the line—that would have a direct relevant interest. What do you think about a council that specifies a representative from those particular groups, and others obviously, as well as the professional groups that are involved, that mixes the practitioner with the professional? I have formulated a council once with a good friend of mine, the National Institute of Corrections, and we put space for people that knew nothing about the subject, so they could hold everybody accountable. That was always my role. So I am used to that role, and somebody that is not a practitioner or is not a professional, or is not an elected official, but someone with an interest there, shall we say.

So, I am sure that everybody would have a lot of good ideas on that, but I think it makes a lot of sense what you are talking about.

Secretary BABBITT. Mr. Chairman, if I might briefly respond?

The idea of having community representatives is, I think, very important because it would teach people how to make this comprehensible and interesting. Now, I must say, that is a very hard job. I was once invited to explain the national spatial data infrastructure at a Cabinet meeting, and I could just watch people nodding off all the way around the table, and I finally gave up.

The private sector is the other important piece here.

Mr. HORN. Sure.

Secretary BABBITT. And Mr. Dangermond and others will discuss that.

Mr. HORN. In terms of the standards that are to be developed—and you heard the Governor's strong feelings, and I am sure there are many of our feelings—to go from the bottom up, not the top down. And then the question would be, to what degree would both federally mandated or non-federally mandated standards be related to this, and how do you see that working?

Secretary BABBITT. Mr. Chairman, we have considerable experience with that, and we have developed a number of standards, both what are known as framework standards, which kind of set the table for fitting the data in, and data standards themselves. But we have done that in a consensus-driven process. We do not have any power to mandate anything.

But if you go out there, and you might press Mr. Dangermond about this and see if he is—and others—in agreement, but we have managed to formulate non-binding, non-mandatory consensus standards. Nobody has to do nothing. But almost everybody is, in fact, moving toward implementation of these standards. And I think we can continue that process.

Now, there may be standards issues within particular groups. For example, it may be that this committee would say, within the

Federal family, there are particular issues that would require the Congress to mandate particular things. But in terms of the standards generally used, I don't think there's any need to do that.

Mr. HORN. Do my colleagues have some questions at this point?
Mr. Kanjorski.

Mr. KANJORSKI. I thank you very much. Mr. Secretary, going along with the need for, or lack thereof, a formalized set of standards, I wanted to call your attention to a visit I made to Missouri several years ago at one of the USGS Centers. As a friend of mine, Bill Emerson, and I were going through this center, the leadership took us aside and said, "Do not ever allow the Congress to do what they did the last time." We said, "what was that?" They said, when we were told to map America, it got into a political issue of States' rights, so the determination of Congress was that each State shall award the contract to map its State, and then it would be brought together. When they put the 50 States together, America could not be joined.

What I am particularly worried about is that we just may end up doing something similar. I like a voluntary standard. But there are certain things, it would seem to me, that have to line up and be rather standardized, particularly if we are going to work with—and I am most worried not only that we have standards, but that we have a way of validating the data; that they comport with those standards and the information is actually correct.

I look at this issue starting out almost virgin. We have a few years to try and make sure that it does not get polluted. If we do not, a lot of this information will become axiomatic. We may end up bombing the Chinese Embassy by mistake but nobody will ever believe us.

I do not like to mandate from the top but I think the fact that you bring the issue up is important.

Do you think, with the use of the funding that we are talking about that the administration and the various agencies have requested to get some handle on GIS, we could have some organized thought process as to encourage standards to be pooled, at least, and considered? Or standardized at least in these beginning grants?

Secretary BABBITT. Congressman, all right, I hope you will ask that question of people from other sectors here. And I am going to venture that what you will hear from all of them is that there is not a problem with standards; that we have, in fact, progressively, for 6 years, with the involvement of everybody here, worked out some very basic things. The framework standards are moving. This is how you fit everything together in a national kind of container. And they are being implemented. The data standards are now moving out. This has been an excruciatingly slow process because we have talked and talked and met and met and worked with States and cities and universities and the private sector, but those standards are popping out.

With respect to the quality of the information, the trade calls them meta-data standards, the data behind the data. That one has been worked out, for the most part, by consensus.

Now, the theory is that in this voluntary group of Federal/State, the early users into the system will set a standard which will be-

come the presumptive standard, because it so obviously would be in the interest of everyone. But I would be interested to hear more about that.

It is my feeling that we need not mandate anything in terms of the broader community, which would be encompassed by this National Spatial Data Council. I do urge you to entertain some direction for the Federal partners and how they go about gathering information, because some of them are onboard, and it is going great. Other ones are—you know, I am not sure we are doing it as efficiently as we ought to.

Mr. KANJORSKI. One other question. The President is about to go on a tour, in the beginning of July, of the distressed economic areas of the country that have not benefited from the last 6½ years of economic improvement. Generally, when I get into these areas, whether it is in hearings or investigative mode, I find that, to a large extent, they do not have the building blocks that are necessary to really be competitive, to be attractive for industry, and to develop.

How are we going to stimulate communities like the Mississippi Delta, and a lot of the interior of the United States that have really been passed by and that are on their way, proportionately at least—they are starting to appear to be Third World Nations? If left to their own designs, I am not sure whether I agree with the Governor or not, that he thinks devolution will work. I am not sure it does. In my district, I have seen it not work. That is why it came to my attention. That is why I got involved.

Secretary BABBITT. Congressman, interesting question. In the aftermath of Hurricane Mitch in Honduras, El Salvador, and Nicaragua, this huge relief effort was mounted. And early on, these mapping and spatial data issues became critical because there were no maps, no data. The infrastructure was all out. And in the emergency legislation, the Geological Survey was called upon to provide the kind of thing you are talking about. And I would encourage staffers and committee members to take a couple hours and go out to the center in Reston and let them show you what is up and operating in Central America, because it is really an incredible, powerful display of what can be done from existing satellite resources, merged through the Civil Applications Committee and the other institutions out there.

And I, you know, lay that out to answer—if we can do it in Central America, we ought to be able to do it in the Mississippi Delta as well. Yes, it is a matter of resources.

Mr. KANJORSKI. Is that the role of the Federal Government?

Secretary BABBITT. Absolutely.

Mr. KANJORSKI. Do we have to stimulate?

Secretary BABBITT. Absolutely.

Mr. KANJORSKI. At least that level. Then, if Government wants to get more sophisticated or have its standards changed or modified by private industry or locality, they can do that. At least, we ought to have something of a standard bit of information existing and up to a level that helps put everybody on a competitive equal ground.

Thank you, Mr. Chairman.

Mr. HORN. Thank you. Let me ask you about the U.S. Geological Survey. I have been a long-time fan of that since I had geologists in my family, and I enjoyed taking the courses.

As you look at it, are they pursuing a lot of these data bases or have they not been given appropriate funding in the last several decades? What is your reading on that?

Secretary BABBITT. Well, two thoughts. The National Mapping Division of the GS has undergone a profound change in the last decade, because it used to be a paper map group. When I was in graduate school, we made maps by plane-tableing. We would carry our plane table out there with a rod man, and work the landscape. That stuff is all obsolete. Gone. This is a digital world, and no aspiring geologist is ever going to see anything like that because it all comes out of the sky now.

And the GS is making a transition to a digital data universe. And it has not been without complications, and that is discussed in this report, too. And I would say that the discussion in here is quite fair. The transition is underway, and I think they are getting back into a leadership position.

The Geological Survey has been starved for funding over the last 7 years. The reason is: It does not have a constituency. The constituency for science in this Congress, because of public command, is NASA, big space programs, NIH, medicine. And we are lagging on basic science, and the GS may be the best example of that.

Mr. HORN. Well, I appreciate that comment. And we do have good relations with the relevant Appropriations Committees, and I hope we can be helpful on some of these things.

Secretary BABBITT. Thank you.

Mr. HORN. If there are no more questions from my colleagues, we thank you very much for spending the time with us, and we appreciate it. We welcome any ideas you have or any other thoughts on the way when you find that tree? [Laughter.]

Secretary BABBITT. Mr. Chairman, thank you. Thank you.

Mr. HORN. And do not let anybody call you "Ferdinand," by the way.

OK, panel two, we will start with, and we have a distinguished colleague which will introduce one of the panelists.

Panel two is Mr. Terry Bills, the managing principal planner, Information Services Department, Southern California Association of Governments, otherwise known as SCAG; Mr. Tom Sweet, Pennsylvania GIS Consortium; Ms. Suzanne Hall, assistant county executive, Wayne County, MI. This subcommittee will be in Detroit in the next few months. We are looking at the year 2000 situation. Honorable Victoria Reinhardt, commissioner and chair, Ramsey County, MN. And the Honorable Sue Cameron, commissioner and chair, Tillamook County, OR; Mr. Lawrence F. Ayers, Jr., project panel member, National Academy of Public Administration.

Congresswoman Darlene Hooley is here, a Member from Oregon. And Members have lots of things to do, so we are going to take this group out of sequence, and have you introduce Ms. Cameron.

**STATEMENT OF DARLENE HOOLEY, A REPRESENTATIVE IN
CONGRESS FROM THE STATE OF OREGON**

Ms. HOOLEY. Thank you, Mr. Chair, and other members. It is my pleasure to introduce someone like Sue Cameron, who is commissioner of Tillamook County. As a native Oregonian, people have come to know her by more than just her achievements. Her license plate back home says it all. And it says: NRG. And if you say it quickly, it is what she brings to all situations, a lot of energy.

During her 13 years as administrator of the health department in Tillamook County, she was able to institute a teen pregnancy program that caught the attention of the entire Nation. Under her watch, Tillamook County teen pregnancy rates dropped from 20 per 1,000 down to 7. Sue's energy was at work then, and she is still one of our most respected county commissioners in our State.

She is now bringing people together to solve some huge problems that we have in Tillamook County, with the performance partnership taking on issues like economic development and planning and watershed issues. And probably, more than anyone else, she knows how important GIS is to the rural communities and rural counties. And so I know you will enjoy her testimony, as I am sure you will of all the panelists. And I am glad to introduce one of Tillamook's greatest assets, Commissioner Cameron. Thanks. Thank you, Mr. Chair.

Mr. HORN. Well, we thank you very much for coming and spending some time with us.

If you will stand and raise your right hands, please. Well, let me ask you, are there any assistants that will be talking behind you, because we will swear them all in. All right.

[Witnesses sworn.]

Mr. HORN. The six witnesses affirmed, the clerk will note.

And we will start down the agenda with Mr. Bills, the managing principal planner, Information Services Department, Southern California Association of Governments.

Nice to have you.

STATEMENTS OF TERRY BILLS, MANAGING PRINCIPAL PLANNER, INFORMATION SERVICES DEPARTMENT, SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS; TOM SWEET, PENNSYLVANIA GIS CONSORTIUM; SUZANNE HALL, ASSISTANT COUNTY EXECUTIVE, WAYNE COUNTY, MI; VICTORIA REINHARDT, COMMISSIONER AND CHAIR, RAMSEY COUNTY, MN; SUE CAMERON, COMMISSIONER AND CHAIR, TILLAMOOK COUNTY, OR; AND LAWRENCE F. AYERS, JR., PROJECT PANEL MEMBER, NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

Mr. BILLS. Thank you, Chairman Horn and members of the committee. I appreciate the opportunity to address your committee today and to present a few thoughts on how we might create more effective partnerships between our various levels of government.

Much like some of the speakers that you have and will hear today, we at SCAG feel that GIS technology can provide an effective tool in the decisionmaking process and which can broaden participation in the formulation of public policy. We feel so strongly about that, that we have actually distributed computers, GIS tech-

nology, software, data, and pre-built applications, as well as training to all of the jurisdictions in our area, some 180 cities. At the heart, these applications are designed to help our cities more effectively coordinate their actions, recognizing that we will only solve our very severe air quality and congestion problems in southern California through the joint efforts of cities working together.

The heart of every effective GIS is the data and information upon which this technology depends. While data collection costs have been coming down, it still remains that data is probably one of the most expensive components in a GIS. And in this context, we applaud the efforts of the Federal Government Data Committee, through the national spatial data infrastructure, to encourage the creation of spatial data catalogs which help and seek to make more data accessible to all. I think it still remains, however, that there is too much unnecessary duplication in data collection, with the result that scarce public resources are not being used as effectively as they should. Because different agencies and levels of government have different needs for the information, it is quite common for two agencies to collect the same information at different scales.

We have many examples, and I will not bore you with all the details. But I do think there is considerable opportunity to reduce redundancy among Federal, State, and local efforts.

The root cause of this is ultimately a human one: that data partnerships take time and they take effort to succeed. In various agencies, when the data collection budgets are already approved within individual agencies, we have few incentives to form effective partnerships. Let me state that I think that the technology already exists to make such partnerships easier and to resolve the issues of scale and consistency, which have been the most common objections to such multi-agency coordination.

As an example, in southern California, when we will collect the basic information for our year 2000 land use update, we at SCAG will pay for the cost of the digital ortho-photographs, photos, at a scale appropriate for regional purposes, while partnering with all of the individual cities, to collect the data that are more appropriate for their uses, allowing them to pay the incremental cost difference. While this makes the process a little bit more cumbersome and more difficult, from a logistical point of view, we do it because it is part of our mission to provide wide benefits to our members.

Let me be clear that I do not think this is an area which requires additional regulation, nor should budgets be reduced to bring about collaboration. Rather, I think ultimately we need to change the mission and the incentive structure of agencies to place a premium on the creation of effective partnerships among agencies.

In this context, a role that this committee may wish to consider is to ensure that the performance standards of various Federal agencies also include measures of effective partnering with State, regional, and local agencies. I maintain ultimately that the Federal agencies stand to gain as much from that process as the State and regional agencies.

I think this can be accomplished with little, if any, additional cost to the Federal Government, while ultimately ensuring that the data which is collected will ultimately benefit the greatest number of users.

Additionally, as I think was previously mentioned, competitive grant programs designed to foster such interagency coordination can be effective at bringing down the bureaucratic barriers which have typically prevented data coordination and partnering.

Finally, if I might say a few words about data standards, or what we often called in the GIS community meta-data. The Federal Government has taken I think a commendable lead in attempting to establish common meta-data standards. These are a critical component which allows agencies to effectively share information. But I also think that up to this point, these committees have been, to some extent, among the already converted and among the most technically proficient, but which have missed important components of the community. As one who has attempted to encourage local cities and counties into adopting such standards, I can also point out the difficulty or perhaps even irrelevance of existing meta-data standards to many local governments. It is very difficult to get them to implement what are, at this point in time, quite admirable standards, but also quite complex standards.

The value of GIS technology is too important to relegate to technical experts, but ultimately should be broadened to include a much wider audience. The Federal Data Committee can and should play an important role in this regard. But I think it does need to encompass and broaden to include the entire community. Only in this way can we devise standards relevant to all.

This concludes my remarks, and, again, thank you for inviting me to participate and or consideration of my comments.

[The prepared statement of Mr. Bills follows:]

Statement by
TERRY C. BILLS
MANAGING PRINCIPAL PLANNER
SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

before the
SUBCOMMITTEE ON GOVERNMENT MANAGEMENT,
INFORMATION, AND TECHNOLOGY

of the
COMMITTEE ON
GOVERNMENT REFORM AND OVERSIGHT

U.S. HOUSE OF REPRESENTATIVES
JUNE 9, 1999

Chairman Horn and Members of the Committee:

I am Terry Bills, a Managing Principal Planner at the Southern California Association of Governments (SCAG). SCAG serves as the Metropolitan Planning Organization (MPO) for a six County area encompassing approximately 16 million people. I appreciate the opportunity to address your committee today, and to present a few thoughts on how we might create more effective partnerships between our various levels of government, and ultimately create better public/ private partnerships in the public interest.

We at the Association of Governments feel that Geographic Information Systems (GIS) technology provides an important tool which can aid the decision-making process, and effectively facilitate and broaden participation in that same process. In our desire to more effectively involve our members in solving our quite severe transportation and air quality problems, we have distributed computers, GIS software and applications, data and training to all of our member jurisdictions in Southern California.

These applications address everything from land uses (current and future), future transportation scenarios, environmental and demographic applications, to applications which help cities better understand their local economies, all presented through GIS technology. These GIS applications are designed to help cities more effectively coordinate their efforts, recognizing that we will only solve our problems in Southern California through the joint efforts of cities working together.

The results have been heartening. Many of our local cities have engaged in common initiatives to address such issues as multi-species habitat planning, economic development, and coordinated long range transportation planning through the use of GIS technology. In addition, our Governing Board is presented with a wealth of maps and analyses drawn from GIS, all of which we hope allows them to make more effective decisions in addressing our regional problems.

Data Partnerships

GIS data and information is the centerpiece of the effective use of the technology. We are in a constant process of creating and updating digital information on Southern California. Fortunately costs are coming down significantly with improved technology, but data still constitutes one of the most expensive components of an effective GIS system.

Because knowledge of what data is currently available is so critical to data sharing efforts, we have been active in creating spatial data catalogs, and this effort has been helped along by grants (from the National Spatial Data Initiative of the Federal Government Data Committee) to our California Geographic Information Association (CGIA), and to other Regional Initiatives. In this regard, we applaud the federal initiative to encourage this process.

But it is still the case that there is too much unnecessary duplication in data collection, with the result that scarce public resources are not being used as efficiently as they should. Because different agencies and levels of government have different needs for the information, it is often the case that a federal agency will collect information at one scale, and a state or local government will collect essentially the same information at a finer resolution.

We have a telling example in California where a Regional Agency proposed a partnership with USGS (who were in the planning stages of their own effort) to collect digital ortho-photography at a scale which would be more useful and appropriate to the local cities and agencies, sharing the costs while still achieving the needs of the federal agency. Sadly they were turned away, only to have to replicate the same data for their local efforts.

Such duplication is not limited to federal agencies alone. In California we were able to identify two state agencies and several regional agencies which all collected essentially the same land use information. When all participants were brought together, there was agreement that there should be a coordinated effort, but this has yet to emerge several years later.

Let me state that the technology exists to make such partnerships much easier, and to resolve issues of scale and consistency which have been the most common objections to such efforts. It is the human element which is the main barrier to more effective coordinated initiatives. With pre-existing budgets approved to pay for data collection in the traditional manner, along with various barriers (some real, others habit) which make coordination among agencies difficult, there are few incentives to form effective data partnerships among agencies.

Perhaps because our budget is relatively limited, we have been forced to create partnerships among various government agencies, as well as utility districts and private

companies. Each of our land use survey updates (which typically cost \$600,000 to \$700,000) has been conducted as part of a partnership. For the year 2000 update, SCAG will pay for the cost of digital ortho-photography at a scale appropriate for our regional uses, and then allow the local cities to pay for the incremental cost difference to collect the data at a resolution more appropriate for local uses. While this makes the process somewhat more difficult from a logistical point of view, we do this because it is part of our mission to provide benefits to our members.

I would hazard that few of us see data duplication as an arena requiring additional regulation, but rather, we need to **change the "mission" and the incentive structure of agencies, to place a premium on the creation of effective partnerships among agencies.** Nor would many of us recommend reduction of the budgets of the various federal agencies who currently collect and generate data and information which is used in GIS systems. Most of this information is widely useful and critical for the efficient management of our national resources.

A role which the Committee may wish to consider would be **to ensure that the performance standards of various agencies also include measures of effective partnering with state, regional and local agencies.** It is my contention that the federal agencies are likely to gain just as much from the experience as the local agencies will. By creating such multi-agency partnerships, we have a better guarantee that information which is collected, will benefit the greatest number of users. This can often be accomplished with little if any additional expense on the part of the federal agency.

Because we have a limited number of cases of effective coordination to draw from, another step that this Committee could pursue would be **the creation of a grant program specifically designed to fund joint federal, state and local data and information initiatives.** The purpose would be to not only create important data of common use to multiple agencies, but also to demonstrate to the various agencies the benefit of cooperation and coordination. We need to find effective ways to bring down the bureaucratic barriers which have inhibited agencies from working together. A competitive grant program could provide one such mechanism to foster this type of cooperation.

Data Standards

Finally if I might say a few words about data standards, or what is often called meta-data in the GIS community. The federal government has taken a commendable lead in attempting to establish common meta-data standards. This would include the attempt through federal guidelines of determining what data elements should be included in all meta-data, and the attempt to establish a common meta-data form and content.

The all too often practice when attempting to assemble a new committee (in this case meta-data standards), is to invite the most technically proficient members of the community that one can assemble. While this is a natural inclination, this does not

always lead to the establishment of standards which are widely accepted or adopted. I'm afraid this is the case with the federal meta-data standards.

As one who has attempted to encourage local agencies into adopting the federal meta-data standards, I can also point out the difficulty or perhaps even irrelevance of such standards to many local governments. Instead of attempting to implement the official meta-data standards, we have pursued a more modest approach of persuading agencies to adopt a minimal set of meta-data standards, that are more likely to be implemented by agencies under common day to day pressures. This allows agencies to still successfully share information, and does not wait until all desired information is collected before moving forward. The hope is that over time such standards may be made more rigorous and comprehensive, but also to focus on what is achievable as opposed to what might be optimal.

The larger point of course is that all too often, many of these federal data committees consist of a dialogue among the already converted, without the perspective of those agencies which are just coming to GIS technology. I would argue that we must include as wide a set of perspectives as is possible on many of these standards committees, or we face the risk of non-relevance or worse. The Federal Government Data Committee does have a valuable role to play in setting national guidelines and standards. But the level of participation needs to be significantly broadened if such standards are to be meaningful at all. We are long past the days when such a dialogue was only among a few federal agencies. The value of GIS technology to the nation is too important to relegate to small groups of technocrats, but must be broadened to a much wider audience.

This concludes my remarks. Again, thank you for inviting me to participate in today's hearing, and for your consideration of my comments.

Mr. HORN. Well, thank you very much.

I think one or two might have come in after I noted that your full statement is automatically put in the record when we call on you. And if you could summarize it in about 5 minutes, that would be appreciated, so we have more time to dialog among you and with you.

Our next presenter is Mr. Tom Sweet of the Pennsylvania GIS Consortium. Mr. Sweet.

Mr. SWEET. Good afternoon, Mr. Chairman, and thank you for this opportunity to participate in what I think is a very important event. I think I would like to take you up on your offer of leaning on the testimony that I have submitted, and I will be brief, and hit some of the highlights.

I think that what we need to understand here is in central Pennsylvania we have started to see the evolution of some organizations, like one that I currently represent, the Pennsylvania Geographic Information Systems Consortium, which is working to coordinate GIS in the central and northeastern portions of the State.

I think some of the key concepts that are worth revisiting are the impacts of coordination and locally independent activities that take place at the county levels. Specifically, what I have seen since 1994, or where I have had the opportunity to work with several counties in the center of the State in deploying this type of technology, is that, when they do it separately, some rather dramatic things happen. When you start to get them to work together, and they are starting to do it on their own, some things worth noting, I think, take place.

One of the best examples, I think, is we had a county in central Pennsylvania that went out on a data acquisition process that ended up costing it approximately \$225 per square mile in a 300-square mile county. When we took the same specifications that they used and started to tweak them a little bit for the second time around kind of thing where you can improve them, and we put six counties together, the same process cost \$84 a square mile. That is a significant savings. And I think that when we look at trying to find the resources to coordinate, when we look at trying to find the resources to make these kinds of things happen, we cannot miss the obvious resources that seem to be laying around at the local level.

I think the other thing that starts to happen is that as we look at the day-to-day operations of individual elements of local government, what we are starting to see is that entities like the 911 centers, entities like tax assessment offices, zoning and planning offices, are not embracing GIS because it is a new technology that has got a lot of whistles and bells. They are embracing it because it makes their job easier to do.

And what that offers us is an opportunity, as Mr. Bills pointed out. What we found is the significant costs of a GIS implementation are in the data acquisition and maintenance activities. They can run as high as 70 percent of a particular application. Of those two, the routine data maintenance activities are the ones that continue to linger on and on. What we are finding is that in deployments where the data maintenance and acquisition activities are not including the people who have to do that on a day-to-day basis,

those types of deployments have difficulty surviving and ultimately fail.

I think as we look at what can be done at the State level and the Federal level, what we have to understand is that what we really need to form are true partnerships between the Federal and the State organizations, between the State and the local organizations. We have to include the educational sectors. We have to include the private sectors, all of which have expertise to offer. In that line of thinking, there are a couple of actions that I think would help.

I think we need to provide incentives to local governments to continue to develop NSDI compliance or framework-compliant data sets. All too often what happens is that they see no Federal dollars or no State dollars coming to their data acquisition processes, so they do not feel obligated to do things that might be in the betterment of a larger community.

We need to provide, likewise, incentives for State and Federal Government to demonstrate that they are, in fact, partnering with each other. I think we need to create budget line items that not necessarily take-away moneys in particular sources, but provide some kind of a mechanism for demonstrating that that coordination activity is taking place.

I think, specifically, we need to support and accelerate the NSDI and framework methodologies; try to get that into the field as rapidly as possible. A survey in the State of Pennsylvania has indicated that all of the counties are currently embracing GIS. Many have already begun.

Finally, I think it is necessary to support the community Federal information partnership process. And I think it is important in doing so to support it in such a fashion that creates a mechanism where those resources can be delivered flexibly and efficiently to where they make the most sense. And in my instance, or from my perspective, they make the most sense in the coordination activities of the data acquisition and maintenance process. Thank you.

[The prepared statement of Mr. Sweet follows:]

Documentation from Thomas O. Sweet Jr. regarding the Written Statement submitted to, the Subcommittee on Government Management, Information and Technology, June 9, 1999

I. Personal background

I currently represent the Pennsylvania Geographic Information System Consortium. The Pennsylvania Geographic Information System Consortium is a 501(c)(3) non-profit organization jointly administered by the Wilkes University and Kings College. The Consortium has designed a program to ensure that GIS is implemented in Central and Northeastern Pennsylvania in a manner that best serves the needs of local government, regional planning and economic development organizations, citizens, and businesses while also accomplishing the goals of the NSDI Demonstration Project. The Consortium has entitled this initiative as the *Locally Independent and Regionally Coordinated, Multiple-purpose GIS Program in Central and Northeastern Pennsylvania*. Before that I was employed by SEDA-Council of Governments for the last twenty years. SEDA-Council of Governments is a regional local development district. For the last 15 I was the leader of their Information Technology Group. As Chief of the Information Technology Group, my duties included the regional coordination of the deployment of locally focused and independent GIS in and around the SEDA-COG region in central Pennsylvania. Most recently (1998/1999) I assisted the coordination of the deployment of GIS and 100 / 50 scale data acquisition for the majority of the 500 year flood plain by the Army Corps of Engineers and municipalities along the Susquehanna River. Past accomplishments (1994 – 1998) that are directly relevant, included detailed simultaneous GIS development and 200 scale data acquisition projects for 12 contiguous counties simultaneously with the GIS development and/or 50 and 100 scale data acquisition projects for over a dozen municipalities. These activities have included, GIS Taskforce creation and associated outreach activities like joint purchasing, joint specification and proposal development, joint vendor selection and contract negotiation, training coordination, and personnel evaluation and selection services. My activities have attracted recognition from several sources the most relevant of which are:

- Nov. 1996 - Received National recognition from the National Association of Development Organizations by being awarded it's National Innovation Award for the Regional GIS data acquisition project titled "Regional Aerial Photography Digital Orthophotography"
- Aug. 1997 – Selected as Pennsylvania representative to the U.S. Department of Interiors Federal Geographic Data Committee.
- May 1998 – Only individual elected to two consecutive terms as President of the Pennsylvania Mapping and Geographic Information Consortium.

May 1999 – Received the Presidents award from The Pennsylvania Mapping and Geographic Information Consortium for outstanding contributions to regional coordination of Geographic Information Systems with in the Commonwealth of Pennsylvania.

II. Introduction

The increasing complexity and growth rate of American society and the economy has placed unprecedented demands on public officials, businesses, and citizens to make well-informed decisions about the design and structure of communities as well as environmental resource management. At the beginning of the 20th Century, America's vast tracts of undeveloped land, bodies of clean water, and stretches of clear skies caused public officials to believe that they had substantial discretion when making choices that affected the community and environment.

As the last quarter of the 20th Century began, it became extremely apparent that the nation's natural resources were limited and there was a growing tension between the public's desire to maintain a good quality of life and standard of living. As a result, many public officials embraced the policies known as "sustainable development" and "smart growth" as a way of balancing the goals of achieving both economic prosperity and environmental preservation.

At the federal government level, Vice President Al Gore has been an outstanding leader on this issue and has been very eloquent about the problem as well the solutions. During a speech on September 2, 1998 at the Brookings Institution, Vice President Gore remarked,

"And increasingly, in the 21st Century, a livable community will be an economically powerful community: a place where a high quality of life attracts the best-educated and trained workers and entrepreneurs. A place where good schools and strong families fuel creativity and productivity. A place where the best minds and the best companies share ideas and shape our common future.

So many towns and suburbs are building more livable communities, and showing that you can embrace community development while growing stronger economically in the process. Indeed, first and foremost, our cities, suburbs, and neighborhoods need continued economic growth and strength to thrive."

However, accomplishing this balance is extremely challenging and it requires a precision in the decision making process that previously has been unnecessary as well as unobtainable. Sustainable development and smart growth policies require public officials to analyze substantial amounts of data and develop a very sophisticated understanding of the inter-relationship between society, the economy, and the environment.

In response to this challenge, public officials began to embrace cutting edge information technologies, that combine place (spatial data) with traditional databases (tabular data) to establish systems known as Geographic Information Systems (GIS). GIS could then be used to organize and visualize complex spatial and tabular data relationships. During the last decade, GIS has become an invaluable decision support tool in communities that have had the financial resources, personnel, and leadership to effectively utilize this technology.

Unfortunately, by the early 1990's it became apparent that the power and promise of GIS in many areas of the country had been limited by the four main problems:

- (1) the failure to establish and employ certain nationally accepted technical standards,
- (2) the lack of coordination between local, regional, state, and federal government to collect, maintain, share, and integrate data,
- (3) the unfamiliarity of public officials and government employees with how to use GIS in the decision making process, and
- (4) The scarcity of government financial resources to implement GIS.

Recognizing the need for federal action to address these problems, in 1994 President Bill Clinton signed Executive Order 12906 to establish the National Spatial Data Infrastructure (NSDI) initiative to implement the recommendations of the Vice President Al Gore's National Performance Review (NPR). The NPR determined that the federal government needed to take action to facilitate the establishment of nationally accepted technical standards, better coordinate federal data collection and dissemination efforts as well as to ensure that all levels of government and the private sector GIS industry were working toward the creation of a seamless national spatial data infrastructure.

Executive Order 12906 established the NSDI to support public and private sector applications of geospatial data in such areas as transportation, community development, agriculture, emergency response, environmental management and information technology. The NSDI was designed to be an essential component of well-coordinated national spatial data infrastructure which would provide local, regional, and state government as well as citizen and businesses with access to essential federal government information. It is believed that this information infrastructure would further the "re-invention of government," improve the delivery of government services, promote sustainable economic growth and sound land-use planning, and strengthen the democratic process.

President Clinton designated the Secretary of Interior as the point person to implement this policy through the Federal Geographic Data Committee (FGDC). The Federal Geographic Data Committee, composed of 14 agencies that produce and use geographic data, was charged with coordinating the federal government's development of the NSDI. During the last four years, Interior Secretary Bruce Babbitt has demonstrated strong leadership to ensure that the FGDC implemented the goals of the NSDI.

III. GIS in Local Government

As the 21st century continues to race toward us. The cost of computer hardware continues to fall exponentially while, simultaneously it and GIS software increases significantly in capability. As a result, many county and municipal governments, long recognizing the need, now have begun to make significant investments in acquiring, developing, and maintaining GIS technology(s). During the last seven years I have had the opportunity to coordinate GIS design and implementation for local government in about 1/6th of the commonwealth of Pennsylvania. Currently I am involved with various projects that have been initiated by local and municipal government that will double this area by the year 2000. Some patterns have begun to emerge in my general observations.

1. GIS design and deployment efforts are usually initiated by a single department and **may or may not** be coordinated within a given entity.
2. The efforts of a given element of government **usually are not** coordinated among neighboring entities equal to above or below that element of government.
3. These efforts **are almost never** coordinated with elements of the state or federal government.
4. Data Acquisition and maintenance costs are a function of the intended use of the data, but typically represent 70% of system deployment costs.

GIS is a new and complex technology. Further because of its newness and complexity, there are voids among all levels of government in terms of expertise, experience, and other resources. It was also discovered that the acquisition and implementation of a GIS is neither simple nor a one-time event. To be cost effective, meet the increasingly complex information demands of local government operations, and achieve the reduction in (or at least hold stable) operational costs, GIS data acquisition and maintenance processes must be thoroughly coordinated interdepartmentally within each county or municipality, as well as regionally among various public and private entities. Finally successful implementation requires continuous commitment to maintenance of identified data sources and a monitoring of the systems ability to meet user needs.

Specific patterns could also be detected in the deployment of GIS within County Government as well as within individual departments themselves. Typically in ranked order of the frequency of occurrence the departments that either initiated, coordinated and or financed GIS design and deployment are listed below.

1. Emergency Communications (E-911)
2. Assessment
3. Planning
4. Conservation District
5. Engineering
6. Human Services
7. Law Enforcement
8. Voter Registration

The overwhelming majority of deployments of GIS in local government were initiated by the first three. Further while GIS may have started in one of these departments it almost always evolved to a department of its own, with its own budget, reporting directly to the commissioners office. In addition observations could also be made regarding the operational uses of GIS within these departments as well as some of the factors that typically effect the cost of the design and deployment. The observations for the first two are listed below.

GIS is considered essential for the deployment of enhanced 911. The data elements included most often, at a minimum of 400 scale (1" = 400') usually 200 scale (1" = 200') are:

1. Road Centerlines
2. Edge of pavement
3. Hydrology
4. Buildings
5. Airports
6. Rail Roads
7. Digital Orthophotography

The deployment of GIS in E-911 leads to other activities such as the assignment of new addresses for county residents (readdressing) and field verification of tabular data elements. It is these type of activities that general lead to the discovery of the importance, cost and complexity of the data maintenance aspects of GIS.

GIS in Tax Assessment departments generally accompanies countywide tax reassessment and computer assisted mass reappraisals (CAMA). The data elements included most often, at a minimum of 400 scale (1" = 400') usually at 200 (1" = 200') for rural areas, 100 (1" = 100') in urban areas:

1. Road Centerlines

2. Edge of pavement
3. Right-a-ways
4. Hydrology
5. Buildings
6. Airports
7. Rail Roads
8. Parking lots
9. Land Use & Land Cover
10. Digital Orthophotography

The deployment of GIS in Tax Assessment also entails complex linkages to the tabular database(s) associated with ownership. As these systems mature they result in:

- improved maintenance efficiency
- improved public access capabilities
- improved analysis capabilities in reassessment, Clean and Green, farmland preservation, economic development,
- greater data utility by users

GIS in Assessment is also generally a more complex implementation of GIS requiring:

- digitization of parcel maps
- integration of CAMA data with mapping
- public access facility
- maintenance

IV. The Problem

The capabilities, potential, and momentum of Geographic Information Systems make the question of acquisition, coordination, or generally dealing with this issue a "when" rather than an "if" proposition. Recent surveys conducted in Pennsylvania confirm this as each of the counties polled is, at the minimum preparing for GIS implementation. Many have already begun. All are without the resources to implement regionally coordinated GIS.

The economies of scale that clearly exist and the fact that geographic elements do not respect political boundaries, suggest not merely the desirability of local and regional coordination, but, indeed, the necessity for it if we are to have the greatest potential for success. A comprehensive approach is essential and will reduce implementation costs. The planning and implementation enhancements of the activities of the various departments are justification enough for supporting the deployment of local independent GIS in a regionally coordinated fashion. However, given a few elementary assumptions, an economic or quantifiable justification is presentable.

V. Quantifiable Justification

Quantifiable justification is provided through economic analysis of the impacts on the local level of the cost avoidance resulting from regional coordination. Typically, these savings will be achieved through:

Mistake Avoidance - Good judgment comes from experience. Good judgment results in more efficient allocation of previous resources. Experience comes from overcoming errors in judgment.

Improved Data Management - Including design, development, and implementation of tabular and spatial data elements.

Reduced Startup Times.

Cost-sharing Activities.

Fund Leveraging.

Examples of quantifiable justification for funding the coordination activities can be found in the lessons learned during the data acquisition activities I have been involved in during the last seven years.

First while coordinating GIS activities at SEDA-COG we were able to confirm that significant synergism and economies of scale are obtainable through the regional coordination of this technology. And, that significant strength and resources were acquired by maintaining and preserving independence in the local implementation process. The most remarkable example of this is the %60 savings in the expense of data acquisition for six counties and ten Boroughs in the region. This data was acquired utilizing Aerial Photography & Digital Orthophotography at 200 (county wide), 100 (township and some Boroughs) and 50 (Boroughs) scale data acquisition. When spec'd and priced as a single county the Aerial photography; Ground control; Vertical Control; and Fully Analytical Aerial Triangulation phase of the project cost was \$225 per square mile. When six contiguous counties in the SEDA-COG eleven county region timed, planned, and proceeded in a regionally coordinated manner the same deliverables were obtainable for \$85 per square mile.

It became clear early, as we embraced GIS technology, that one integral and necessary component of success was simultaneous management of regional coordination efforts and issues while preserving local independence in implementation efforts and application creation. Each of the counties have and

continue to recognize the need to establish and maintain rapid, integrated access to their data. Further, these entities have and continue to recognize the necessity of coordinating the tabular data organization and maintenance process(s) with the spatial data collection process(s) both for individual and collective uses. The various entities within the SEDA-COG region recognized that rapid manipulation and integrated access to accurate information strengthens the link between operations and management, permits more accurate forecasts and informed decision making, while reducing or holding stable operational costs and supporting region wide economic development and enhancement.

Second these activities also demonstrated the leveraging potential of funding regional coordination. Between 1994 and 1997 \$500,000 in federal funds were allocated by the Appalachian Regional Commission for the coordination activities necessary for the locally independent deployment of GIS in a regionally coordinated fashion. Unexpectedly, regional coordination activities were responsible for a local investment match ratio of 10 to 1. Local governments who previously had budgeted no funds for GIS invested over 5 million dollars.

Third, during the 1999 flight season the Pennsylvania GIS consortium was able to confirm the existence of a strong relationship between saving potential and the level of detail required, and data acquisition target size and shape.

To begin, one must understand that:

- ✓ The detail level of the deliverables drives expense;
- ✓ The economies of scale are a function of the size of the target area, and;
- ✓ The efficiency of investment is a function of the target area shape.

In other words:

- ✓ The greater the level of detail the greater the expense;
- ✓ The greater the number of the square miles the lower the per square mile cost, and;
- ✓ The perfect target or block area is a square with its sides being of equal length and oriented in the East - West and North - South direction.

As the target area evolves towards a more Linear shape the ratio of perimeter to area increases. This increase can be dramatic and can result in significant expense increases. Larger perimeter and linear shape means more flight lines and exposures as well as overlap at corners. For example a 100 square mile block area (with a forty-mile perimeter and at 800 neg.) might contain 9 flight lines with 225 exposures with 2 tie lines with 50 exposures. A 100 square mile target area that is 100 miles long and one mile wide (202 mile perimeter and at 800 neg.) might contain 32 flight lines with 451 exposures with 9 tie lines and 113 exposures. It is therefore absolutely necessary to clearly understand these

relationships and use these costs for budgetary purposes only. Also to ultimately verify total expenses after the target area(s) have been finalized. To illustrate this process further please review the budgetary costs provided below. The Block Target Area costs listed represent the square mile expenses of various data acquisition processes typically applicable municipalities or drainage basin of a river. The Linear Target Area costs listed below represent the square mile costs typically applicable to a flood plain area a river. The figures have been rounded to facilitate comparison.

BLOCK AREA SQUARE MILE COSTS

Photography scale	800 negative scale	1600 negative scale
Mapping scale supported	1 inch equals 100 feet	1 inch equals 200 feet
Target Area Minimum Size	250 Square Miles	250 Square miles
Maximum Contours supported	2 foot	5 foot
EXPENSES		
Flight costs including Contact prints and Diapositives	\$150.00 with Airborne GPS	\$47.00 with Airborne GPS
Control	\$81.00	\$20.00
Analytics	\$186.00	\$51.00
Planimetrics	\$1,250.00	\$340.00
DEM for Orthophotos only	\$419.00	\$144.00
OrthoPhotography	\$140.00	\$44.00
GIS Processing for Planimetrics	\$50.00	\$14.00
2 foot contour	\$2,433.00	na
5 foot contour	Na	\$1,100.00

NOTE:

Planimetrics above include Street Center Line, Edge of Road, Building Centroids, Hydrology, Railroads, Airports, Wooded Area. Also the price shown is valid if the Digital Elevation Model for Ortho's are done at the same time as the planimetrics. If done separately the square mile price of which ever is done at a later date will increase.

LINEAR AREA SQUARE MILE COSTS

Photography scale	800 negative scale
Mapping scale supported	1 inch equals 100 feet
Target Area Minimum Size	100 Square Miles
Maximum Contours	2 foot

supported	
EXPENSES	
Flight costs including	\$300.00
Contact prints and Diapositives	Pre targeted No Airborne
Control	\$800.00
Analytics	\$600.00
Planimetrics	\$3,890.00
DEM for Orthophotos only	\$906.00
OrthoPhotography	\$750.00
GIS Processing for Planimetrics	\$750.00
2 foot contour	\$3,1100.00
5 foot contour	Na

Planimeterics may include:

Airports & Runways, Borrow Pits & Quarries, Bridges, Building Foot Prints, Canals, Cemeteries, Dams, Ditches (Prominent one only), Driveways (over 100 ') Falls, Lakes & Ponds, Orchards & Nurseries, Parking Areas, Parks over one acre, Piers & Wharfs, Piles (Coal, sand, slag etc.), Pipelines (x-country), Power Generating Stations & Sub-Stations, Power Lines and Towers, Radio Towers, Rail Roads (Centerline of tracks) Reservoirs, Retaining Walls, Rivers & Streams, Roads, Ruins, Sewage Treatment Plants, Smokestacks, Swamps, Tanks, Trestles, Tunnel Portals, Utility Poles, Walls & Fences, and Wooded Areas.

Comparison of the figures above illustrates the dramatic price fluctuations that result from changes in the size, shape, and level of detail, of a given project. This supports and re-emphasizes the importance of proactively controlling these factors. The level of detail specified must coincide with the level of detail required for future work or project outcomes and outputs. Further the process and partners of the project must be managed to maximize the potential impacts of the size and shape of the target area. The size, location and number of prospective partners are critical elements of cost reduction. While increasing the managerial or coordination challenges -- simply put -- the more partners and coordination you have the greater your chances of success.

Finally for illustration purposes and to cite just one example of the cost reduction potential of the partnership process lets combine the two. Separately these two projects would look like:

DESCRIPTION:	SQUARE MILE COSTS OF 500 YEAR FLOOD	SQUARE MILE COSTS OF AMERICAN HERITAGE
phase I		

	PLAIN LINEAR TARGET AREA	RIVER BLOCK TARGET AREA
Flight	\$300.00	\$150.00
Control	\$800.00	\$81.00
Analytics	\$600.00	\$186.00
Total	\$1,700.00	\$417.00

When the flight, control, and analytics of the two projects are combined the square mile costs for the "partners" concerned with the 500 year flood plain area drop to a total of \$417.00. This represents a total savings of 75% that would return approximately \$128,000.00 to the respective budget of the appropriate partners that is a direct result of coordination activities. Further, while the savings potential of future data acquisition phases also depends on the needs identification of each partner they also require strong regional coordination and management. Failure to do so may actually result, not only in the loss of savings but actual cost increases.

VI. Recommendations

Currently there is no functioning coordination in the design and deployment of Geographic Information Systems within and across Federal, State, and Local levels of our government. This lack of leadership and coordination among elements of our Government as well as the private and education sectors has led to millions of dollars of inefficiency and duplicated unnecessary expense. County governments in Pennsylvania alone spent, conservatively over \$35 million on geographic data in the last three years, and are poised to increase that activity. Federal and State agencies develop their own data even though their needs would be better served by the county information. Unless coordinated bottom-up leadership is established this waste of taxpayer dollars will continue. There are pockets of coordination within Federal and State government but these efforts remain isolated and independent. We ignore the power of local, independently deployed GIS at a time when regional coordination for other ends is deemed important.

The most obvious opportunity we have is the annual savings of millions of tax dollars through the coordination in the design and deployment of Geographic Information Systems. The principal benefit to many activities, however, is increased productivity. Data standardization generates uniform information, which can be utilized by all entities. Avoiding duplication frees staff to perform their function immediately rather than collecting the information needed first. Improved reporting capabilities will supplement everyone's abilities to:

- monitor and control growth
- evaluate services to targeted populations
- facilitate planning operations
- enhance command and control activities

- Balance workloads by geographic areas.

The consequences if we act to coordinate are the reduction of costs and increase in the return of our data acquisition and maintenance investments. To do this we must realize that the Federal and State government can not effectively collect, maintain or disseminate the quality of data that is essential for local uses, but that the reverse is true. This requires an evolution away from the top down approach to solving this problem. Design and deployment of Geographic Information Systems **must** be coordinated in such a manner so as to preserve the power, capability, and focus resulting from locally independent installations. Then and only then will any Federal or State wide coordination effort receive the local support necessary for success! The funds currently deployed at the Federal and State level for the purposes of data acquisition that duplicate local efforts must be transferred to the local level in the form of incentives to assure wide spread use of the data.

Our largest opportunity is to have better, more detailed, and timely data at the Federal and State Level by recognizing and encouraging the work being done by local governments. Counties and municipalities acquire and maintain spatially referenced data daily and will continue to do so. They have the detailed knowledge and local access not available to state agencies. Also, simply put they must continue to do so to execute their job responsibilities. Incentives rather than mandates will teach them to share their knowledge and information with "downstream" Federal and State elements of government.

Accepting the concept that local governments know themselves and their citizens brings other opportunities. Our public agency scientists and policy experts would operate with rich data and have time for analysis rather than data collection. Reports to the federal agencies farther downstream would be current and simpler to compile if we all used data in compatible formats and of known quality. Do we believe that the year 2000 Census will accurately reflect the state of our nation if all our base map information is inaccurate? What accuracy is required?

GIS can help us cope with the changes in information management - a study published in Business Geographics magazine showed 60% faster decision-making resulted with graphical versus tabular data. Regional coordination also must prioritize our Web-based GIS of GIS's - i.e. - a graphical database detailing activity, data, and plans statewide. Common uses would include:

- new users searching for similar projects to guide them and avoid mistakes
- search for partners on proposed work
- seek qualified vendors or references
- share legal policy text
- seek competent trainers and their references
- research historic data for long-term studies
- buy and sell proprietary data

The function would be; in essence, a catalog of know-how and geospatial data, and its purpose would be to allow more rapid integration and use of GIS and the related technology at all levels of government.

Another important area is GIS data standards. The most critical areas for data standards are in data format and in data documentation. Without clear documentation of format the task of merging various databases is onerous and costly. Even something as simple as how many columns a database field contains can cost hours of programming time to assess and resolve. What information to include about each tax parcel is critical if that information is to be shared and compared or is required by the analysis at hand. Certain locational data sets are not comparable if their accuracy is not to a minimum standard. Our GIS data in Pennsylvania is not now comparable except where regional coordination has taken place.

It is common for GIS users to pass along data they find useful. In the Commonwealth of Pennsylvania today it is possible to find four (4) different versions of school district boundaries, at least three versions of political boundaries, and any number of road files for any area. They are all of different quality and value, and yield much different results when used for analytical purposes. If someone offered you a sandwich you would at least like to know what it was made of and when it was made. Knowing the origin of data, the methods and purpose of compilation, vintage and format make any interpretation more valid. The term used to describe such information about the data is metadata, and shared use of information requires it. The federal NSDI initiative details how to document one's data and will become a standard.

Several obvious themes emerge:

1. Applications of GIS are expanding rapidly throughout Federal, State, and Local government and only coordinated efforts will make it manageable.
2. Certain data sets provide the framework on which all other data overlays, and those agencies with day to day needs are not those developing them or are redeveloping them due to inaccuracies.
3. We can only make informed decisions if we are aware of resources, opportunities, and ideas. We can use new technologies to be aware together but the quality of our decisions will be a function of the quality and source of the data.
4. Data Standards will accelerate GIS adoption and help us avoid mistakes.

Specific actions that would help:

- ✓ Incentives for local governments, that agree to develop NSDI – Frame work compliant data sets, with complete metadata, in exchange for unrestricted, use of that data.

- ✓ Incentives for State governments that demonstrate they have become meaningful active partners with the local government in the deployment of their GIS and that they are utilizing the data collected and maintained at the county and municipal level.
- ✓ The creation of a National GIS of GIS. This clearinghouse would catalogue all historic, current and planned GIS activities with the goal of keeping all partners involved and informed to avoid duplicated efforts. Additionally, RFP and contract language would be available for new partners, and sources of expertise and experiences clearly documented.
- ✓ The creation of budget line items specifically for coordination activities. These funds would come from within the current budgets, not as an increase, and could be as high as 1-2% of the entire budget. The savings from coordination are proven to be much higher than that.
- ✓ Support and replicate the concept or "locally independent, regionally coordinated GIS deployment. The data acquisition and maintenance cost savings alone make this a necessity.
- ✓ Support and accelerate the adoption and deployment of NSDI in a manner that assures that it will be flexible enough to be able to adapt to the rapidly changing environment of information technologies.
- ✓ Support and accelerate the adoption of Framework data concepts. The Framework data concepts form the backbone of NSDI.
- ✓ Unify, and accelerate the support for the Community/Federal Information Partnership (C/FIP). Make sure that this support flows from a stream line flexible single point of control in the Federal Government to State and Local governments. Make sure that C/FIP guarantees the creation and maintenance of true, partnerships among Federal, State and Local governments. And, finally that the majority of C/FIP resources are brought to bear providing coordination of and by as well as providing incentives to the Local government data acquisition and maintenance process so that their power and leveraging capabilities can be fully utilized.

Finally I wish to thank Mr. Chairman as well as each of the Members of the Subcommittee, for the opportunity to provide input on this important topic. I am excited and encouraged that this committee has recognized the role of Geographic Information Systems as a critical element to the future success of managing our government as well as to our nations ability to compete in the 21st century's digital economy. In particular I would like to thank Congressman Paul Kanjorski for his extraordinary vision and leadership in the coordinated deployment of Geographic Information Systems.

Mr. HORN. Thank you very much.

Our next witness is Ms. Suzanne Hall, who is the assistant county executive of Wayne County, MI.

Let me ask you, Ms. Hall, do you also handle things like the year 2000 Y2K problem?

Ms. HALL. Yes.

Mr. HORN. OK. Well, I hope our staff will get with you before you leave town, because we are hoping to have a hearing in Detroit, and we would love—

Ms. HALL. Oh, very good.

Mr. HORN [continuing]. To hear what Wayne County is doing.

Ms. HALL. We would love to welcome you to Wayne County.

Mr. HORN. Good. Thank you. I thought we would save a little phone calls that way.

So please proceed.

Ms. HALL. Mr. Chairman, and members of the committee, I appreciate the opportunity to be here, and I really appreciate the chairman saying throw out your speech and just summarize it, because I do much better with summary than reading word for word. And the 5-minute time limit made me quite anxious on whether I could get through everything we wanted to say.

Mr. HORN. Don't worry. We will give you another 10 seconds.

Ms. HALL. OK. I am here on behalf of our county elected executive, Ed McNamara, to talk about what we have done in Wayne County, which we think is a model for the rest of the country in how we approach GIS.

A little bit about Wayne County: We are the eighth largest county in the country. We have 2.1 million people; 43 jurisdictions, including the city of Detroit. We are very diverse. We go from the very, very rural to the very urban.

And what happened in Wayne County—we have 6,000 employees—is that the county executive was hearing that the airport was going to develop a GIS application, and environment department, and roads department, and they were all out developing their own little GIS, and he said: Wait a second, let us pull it in, and let us do it together as one GIS for Wayne County. And that is how I view the Federal Government that they are out doing a lot of little GISs, but they are not pulling it together.

Primarily, we need to have an organizational structure that is consensus-based. And what we have done with our partnerships that we have developed with neighboring counties, with the State of Michigan, with the utilities, and with the private sector, is that we will build—in Wayne County we are investing \$14 million—we are different than many other municipalities in that we are putting up the money upfront—\$14 million to build a parcel base map. And we are going to provide it to all our local jurisdictions, free of charge, as we make the same offer to the Federal Government—in exchange for the data elements that we need from those municipalities back to us.

We view this as an opportunity to improve government services to make us more efficient; and therefore, that is the payback in the long-term. We, however, recognize that we cannot do it by ourselves. That is a huge investment from county tax dollars, and we are actually looking for leadership from the Congress, and I have

actually spent the last couple of days talking to members of the Michigan delegation just, first of all, educating them what GIS is, because I am not a technocrat—it took me about 2 years to even know what it means—but educating them and having them understand what it means to their constituents. I mean, that is what this is all about: What does it mean to our community? What does it mean to our neighborhood? What does it mean to our individual families? And I think that that is really the toughest saw of all, is that: How do you bring it to individuals?

So we have been working with our congressional delegation, and we are asking—although you are not at the Appropriations Committee, we understand that—we are asking for your leadership in helping to receive support for the President's Community/Federal Information Partnership, like CFAB, budget recommendations.

Then, how do you go about allocating the money? I would hope that, if, in fact, the funding does become available, the government will look at those places that have developed partnerships and use that as the framework for competitively providing funds to local units. Because getting back to what Congressman Kanjorski had said earlier today at the conference, and then also this afternoon, it is that we are going to be at a point where we have the haves and have-nots within the communities.

We have communities in Wayne County that do not have computers. Yet, we have those that spend millions and millions of dollars to correct Y2K. So we have to make sure that, as we approach GIS, and as we institutionalize it and in providing community services, that we help the haves as well as the have-nots.

So that is a very quick summary of my statement because I would rather spend time in dialog.

[The prepared statement of Ms. Hall follows:]

TESTIMONY

of

SUZANNE K. HALL

before the

**SUBCOMMITTEE ON GOVERNMENT MANAGEMENT,
INFORMATION, AND TECHNOLOGY**

on

**“GEOGRAPHIC INFORMATION SYSTEMS
POLICIES AND PROGRAMS”**

**Suzanne K. Hall
Assistant County Executive for Administration, Wayne
County, Michigan**

June 9, 1999

STATEMENT OF TESTIMONY

Before the

**Committee on Government Reform
Subcommittee on Government, Management, Information & Technology
U.S. House of Representatives**

by

**Suzanne K. Hall
Assistant County Executive for Administration
Wayne County, Michigan
June 9, 1999**

Good Afternoon.

My name is Suzanne K. Hall, Assistant County Executive for Wayne County, Michigan.

Before proceeding, I would like to extend my appreciation to Chairman Stephen Horn for affording Wayne County the opportunity to testify today about our Geographic Information System (GIS) initiative and progress, and the need for more support from the federal government for municipalities committed to local GIS initiatives. Also, I would like to extend my sincere appreciation to Congressman Paul Kanjorski for his dedication and leadership on GIS and his encouragement of partnerships. In addition, I am grateful to the Michigan Congressional delegation for their continuous support.

Wayne County is the largest county in the State of Michigan and the eighth largest county in the country, with a population of 2.1 million people.

Wayne County has 43 municipalities under its jurisdiction, including the City of Detroit. The County is administered by an elected County Executive, Edward H. McNamara, and has an annual budget of \$2 billion. We are responsible for operation and maintenance of 1700 square miles of roads, two international airports, health and community services, environment, parks, adult and juvenile corrections, court system, and all the citizens' vital records.

Like all local governmental entities, Wayne County is daunted by the challenges of running efficient and timely services on a very tight budget. Though difficult, I am happy to report that Wayne County has managed to deliver exceptional services while maintaining a balanced budget for the last 10 years.

In addition to maintaining a balanced budget, our present and future goal is to build a premier, diverse and global county. As the new millennium approaches, we are motivated by the accelerated changes that are defining our era. The tide in government is now shifting. Technology and global economic integration are defining the future

challenges. Daring new initiatives, keen vision, and commitment from our County Executive has turned Wayne County's technological challenges into opportunities.

Four years ago, Wayne County recognized that economic growth, delivery of efficient services, and social responsibilities require accurate, current and well-maintained information. Further, we realized our task could only be accomplished by the proper integration of the right technology. After conducting a county-wide GIS Needs Assessment Study, we concluded that implementing a Geographic Information System (GIS) is essential to the success of the county's mission.

In 1997, Wayne County invested \$14 million from its own general tax funds to build a parcel-based map with two foot (plus or minus) accuracy level. This compares to the United States Geographic Survey (USGS) map, which has an accuracy level of 35-40 feet (plus or minus). All Wayne County departments as well as all the local municipalities under our jurisdiction will use this accurate parcel map to build application layers needed to better manage their daily business operations. Our goal is to incorporate GIS into all of Wayne County's operations. We estimate that the total cost of building all necessary Wayne County GIS applications will exceed \$60 million in the next five years.

Wayne County is proceeding to build a seamless, accurate GIS map. The digitizing of all aerial photography with triangulation, planimetric and street centerlines will be completed in September of this year. By December 2000, we will complete the conversion of 900,000 parcels. Concurrent with building the base map, we are proceeding to build applications in various departments. To date, we have completed applications for emergency management, brownfields, road mobile mapping, and numerous environmental cleanup areas.

With limited resources we are able to proceed only incrementally in achieving our goal. Wayne County is determined to be a leader in this field. With the help of Congress, our county and other counties across the country will be able to form a powerful force to build a uniform, accurate map for the whole country. This, in turn, will enable local governments to provide faster, more efficient, and less costly services to our citizens.

From the beginning of our GIS project in Wayne County, we recognized that the focal point of building such a system is not the hardware and software, but rather the organization, shared information, and uniformity of all requirements and standards between and among all parties.

Before proceeding with the development and implementation of our plans, we formed an alliance and partnership with all our local municipalities, surrounding counties, private sector utility business, and the State of Michigan. We worked with them to ensure that the system is in compliance and appropriate to fit their needs. To avoid duplication of efforts, to provide consistency in the product and to save unnecessary spending, we are sharing the base map with all governmental agencies in exchange for data needed to build our GIS applications. We would like to offer the same opportunity to the federal

government. Improving interface between the federal agencies and local governments should receive high priority.

The cooperation and progress we achieved with our local, regional and state agencies is unprecedented. Together we have been able to introduce and pass the Michigan "Enhanced Access" legislation. Through the bipartisan cooperative efforts of officials and leaders in Southeast Michigan, we are implementing uniform standards and requirements. In addition, through private and public cooperation, we are setting up training and educational programs to teach present and future employees basic and advanced GIS programming. Our partnership extends further than the border of the State of Michigan -- recently we formed a partnership with the Pennsylvania GIS Consortium. The link with other states will provide us access to broader information and will facilitate future system and information integration. The benefits of partnership and collaboration can be demonstrated already in the reduced duplication of efforts and cost savings for each agency.

Today, we are here to ask for increased federal assistance and leadership in the GIS arena. Specifically, we urge the federal government to partner with counties and local communities. Building a superb quality information system requires everyone's participation. I am here to support the President's Community Federal Information Partnership (CFAP) budget recommendations. This allocation is critical to us, as it provides and encourages funding for agencies that participate in collaborate efforts.

Wayne County is encouraged by the cooperation and hard work of several federal departments -- for example, the Interior Department's Federal Geographic Data Committee deserves recognition, along with the efforts of Vice President Gore's Office of National Partnership for Reinventing Government.

Significant as these efforts are, they are still not enough. Every single federal agency must invest in the commitment to GIS if we at the local level are to be ultimately successful. The reality is that local communities need resources from the federal government to help to build their geographic information systems! The cost of instituting a comprehensive GIS system is astronomical. Most municipalities simply do not have the extra dollars in the tax base necessary to fulfill this critical task. The current GIS federal base map, although adequate for our macro needs, does not provide local jurisdictions with accurate information essential to the execution of their daily operations. Millions of dollars are invested in the federal map, only to be rebuilt by the local communities to meet the local needs.

While we believe that federal investments in Geographic Information Systems are critical, we also need to reevaluate the current practice of developing maps and applications on the federal level. When building a federal system we must consider

- who uses the system;
- whether it is utilized by more than one agency;
- whether local government can use it; and
- how accurate the data is.

Today, the Federal GIS initiatives have very limited uses to the local agencies. In order for us to use the system, we have to rebuild it. To eliminate waste and duplication of efforts, we advocate that the federal government form partnerships with local agencies. Local communities enjoy access to data that will allow them to build more accurate and functional maps.

Instead of building two systems, we propose that local governmental agencies build the systems and provide federal agencies with unlimited access. The local communities are eager to work, assist and partner with federal agencies. However, our resources are limited and we need the help of Congress and executive branch agencies to succeed in the long term. Combining the federal government data with the local data, we will be able to truly build a premier Geographic Information System that will allow all levels of government -- federal, state and local -- to deliver better and less costly services.

In closing, we on the local level recognize clearly that social and efficient requirements raise the bar for public performance. Daring new initiatives and cooperative strategies such as GIS applications can turn our challenges into new opportunities. We all feel keen responsibility for the fiscal policies and the health and safety of our citizens. Together we must take the lead to ensure the delivery of governmental services at the most efficient level and in the most cost-efficient ways. The innovative capability of our public servants and the rapid development of new technologies will allow us to achieve our goal of fiscally responsible government. While each of us must play a role, the sum of our collective efforts and cooperative partnering can lead to a better and more prosperous government.

Thank you for your time and dedication to good public services.

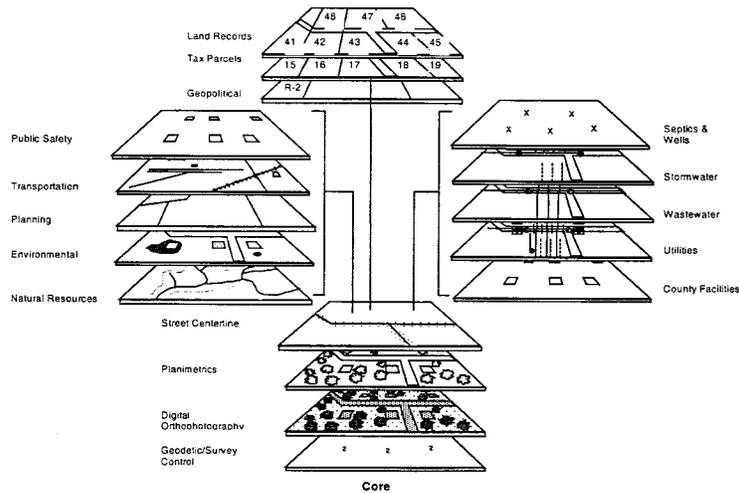
Suzanne K. Hall
Assistant County Executive for Administration
Wayne County, Michigan
600 Randolph, Suite 349
Detroit, Michigan 48225
(313) 224-0446 work
(313) 224-0818 fax
shall@co.wayne.mi.us

WAYNE COUNTY'S GEOGRAPHIC INFORMATION SYSTEM (GIS)

Wayne County recognizes the value and social utility of Geographic Information System (GIS) technology with and between the County, its municipalities, federal, state, and regional agencies and authorities, and the private sector. In pursuit of this goal, the County has initiated a program to develop and maintain a shared access GIS based upon the following major objectives:

- Provide improved Economic Development and Planning decision making at the County and Regional levels.
- Improve quality and efficiency of the County's operations and services. Avoid waste through duplication of cost and effort within the County and between regional entities.
- Enable the County to be more responsive to the needs and concerns of its constituents.
- Facilitate the sharing and transfer of geographic information between/among local and regional public and private sector entities.

Initially, the GIS will provide a comprehensive basemap overlaid onto a seamless high resolution digital-orthophoto. The core basemap will include geographic layers representing cadastral (property and right-of-way boundary lines) transportation, street centerline, geopolitical, environmental, and survey control themes. The following diagram represents a conceptual model of the County GIS data themes:



A Brief History of Wayne County's GIS

In the spring of 1996, the County began preliminary work on its GIS by developing a comprehensive needs assessment and plan for the proposed system. The implementation schedule identified major project tasks and included a five-year, \$14 million dollar plan for developing a countywide GIS. That same year, the County established two inter-departmental committees, a Policy committee to help incorporate the County's vision and direction into the project, and a Technical committee, to ensure that the GIS would incorporate both long and short term business requirements for all County departments.

In the summer of 1997, the County created the GIS Management Unit, under the Office of the County Executive. Together with the Policy and Technical Committees, the GIS Management Unit procured contractual work to assist with the building of the GIS. In the spring of 1998, the County Commission approved these contracts and development of the basemap was underway.

Current GIS Tasks

To date, the GIS Management Unit has initiated several tasks in establishing the GIS program:

1. Aerial photos of the entire County were procured at a scale of 1" = 660'. These photos will also support the production of 2' contours.
2. A seamless Digital Orthophoto database of the County is being developed with a pixel resolution of 6 inches and a ground accuracy of approximately 2 feet.
3. Features such as road centerlines, edge of pavement, rivers and drains are being developed at mapping scale of 1"=100' with an one foot accuracy.
4. Over the past year, the GIS Management Unit has worked with County departments to establish a detailed database design for tax, ownership, and right-of way parcels. Project work has started to convert to automate an estimated 800,000 County parcels. This work is scheduled to be completed by December of 2000.
5. Since the start of this project, the County has been an active participant in the Michigan Geographic Framework (MGF) project. The MGF project involves creating a common road centerline basemap for use by state, federal, county, and local governments and agencies. It is a collaborative effort originally initiated by the State of Michigan, the Southeast Michigan Council of Governments (SEMCOG), and the Federal Census Bureau. This basemap will feature Federal census data, including street centerlines, census tract boundaries, municipal/political boundaries such as voter, legislative and, city that is conflated (fit) to the Framework basemap. In late 1999, these feature rich sets of data will be conflated to the new digital orthophoto and the 100' scale road centerlines. It will greatly simplify and enhance the prospects for GIS applications at the local government level. The same map used to support Wayne County municipalities and County business operations will also be used as the standard GIS data reference map for state, federal, and regional applications.

6. Throughout the project, the County has participated in a dialogue with neighboring counties, SEMCOG, and the State of Michigan in an effort to establish common data sharing standards, which, will ultimately lead to a regional GIS tool. A regional GIS will greatly benefit County municipalities by providing a tool that quickly and efficiently identifies potential areas for development with required proximate resources.

The Future Role of GIS in the County

In the future, the GIS will serve as an integral component of the County's information infrastructure by providing a platform for integrating data across the enterprise. One of the most powerful aspects of a GIS is that it provides an efficient way of linking disparate types of information. For example, there is often sizeable effort required in a plan review process for road construction projects. The reviewing department must analyze different bits of information related to the construction area involving ownership, tax, easement, environmental, utility, permitting, and topological data. The gathering of this information may require numerous calls, extended research, trips to other departments, municipalities, and field locations. Moreover, the format, method, and complexity in the way this information is stored varies significantly across departments and jurisdictions. Alternatively, an enterprise GIS will provide a tool where many different types of information may be associated through common geographic locations. In the plan review example described above, the reviewing department could gather and analyze essential information with much greater efficiency as each piece of diverse information is linked through common spatial locations.

Additionally, the County's enterprise GIS will be utilized as a tool to improve the flow of information and services between the County, its cities and townships, neighboring counties, regional agencies, and both state and federal governments. When completed, this system will be among the largest and most sophisticated of its kind in North America. Together, Wayne County and its surrounding communities are building a tool that is enabling government to be smarter, more efficient and more responsive to its constituents.

Mr. HORN. Well, thank you very much. That is a very helpful statement.

Next is the Honorable Victoria Reinhardt, commissioner and chair of the County of Ramsey in Minnesota. Glad to have you here.

Ms. REINHARDT. Mr. Chairman, members of the committee, I am Ramsey County Commissioner Victoria Reinhardt, Chair, not of the county board, but of the Metro GIS Policy Board.

Thank you for this opportunity to testify regarding Federal Government assistance for implementation of locally independent, regionally coordinated multi-purpose GIS programs.

Since 1995, organizations in the St. Paul-Minneapolis metro region have been working for a sustainable structure for our common geospatial data needs. Metro GIS is an ambitious undertaking to fill that need that has brought together over 250 local units of government.

The board is a broad cross-section of the organizations that have made strong commitments to Metro GIS. The policy board itself is advised by a coordinating committee comprised of over 20 GIS professionals and managers. The Metro Council, which is a regional agency in the seven-county metro area of Minnesota, covering 3,000 square miles and more than 2½ million people, has been a champion for Metro GIS and is committed to achieving the Metro GIS vision. That vision is to provide an ongoing stakeholder-governed, metro-wide mechanism through which participants easily and equitably share geographically referenced graphic and associated attribute data that are accurate, current, secure, of common benefit, and readily usable.

Metro GIS is a stakeholder-governed board and is a work-in-progress. The definition stage will be substantially complete this fall. We abide by guiding principles which include, first of all, policymaker involvement early and throughout.

Second, common business information needs drive the organization. In other words, what information do you need to do your business?

Third, recognition is given to cost recovery as a legitimate practice, and one that must be dealt with head on.

And finally, compensation is needed for tasks beyond internal business needs.

Major accomplishments include a 1998 Governor's Commendation for an Exemplary GIS Project, a partnership that provides access to the Lawrence Group's addressable street center line data set. We have received formal endorsement from all the policy boards of the key stakeholders, and an agreement was reached to appoint a member to serve on the policy board. The priority information needs were unanimously approved, and the data finder is operational and can be found at www.datafinder.org. We are very proud of data finder. We have data- and cost-sharing agreements that have been executed with all seven counties, which levels the playing field for data-sharing, and was something that was mentioned earlier by members of the committee.

And finally, we received a grant from NSDI Framework in 1998 for the Fair-Share Financial Model Project.

Major challenges that are faced by Metro GIS include achieving agreement on benefits received from Metro GIS, and I think, all too often, the needs that we are talking about here are simply taken for granted.

Defining an equitable means to share the cost and securing a stable financing source.

Data practices are an obvious consideration.

And finally, achieving Metro GIS' needs while also trying to ensure that a migration path will be available to achieve objectives of NSDI.

As far as the Federal Government involvement, I believe you should continue to advocate the data-sharing and dialog; provide leadership on development of standards; maintain the grant programs, and consider something such as bridge funding to help establish collaboratives. The Federal Government in the long run will save money. Support benefits research and participate directly in operating collaboratives based on the direct benefit received.

Current Federal efforts are seeking to provide for livable, sustainable communities. Through GIS and data-sharing, we can attack issues such as urban sprawl and improved economic competitiveness. Issues such as these do not recognize jurisdictional boundaries.

In conclusion, we are ready, willing, and able to work collaboratively with you on regional GIS efforts. Again, thank you for this opportunity.

[The prepared statement of Ms. Reinhardt follows:]

MetroGIS*Cooperation, Coordination, Sharing Geographic Data*

June 4, 1999

Congressman Stephen Horn, Chairman
 Subcommittee on Government Management,
 Information, and Technology
 U.S. House of Representatives
 Washington D.C. 20515

**Oversight Hearing on Policies and Programs of Geographic Information Systems
 June 9, 1999**

Dear Congressman Horn:

On behalf of the entire MetroGIS organization, we are honored to have been selected to testify before your subcommittee as a representative of locally focused, regionally coordinated GIS initiatives. We are equally honored to have the opportunity to offer suggestions about how the federal government would be a resource to help regional GIS collaboratives overcome challenges and meet local objectives.

I chair the MetroGIS Policy Board. The Board is comprised of twelve locally elected or appointed officials who represent eleven categories of local and metropolitan government which serve the seven-county Twin City Metropolitan Area. Each member is committed to institutionalizing widespread data sharing among our stakeholder organizations. MetroGIS, like the National Spatial Data Infrastructure (NSDI) project, is founded on the principle that data sharing and collaboration are in the public interest. MetroGIS' philosophy appears to differ slightly from that of NSDI in that we are attempting to address stakeholder perceptions of the degree of benefit received rather than assume benefit is received.

MetroGIS is a work in progress, an ad hoc organization not yet able to operate independently. Even so, I believe the guiding principles we rely upon as we undertake each of our strategic initiatives will permit us to evolve into a sustainable entity. I also believe the work of MetroGIS will have a profound affect on information and data sharing policy as well as substantially increase collaborative data development and data sharing activity in the Twin Cities, possibly the State of Minnesota. The single most important reason for MetroGIS' success to date, I believe, is we took a substantial amount of time early on to understand commonalities among the business information needs of our key stakeholder organizations. We have also remained focused on our ultimate goal to improve efficiency and effectiveness of our stakeholders in their pursuits to improve quality of life and economic competitiveness.

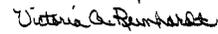
MetroGIS

Mears Park Centre, 230 East Fifth Street, St. Paul, MN 55101
 Tel: (651) 602-1638 Fax: (651) 602-1404

Letter Congressman Horn
Page 2

Again, on behalf of MetroGIS, and with great pleasure I submit the attached written testimony. I also am looking forward to appearing before your subcommittee to discuss goals and issues we have in common.

Respectfully,



Victoria Reinhardt, Chairperson
MetroGIS Policy Board and
Ramsey County Commissioner

cc The Honorable Bruce Vento
The Honorable Jim Ramsted
The Honorable Martin Sabo
The Honorable Bill Luther
Metropolitan Council
MetroGIS Policy Board

MetroGIS

Mears Park Centre, 230 East Fifth Street, St. Paul, MN 55101
Tel: (651) 602-1638 Fax: (651) 602-1404



Working for the Region. Planning for the Future

June 4, 1999

Congressman Stephen Horn, Chairman
Subcommittee on Government Management, Information and Technology
United States House of Representatives
Washington, D.C. 20515

**Oversight Hearing on Policies and Programs of Geographic Information
Systems – June 9**

Dear Congressman Horn:

I am writing on behalf of the Metropolitan Council of the Greater Minneapolis-St. Paul Metropolitan Area. I wish to thank you for your recognition of MetroGIS' philosophies and accomplishments as an example of a successful, locally focused, regional coordinated GIS initiative and for your invitation to testify before your subcommittee on June 9.

The Metropolitan Council is the regional planning organization for the seven-county Minneapolis-St. Paul Metropolitan Area. I serve as the Metropolitan Council's chair and, together with sixteen colleagues, we provide policy direction for the organization. The Council's responsibilities include running the regional bus system, collecting and treating wastewater and managing water resources preservation, overseeing growth management policy, planning regional parks and administering funds that provide housing opportunities for low and moderate income families¹.

In 1994, the Metropolitan Council concluded it needed a parcel-based GIS to support its business operations. We also concluded that a collaborative approach with our local government partners, in particular with the seven counties, was the most prudent course of action. Championing of this initiative was also consistent with the Council's overarching goals to foster collaborative solutions to needs in common with other government entities that serve our seven-county region and with the Council's desire to be recognized as an effective leader in the region.

Since the fall of 1995, the Council has been the sole source of local funding for what has come to be known as the MetroGIS initiative². These resources include in excess of \$1.2 million for MetroGIS' various studies and projects, providing two full time staff dedicated solely to the initiative, and making available the equivalent of an additional two staff positions for special projects and administrative support.

¹ See www.metrocouncil.org for more information about the Metropolitan Council's responsibilities.

² See www.metrogis.org for more information about MetroGIS as an organization, its objectives, and its accomplishments. See www.datafinder.org for MetroGIS's Internet-based tool to search for, view, and obtain data.

MetroGIS is a work-in-progress governed by its key stakeholders, the Metropolitan Council, the seven metro counties, representatives of the municipalities in the region, watershed organizations and school districts. Grant funding received from the federal NSDI Framework Demonstration Project has made it possible for MetroGIS to embark on its final definitional challenges – developing a fair-share cost allocation scheme and identifying an appropriate organizational structure – without impeding progress on other strategic projects underway.

Again, on behalf of the Metropolitan Council, thank you for your interest in learning more about the Twin Cities' MetroGIS initiative. The Council and its partners expect MetroGIS to be able to more efficiently and effectively address issues of quality of life and economic competitiveness and to minimize time consuming costly debates over inconsistencies in data from one jurisdictional entity to another.

Good luck with your hearing.

Respectfully

A handwritten signature in black ink, appearing to read "Ted Mondale", written in a cursive style.

Ted Mondale, Chair
Metropolitan Council

Cc: U.S. Representative Jim Ramstad, District 3
U.S. Representative Bruce F. Vento, District 4
U.S. Representative Martin Sabo, District 5
U.S. Representative Bill Luther, District 6

**SUBCOMMITTEE ON
GOVERNMENT MANAGEMENT, INFORMATION AND
TECHNOLOGY**

**of the
COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT
U.S. HOUSE OF REPRESENTATIVES**

**Oversight Hearing on Geographic Information Systems
Policies and Practices**

June 9, 1999



Statement from

MetroGIS:

A Regional GIS Collaborative Serving the
Seven-County Minneapolis-St. Paul Metropolitan Area

Presented by

Victoria Reinhardt

Chairperson, MetroGIS Policy Board and
Commissioner, Ramsey County, Minnesota

ACKNOWLEDGEMENTS

Principal Contributors: Dr. David Arbeit, Director of the Minnesota Land Management Information Center (LMIC) and member of the MetroGIS Coordinating Committee, and Randall Johnson, MetroGIS Staff Coordinator, Metropolitan Council.

Other Contributors: Rick Gelbmann, Metropolitan Council GIS Supervisor and member of the MetroGIS Coordinating Committee; Jeanne Landkamer, communications consultant to MetroGIS, Trudy Richter, Richardson and Richter & Associates, Inc., member of consultant for MetroGIS Fair-Share Financial and Organization Structure Project; and Craig Skone, GIS Technician, Metropolitan Council; and Mejissa Walker, GIS Administrative Assistant, Metropolitan Council.

For information about this report, please contact:

Randall Johnson, AICP
MetroGIS Staff Coordinator
651-602-1638
randy.johnson@metc.state.mn.us

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The Twin Cities MetroGIS Project and Its Significance to the NSDI

Introduction

Organizations within the Minneapolis-St. Paul metropolitan region have been working together since 1995 to build a sustainable structure for effectively meeting their common geospatial data needs. This effort, called MetroGIS, reflects Minnesota's historical tradition of practical collaborative development and implementation of geospatial information technology. Involving a comprehensive cross-section of public and private organizations doing business within the seven-county metropolitan planning region, MetroGIS evokes an unprecedented level of commitment from its stakeholders to a shared vision. This paper describes that vision, documents some of the progress that has been made towards achieving it, identifies some important challenges facing MetroGIS and the National Spatial Data Infrastructure, and offers some ideas about federal roles in fostering regional GIS collaboratives such as MetroGIS.

MetroGIS: Reflecting Minnesota's Cooperative Spirit

MetroGIS¹ may be the most ambitious multi-participant GIS venture in the country with over 250 units of local government represented by its stakeholder organizations. Conceived in late 1995, it reflects significant commitments of a broad cross-section of organizations: the Metropolitan Council of the Greater Minneapolis-St. Paul Metropolitan Area (Metropolitan Council)²; other metropolitan agencies, such as the Metropolitan Airports Commission and the Metropolitan Mosquito Control District; city councils; county boards; school districts; watershed organizations; state and federal agencies; the academic and non-profit communities; and the private sector.

Organizational Structure. The organizational structure for MetroGIS reflects the strong commitment that has been made. Legislative bodies and policy boards of key organizations have adopted resolutions supporting MetroGIS principles and members from organizations critical to the success of MetroGIS serve on the MetroGIS Policy Board³. The Policy Board is advised by a Coordinating Committee comprised of more than twenty GIS professionals and managers representing participating organizations, while dozens of other GIS professionals serve on MetroGIS teams and special purpose workgroups devoted to identifying workable solutions to data access, data content, data standards, and policy needs critical to achieving the vision of MetroGIS.

Detailed by-laws and operating procedures guide MetroGIS. Adopted by the Policy Board, they provide a basic structure for governance. The Metropolitan Council provides administrative

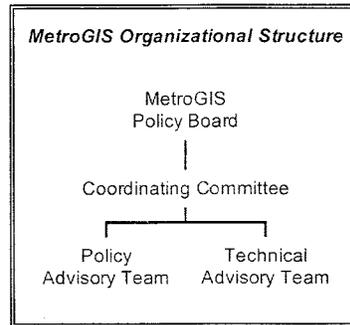
¹ See the MetroGIS Internet site at www.metrogis.org for additional information about the participants, projects, and operating guidelines.

² The Metropolitan Council is the regional planning organization for the seven-county Minneapolis-St. Paul Metropolitan Area. Its responsibilities include running the regional bus system, collecting and treating wastewater and managing water resources preservation, overseeing growth management policy, planning regional parks and administering funds that provide housing opportunities for low and moderate income families. See www.metrocouncil.org for more information.

³ Refer to Appendix A for a listing of the MetroGIS Policy Board members and their affiliations.

support and most of the funding at the present time. The Policy Board and Coordinating Committee meet quarterly. Advisory Teams and their various work groups meet as needed to complete their work, which is generally assigned by the Coordinating Committee. The teams report back to the Coordinating Committee, which recommends actions to the Policy Board.

Although the current geographic scope of MetroGIS is the seven-county region served by the Metropolitan Council, the by-laws and procedures adopted by the Policy Board provide for extending the effort beyond those boundaries. Since the Metropolitan Council serves only the core counties of a much larger Minneapolis-St. Paul Metropolitan region recognized by the U.S. Census Bureau, including three counties in Wisconsin, the organizational framework and the technical protocols for integrating data adopted by MetroGIS must be capable of expansion.



Vision and Accomplishments. A seemingly simple vision guides MetroGIS, forged through an intensive consensus-building process⁴ and endorsed by all local government organizations critical to its success. The vision:

Provide an ongoing, stakeholder-governed, metro-wide mechanism through which participants easily and equitably share geographically referenced graphic and associated attribute data that are accurate, current, secure, of common benefit, and readily useable.

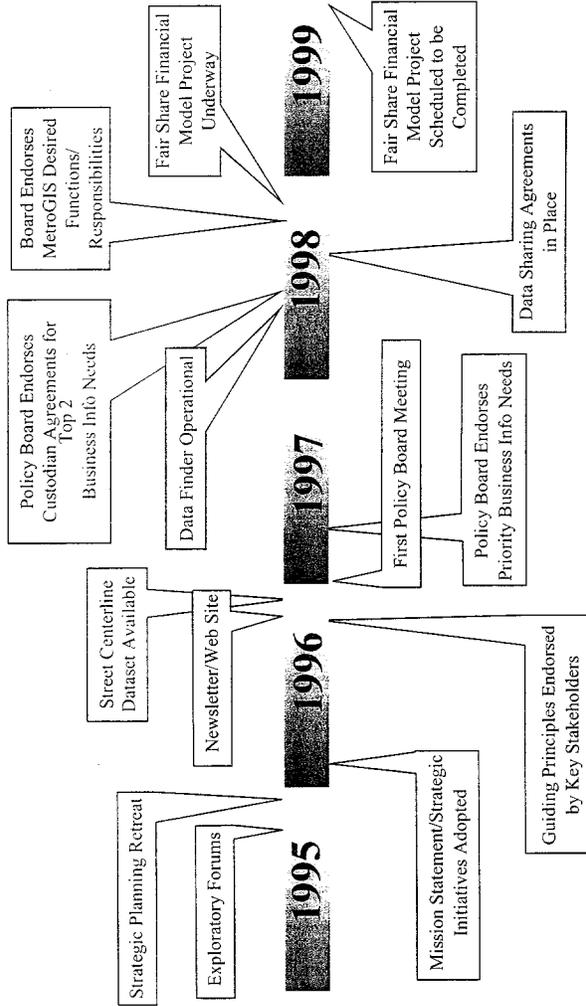
MetroGIS has made significant progress towards fulfilling its vision, thanks to substantial financial and resource commitments made by the Metropolitan Council, several hundred volunteers representing dozens of cooperating organizations, and grant funding received from the National Spatial Data Infrastructure (NSDI) program. A timeline of significant MetroGIS accomplishments is provided on the following page, supplemented by brief descriptions in Appendix B.

Nonetheless, MetroGIS is a work-in-progress, an ad hoc organization not yet able to operate independently. The current schedule calls for the MetroGIS Policy Board to decide on October 27, 1999 whether to seek legal standing for MetroGIS as an independent entity. The Board will also be asked to consider the final components of the MetroGIS definitional phase that relate to adopting an approach for equitably sharing MetroGIS operating costs.

⁴ In December 1995, the Metropolitan Council hosted a strategic planning retreat to begin discussion on how to proceed with creation of a regional GIS collaborative to serve the seven county Minneapolis St. Paul Metropolitan Area. Twenty invited management representatives of public and private organizations, which serve the metro area, attended. Michael Domaratz, former NSDI Framework Coordinator with the FGDC staff, also participated. The majority of the participants agreed to continue to serve as a Coordinating Committee for the initiative. Dr. John Bryson and Charles Finn, University of Minnesota, Humphrey Institute for Public Affairs, facilitated the retreat. Dr. Bryson is a recognized expert on strategic planning and public policy development.



MetroGIS Milestones



MetroGIS: the State and National Context

MetroGIS shares a similar vision with visions adopted by the Minnesota Governor's Council on Geographic Information and promoted for the NSDI. Each assumes that geographic data have significant value and that coordination among data producers can significantly enhance that value while reducing the costs of data development and use. Each also envisions making data available for use at minimal cost to users. Further, MetroGIS⁵ and the state of Minnesota⁶ have both actively contributed to refining and advancing the NSDI vision. Based on these circumstances, it is tempting to conclude that the NSDI vision is a practical goal and that, at least within Minnesota, the pieces will easily and are rapidly fall into place.

But similar visions do not guarantee easy synchronization between MetroGIS, the state of Minnesota, and the NSDI. As a regional organization, the geodata needs for MetroGIS cannot be assumed to be identical to state of Minnesota needs or to the needs of federal agencies. Even within single units of government, geodata needs are often complex. A municipal public works department may legitimately view its data needs differently from the same city's planning department; diverging data needs also are common among county departments, state agencies, or federal units of government. Assuming that locally generated data can be meaningfully pieced together to form coherent regional, state or national data collections requires a huge leap of faith. Simply stated: one size does not fit all!

The NSDI vision⁷ assumes that any organization may contribute to the NSDI framework by integrating data for a geographic area contributed by local governments, state and federal agencies, the private sector and other organizations. Such organizations, called *data integrators*, would format the data to agreed upon standard specifications. In local areas, organizations would work together to create large-scale data. These data would be aggregated by data integrating organizations needing more generalized data for larger areas. This would be a plausible scenario if the geodata needs of all organizations within an area were identical and the costs of integration were trivial. But the reality is quite different — organizations have different data needs and the costs of integration are real! The vision requires willing data contributors and willing data integrators. Therein lies a key question: why would organizations choose to assume those roles?

MetroGIS makes a practical assumption that organizations cooperate out of self-interest. Very early, participants agreed that they would be asked to support the "data sharing" ideal only if it met their own business needs. In other words, MetroGIS must serve a diverse collection of functional ends, not data sharing for its own sake. For MetroGIS, the principal stakeholders are the Metropolitan Council and the over 250 local units of government that serve the seven county

⁵ MetroGIS staff has participated in a number of FGDC meetings concerning the NSDI and FGDC staff has shown great interest in MetroGIS as a model for other regional GIS collaborative projects. MetroGIS has received an NSDI Framework Demonstration grant to identify and assess some of the organizational issues of sustainable regional geodata collaboration.

⁶ The Minnesota Governor's Council on Geographic Information is recognized by the FGDC as an NSDI cooperating state organization. Its member organizations have contributed to creating, reviewing and promoting standards for data and data documentation, helped guide creation of a Minnesota Geospatial Data Clearinghouse node, and coordinated other NSDI activities within Minnesota.

⁷ Federal Geographic Data Committee. 1997. *Framework: Introduction and Guide*. Federal Geographic Data Committee. Washington, D.C.

Minneapolis-St. Paul Metropolitan Area — counties, cities, school districts, and watershed districts — few of which need geodata for the same purpose or use it in the same form. The principal challenge for MetroGIS is to meet the geodata needs of these organizations without costing them more in resources or time than would otherwise be the case if they developed or integrated the data themselves.

To succeed, MetroGIS must clearly identify benefits to stakeholders to justify the resources they will be asked to commit to collaboration. Costs are a significant issue. In some cases, the data-sharing goal threatens stakeholder revenue streams — sometimes real; sometimes imagined. This issue, too, must be addressed fairly and practically. The answers will be important to MetroGIS and to the NSDI.

Based on this "self-interest" assumption, MetroGIS is guided by several fundamental principles, including the following.

1. **Actively Involve Policy Makers.** The MetroGIS Policy Board was created to include high level representation of key stakeholders and to keep MetroGIS focused on stakeholder needs. The Board has set the direction for strategic initiatives, provided a reality check for proposed courses of action, identified appropriate areas for collaboration and, of course, set policy.
2. **Promote Understanding.** To help Policy Board members understand the value of geodata and GIS, Policy Board meetings include demonstrations by organizations represented on the Board using GIS to support their business operations and to point out benefits associated with data sharing.⁸
3. **Seek Consensus on Policy Decisions.** Consensus among Policy Board members is sought for courses of action on issues and opportunities fundamental to MetroGIS.
4. **Represent Diverse Perspectives.** MetroGIS decision making derives from work performed by broadly representative committees and workgroups, comprised of managers and technical staff with appropriate expertise, which identify common needs, develop work programs, and formulate solutions to these needs.
5. **Maintain Focus on Business Information Needs.** MetroGIS took pains to identify common business information needs of key stakeholder organizations and embarked on a regional geodata strategy consistent with these common needs.
6. **Focus on Stakeholder Benefits.** Identifying stakeholder benefits is fundamental to strengthening commitments to MetroGIS, whether or not benefits can be precisely measured. Identify and communicate the benefits.
7. **Acknowledge Fair-Share Contributions.** Contributions to the sustained operation of the regional collaborative, from any one stakeholder, may be in the form of funding, data, and/or people and equipment.
8. **Compensate for "Costs of Collaboration."** No stakeholder organization will be asked to perform a function for the collaborative, which exceeds their internal business needs, without appropriate compensation.

⁸ See Appendix I for an overview of one benefit associated with each level of government, five of which are represented on the MetroGIS Policy Board. This material was shared with the Board at its first meeting in January 1997.

The Metropolitan Council as Project Champion

The Metropolitan Council is a metropolitan government organization charged by the Minnesota State Legislature to provide leadership that results in policies and mechanisms to wisely use land resources within the seven-county Minneapolis St. Paul Metropolitan Area and to cost-effectively operate regional systems for transit and wastewater treatment.

In 1994, the Metropolitan Council concluded it needed a parcel-based GIS to support its mission. It also concluded that a collaborative approach with its local government partners was the most prudent course of action for achieving this goal. The Council also concluded that championing a regional GIS collaborative was consistent with its over-arching corporate goals to foster collaborative solutions to needs in common with its local government partners and with its desire to be recognized as an effective leader in the region.

In October of 1995, the Metropolitan Council and the Minnesota Land Management Information Center co-sponsored two informational forums to assess support for pursuing a regional GIS and for the Council to facilitate the effort. Over 150 people attended these forums. Strong support was received for both concepts. In 1995, recognizing that a regional GIS could simultaneously address two of its high priority corporate goals, the Council approved a statement of its role in facilitating the creation of a regional GIS (Appendix C) as recommended by the MetroGIS Coordinating Committee. Subsequently, the Council authorized additional staff for the project; funding for data and cost sharing agreements with each of the seven counties; and funding for outreach activities, general program administration, team support, pilot projects, and strategic initiatives to acquire institutional and technical knowledge needed to implement a regional data sharing mechanism.

Through May 1999, the Metropolitan Council has contributed in excess of \$1.2 million in project funding, in addition to four FTE in staff support. Other sources of project financing have been about \$380,000 from the Minnesota Department of Transportation for a master data license and maintenance agreement for addressable street network data and a \$100,000 NSDI Framework Demonstration Grant awarded for the MetroGIS Fair-Share Financial Model and Organizational Structure Project (see the Strategic Initiatives section).

The Metropolitan Council concluded it would be difficult, not to mention extremely time consuming, to obtain significant financial contributions from other stakeholders until they acknowledged the benefits of a regional GIS. By removing the financial risk of participation, the Council cleared the way for essential stakeholders, regardless of their philosophy and financial resources, to actively participate in strategic decisions that have shaped MetroGIS.

MetroGIS Strategic Initiatives

Several MetroGIS strategic initiatives are currently in progress. One is complete. The following initiatives address needs critical to the success of MetroGIS and achieving its vision.

1. Obtain Endorsement From Key Stakeholders

This initiative is complete. In spring 1996, immediately following agreement on a mission statement and high level goals for a regional GIS, a stakeholder classification scheme was devised⁹. By December 1996, all eleven "essential stakeholder" organizations had approved a

⁹ The scheme is posted at the MetroGIS web site at [www.metrogis.org/organization/who are the stakeholders](http://www.metrogis.org/organization/who%20are%20the%20stakeholders).

resolution (Appendix D) endorsing the MetroGIS principles and had appointed one of its members to serve as a member of the MetroGIS Policy Board. The Policy Board met for the first time in January 1997. The members and their affiliations are listed in Appendix A.

2. Execute Data and Cost Sharing Agreements

Geospatial data assembled by local governments within Minnesota is often distributed for a fee and with restrictions. Minnesota law permits cost recovery for datasets developed by government that have commercial value and whose development involved substantial public investment. For instance, most counties within the region currently maintain some cost-recovery policy for their parcel data as does the Metropolitan Council charges for its existing land use and other datasets.

The first phase, securing the agreements, is complete. In accordance with its MetroGIS facilitation roles, the Metropolitan Council entered into interim data and cost sharing agreements¹⁰ with each of the seven counties in the Twin Cities Metropolitan Area. The focus is now on administering the provisions of these seven agreements. They foster a collaborative environment for testing solutions to technical and organizational obstacles to data sharing. The Council provided more than \$635,000 to the seven counties to assist with local GIS data and systems enhancement projects that have regional significance as an incentive to the counties to share, without cost other than any modest costs for reduction, their data with all government units.

Each of the agreements has a three-year term and is intended to be superseded by agreements with the MetroGIS Policy Board. Two of them will expire on December 31, 1999. Extensions will be sought if the MetroGIS Policy Board decides to seek legal standing. Each of the seven Counties has or will receive funds ranging from \$49,500 to \$160,700 for GIS program and data enhancements that have significance for defining and implementing components of a regional data sharing mechanism. In exchange for these funds, each of the Counties has agreed to:

- share their geospatial data with all government organizations serving the region during the term of the agreement,
- facilitate the creation and foster operation of a GIS Users Forum for local government within their respective boundaries,
- actively participate in these forums and in the MetroGIS decision making process to address GIS issues and opportunities of common interest,
- abide by common rules for data access/distribution,
- maintain logs of the data they share, and
- provide the data sharing logs to MetroGIS to support research on the benefits of data sharing.

3. Define Priority Information Needs

¹⁰ See <www.metrogis.org/publications/index of MetroGIS Publications in PDF Format/Moving MetroGIS From Concept to Reality: An Overview of the Metropolitan Council's Data and Cost Sharing Agreement Initiative> for more information about the objectives and expectations.

MetroGIS participants have worked hard to reach consensus about their collective priorities. The Business Information Needs Project has been especially important. This multi-purpose, consensus-based, broadly representative process was devised to:

- identify priority regional information needs information needs common to stakeholder organizations, in particular those represented on the Policy Board,
- identify data needed to answer each priority information need,
- identify primary and regional data custodians and their responsibilities, and
- define critical standards, integration and aggregation specifications, and institutional policies necessary for MetroGIS participants to share commonly needed priority data.

An Information Needs Forum and three Business Object Framing Modeling Sessions held fall 1996 were the initial events for the project. A survey followed in February 1997 to narrow the field of distinct information needs from 87 to the top 13. The highest priority information needs are not only significant to the internal business operations of a variety of key MetroGIS stakeholder organizations, but are also highly dependent upon others for the data to address these information needs. In the near future, a summary of the ranking methodology used to identify MetroGIS' highest priority information needs will be available on the MetroGIS web site. Dr. David Arbeit, Director of the Minnesota Land Management Information Center (LMIC), and Dr. William Craig, Associate Director of the Center for Urban and Regional Affairs at the University of Minnesota, designed this methodology.

Thirteen priority business information needs¹¹ were identified for MetroGIS. A consensus-based process also was created to identify desired specifications for data needed to answer each priority information need and candidate custodians for these data and their responsibilities. The seven NSDI Framework Functions, as outlined in the Framework Handbook published January 1998, have been incorporated into the methodology.

Work on the top MetroGIS information need, "location of MCD (city and township)/county jurisdictional boundaries", is complete. The Metropolitan Council has accepted responsibility to serve as the regional custodian and has developed the regional dataset. Preliminary work has been initiated on data specifications for regional school and watershed district jurisdictional boundary solutions. A partial solution has been implemented for the "addresses for people, places, and things" information need through a public-private partnership. This partnership between the Metropolitan Council, Mn/DOT and The Lawrence Group (TLG) provides free access to TLG's addressable street centerline dataset by government and academic institutions that serve Minnesota. In October 1998, the Governor of Minnesota awarded a Commendation as an Exemplary GIS Project to this partnership. Desired data specifications for the MetroGIS census geography information need are substantially complete and desired regional specifications for the parcel, future land use and existing land information needs should be complete fall 1999. MetroGIS is collaborating with the Minnesota Governor's Council on Geographic Information to develop specifications for the MetroGIS hydrology information need.

¹¹ More than 120 persons representing governments, private and non-profit sector interests and academia serving the metropolitan area were asked: *what information do you need to do your job?* More than 800 individual responses were received, which were consolidated to 87 mutually exclusive categories. A similar group was surveyed to rank the 87 needs on the basis of importance to the respondent's organization and the dependence on other organizations for data. On May 28, 1997, the MetroGIS Policy Board endorsed 13 of the 87 as priorities. These are listed in Attachment E.

4. Implement Internet-Based Data Search and Retrieval Tool

Core functionality for Data Finder (www.datafinder.org), the MetroGIS internet-based data search and retrieval tool, became operational in April 1998. Data Finder is designed to facilitate data sharing by providing a means to quickly search metadata for data holdings relevant to specific needs and facilitate data retrieval. The concept is similar to that of the NSDI Clearinghouse. Consequently, there has been close coordination between the Data Finder project and Minnesota's Geospatial Data Clearinghouse, a node of the NSDI Clearinghouse infrastructure.

Emphasis for the past year has been on identifying incentives to institutionalize widespread development of metadata by MetroGIS stakeholders for their data holdings in a standardized format endorsed by the Minnesota Governor's Council on Geographic Information. Emphasis is on documenting data associated with the high priority regional information needs. The standardized metadata is then posted with the Data Finder database to enable it to be searched over the Internet. The findings and recommendations of this metadata facilitation effort will be presented at the 1999 National URISA Conference and summarized in a paper entitled "Making Metadata Part of Your Daily Diet." An expanded version of this paper will also be available on the MetroGIS web site.

In addition to continuing to encourage MetroGIS stakeholders to develop and post metadata with Data Finder, the next phase of the Data Finder project will involve expanding its functionality.

5. Identify A Sustainable Long Term Financing and Organizational Structure

Addressing this strategic issue is currently the highest priority of MetroGIS. A \$100,000 NSDI Framework Demonstration Grant has been received to assist with this effort. A peer review forum is proposed for August. MetroGIS Policy Board consideration of the findings and recommendations is scheduled for October 27, 1999. At that time, the Board will be asked to decide if sufficient public purpose exists to seek legal standing for MetroGIS. If so, the Board will be asked to act on recommendations to secure sustainable financing for the organization and an appropriate organizational structure to move MetroGIS to the next level. Several assumptions (Appendix F) have been approved by the Policy Board to drive the development of the cost allocation model. They include recognition of previous investments, in particular by the Counties as producers of primary (source) data, recognition of existing formal partnerships between counties and local governments located within the counties, and acknowledgment that contributions cannot exceed perceived benefit.

The project consists of the following four major tasks:

Task A: Clarify Roles and Responsibilities

Outcomes/Deliverables: Identification of the roles, responsibilities and tasks beyond the business needs of MetroGIS stakeholders that are necessary to the functions which the Policy Board adopted for MetroGIS (Appendix G) in September 1998. These include executive guidance, monitoring, communication, advocacy, and support for MetroGIS Data Finder as well as regional data development and management responsibilities associated with each of our thirteen priority information needs. The roles and responsibilities for Framework Collaboratives, as presented in the NSDI Framework Handbook, provided the starting point for this task. High level differences between roles and responsibilities identified for MetroGIS and those identified for NSDI will be documented. Cost estimates to carry out these tasks for MetroGIS will be provided.

Challenges: Development of roles and responsibilities scenarios must balance the needs of prospective primary data producers, area integrators/regional custodians, and data consumers. No proven models exist to accomplish this balance. Consensus on a solution is necessary to achieve widespread participation.

Task B: Estimate the Costs of Tasks Identified In Task A

Outcomes/Deliverables: A realistic estimate of the “costs of collaboration”. That is, the tasks and their associated costs beyond the internal business needs of the stakeholders but necessary to sustain operation of a mature MetroGIS organization.

Challenges: Completing Task A in a timely manner and accurately estimating the level of expertise and amount of time needed to accomplish each of the tasks. No proven models consistent with MetroGIS’ needs exist to our knowledge.

Task C-1: Design Fair-Share Financial Model

Outcomes/Deliverables: A politically-acceptable cost allocation model that equitably distributes the “costs of collaboration” among the stakeholders consistent with their perceived benefits from MetroGIS.

Challenges: Defining “perceived benefit”¹² and developing a scheme that balances amount of contribution with perceived benefit. Defining a means to balance the value of non-cash contributions, in particular, the relative value of data that addresses priority information needs against the need for cash contributions to fund administrative and maintenance needs of MetroGIS.

Task C-2: Identify Appropriate Legal Organizational Structure

Outcomes/Deliverables: A politically-acceptable organizational structure to sustain the stated mission of MetroGIS and a high-level implementation strategy, including any legislation needed to achieve any authorities not currently available. The implementation plan will include options for an agency to which the MetroGIS organization could be assigned, number of staff positions, and their responsibilities.

Challenges: There are no proven models consistent with MetroGIS’ needs. An acceptable balance among decision-maker representation must be achieved between primary producers, regional custodians/area integrators, and data consumer interests. Board consensus is a must if there is to be widespread participation and if any Legislative approval will be required.

6. Finance Pilot Projects with Regional Significance

The Metropolitan Council, acting in its MetroGIS facilitation role, has financed three pilot projects outside of its GIS Data and Cost Sharing Agreements with the seven Metro Area Counties. They are: facilitating a GIS Data Fair, mapping land use designations in Dakota County, and assisting the North Metro I-35W Corridor Coalition implement its GIS “backbone” GIS database. The latter is the most significant, resulting in a subregional “backbone GIS” database including integrated: parcel, future land use, existing land use, and zoning data.

¹² We will be relying upon three surveys/studies from which to craft these financial equity policies and definitions (1997 MetroGIS Information Needs Study, 1998 NSGIC survey-Minnesota component, and Dr. William Craig’s 1999 MetroGIS Benefits Study funded with an NSDI Benefits Grant).

The Coalition is comprised of seven cities, located in two adjoining counties within the MetroGIS project area. The business needs the Coalition is attempting to address with GIS technology are similar to the business needs of MetroGIS stakeholders throughout the seven-county region. Specifically, the Coalition developed its subregional GIS to address the following objectives:

- Expand conventional land-use planning methods by applying livable community goals and objectives;
- Approach physical, social, and economic development issues in an integrated and multifaceted manner;
- Work at a subregional level to bridge the gap between regional policies and local circumstances; and
- Implement the policies and strategies outlined in the Twin Cities Metropolitan Council Regional Blueprint.

In addition to addressing similar business needs to those of many other MetroGIS stakeholders, the technical GIS procedures developed by the Coalition to merge parcel data from two counties are directly relevant to technical hurdles that MetroGIS must resolve. MetroGIS is currently evaluating the policies and procedures developed by the Coalition for their applicability to MetroGIS needs.

In Appendix H, a detailed summary of the Coalition's leading edge work is presented in a document entitled "Using GIS In The Multijurisdictional Planning of Diverse Metropolitan Communities." This paper will be presented at the 1999 Nation URISA Conference in August.

MetroGIS Challenges and Issues

The MetroGIS vision that emerged out of public forums and strategic planning events held in 1995 continues to drive the active involvement of organizations within the Twin Cities metropolitan region. With the Metropolitan Council acting as a patron, offering significant start-up funds and staff support, tangible benefits have resulted, some of which are referenced in this paper. Still, the long-term future of MetroGIS is unclear: no permanent structure has been created, no stable source of funds have been committed, and data sharing agreements and license arrangements that currently facilitate extensive data sharing among MetroGIS participants will soon end.

This fall, the results of the MetroGIS NSDI Framework study will offer recommendations that may help resolve some of these uncertainties. But even with such recommendations, a sustainable MetroGIS will not be guaranteed. The following are some of the more evident challenges and issues that must be overcome, presented in no particular order.

1. **Clarifying Benefits for Data Producers.** MetroGIS has clearly benefited MetroGIS stakeholders who depend upon other organizations for data, especially organizations that depend on data from more than one data producer. School districts and watershed districts are good examples, especially when their jurisdictions cross county lines. Reliable and useful geodata that costs them little allow such organizations to fulfill their missions more effectively at reduced costs. However, counties are the primary data producers within Minnesota and depend only marginally on other organizations for most of the data they need.

The case for county participation — essential for MetroGIS success — can be greatly strengthened if the benefits to them of data from other sources can be more convincingly documented.

2. **Developing Practical Common Data Specifications.** MetroGIS has identified its highest priority information needs, based upon public forums and formal surveys, and is working to develop clear data specifications to appropriately address those basic needs. Some of the data needs parallel the NSDI framework data elements, but others reflect local priorities. General specifications have been developed for some of the highest priority data, such as municipal boundaries, and de facto specifications have evolved for some others, such as an addressable transportation network. In all cases, adopted specifications must be supported by strong consensus. Developing data specifications that both work and receive consensus support requires a significant investment in time, resources and personnel. This is a challenge with no obvious solution.
3. **Respecting Costs of Collaboration.** MetroGIS participants, whether active on its Policy Board, its Coordinating Committee, or its working committees, have made a huge investment to help carry MetroGIS as far as it's come. These investments cannot be continued forever without obvious benefits or some form of compensation. As protocols for integrating local data within a regional data infrastructure are implemented, some organizations may potentially incur new costs to adapt their data to be compatible with that infrastructure. These collaboration costs must be fully understood so that organizations can be fairly compensated for work not needed to meet their own needs.
4. **Adopting a Workable Organizational Structure.** MetroGIS still functions without legislative authority as an informal organization supported by the Metropolitan Council. Alternative legal structures are currently being evaluated as part of the NSDI Framework grant. A recommendation will be presented at a public forum later this summer and to the MetroGIS Policy Board in the early fall. Identifying a workable structure that can be supported by the principal MetroGIS stakeholders and then implemented is a significant obstacle to overcome and is directly linked to funding options.
5. **Securing Adequate and Stable Funding.** Based upon the MetroGIS experience, the ongoing costs for maintaining basic support for MetroGIS is in the \$400,000 to \$500,000 range, depending upon the level of staff support for committees and the pace of development for some technical needs related to web site maintenance and data distribution. These costs are above and beyond what organizations already spend to meet their own geodata and GIS needs. They do not include data integration efforts beyond those that meet the immediate needs of the Metropolitan Council or data development costs for other regional needs. Nor do they include the costs for "data sharing incentives" such as those that made active data sharing possible thus far.
6. **Adapting to State Data Practice Laws.** Minnesota laws governing data access, privacy, intellectual property, and cost recovery were reviewed by a state Information Policy Task Force that made some very significant recommendations in a recent legislative report. Controversial recommendations were considered but not approved during the 1999 legislative session and will be reintroduced next year. Several of these directly affect the current ability of government to charge fees for data. Most local governments oppose the change, especially those that classify their geodata as having commercial value. The challenge is double-edged: while eliminating most data fees potentially removes a major

barrier to data access, it also may curtail funding for geodata development and constrain MetroGIS from using subscriptions and fees as revenue sources to support for its work.

7. **Replacing "Data Sharing" Incentives.** MetroGIS participants have enjoyed an open data-sharing environment for the past several years, largely because of agreements between the Metropolitan Council and each of the seven MetroGIS counties. In exchange for a negotiated amount of funding to be used for data maintenance and other technical work that both meets the needs of the contracting county and addresses a MetroGIS issue, each county has agreed to make its geodata available to any public organization doing business within the metropolitan region. Several metropolitan counties had previously charged fees for their data, but essentially have waived those fees for MetroGIS participants in return for a negotiated amount. Continued "data sharing" incentives may be needed to maintain an open data sharing environment for MetroGIS.
8. **Maintaining Focus.** Keeping focused on the basic MetroGIS vision remains a challenge, especially as the real and perceived successes of MetroGIS become increasingly apparent to organizations elsewhere promoting the NSDI vision. MetroGIS was created to meet regional and local needs. MetroGIS staff has participated actively in Minnesota organizations seeking improved coordination of geographic information technology and with NSDI events sponsored by the Federal Geographic Data Committee. For the most part all parties benefit, but maintaining focus on MetroGIS needs is, at times, a balancing act that requires constant attention.

Some Federal Role for Regional GIS Collaboratives

MetroGIS is honored to have this opportunity to suggest roles the federal government might consider to facilitate and nurture regional GIS collaboratives. The following suggestions are based primarily upon experiences gained as we have tackled institutional issues associated with implementing the MetroGIS vision. Our suggestions are.

1. **Advocate Data Sharing.** Federal agencies, particularly through the Federal Geographic Data Committee, have been strong advocates of data sharing through the NSDI. The vision is important and continued leadership is needed.
2. **Promote Dialog.** Continue to provide opportunities for officials of regional GIS collaboratives from around the country to meet and discuss issues and opportunities we have in common. Continue to bring the corporate and public sectors together to collaborate on common issues.
3. **Promote Standards.** Continue to facilitate development of model standards with broad representation from all key stakeholder communities.
4. **Maintain Grant Programs.** Continued funding is needed, especially to help regional collaboratives such as MetroGIS develop in a timely fashion. Continue support for data search and distribution solutions and to address institutional needs as currently provided by the NSDI Framework Demonstration Grant Program.
5. **Offer "Bridge Financing" for Regional and State Collaboratives.** Provide "bridge financing" to support regional GIS collaboratives until they secure a mature revenue stream. Continued development of MetroGIS will require funding from several key stakeholders in excess of their individual needs. The Metropolitan Council agreed to finance the majority

of the definition phase of MetroGIS, which could be effectively complete on October 27, 1999. Continued progress may require funds from the Metropolitan Council not justifiable by the direct benefits derived. This is likely to be an obstacle to establishing other regional collaboratives. Regional GIS collaboratives will encounter time consuming organizational hurdles such as legislation to authorize implementation of the organization as well as building political consensus to enter into the selected organizational structure.

Federal participation as a stakeholder, acting to promote its NSDI objective, could help foster and nurture GIS regional collaboratives. To qualify for this "bridge financing", regional GIS collaboratives could be required to: a) adopt a business plan determined to be consistent with the NSDI philosophy and b) have an authorized organizational structure consistent with the functions stipulated in the business plan.

6. **Get Real About Data Integration.** Resolve the inconsistency between NSDI's philosophy of aggregating data from highest accuracy source with the dilemma of the Census Bureau not being able to incorporate higher precision locally produced data. This situation results in significant and repeated manual effort by local government of no value to their GIS programs and in an age when they are trying to work more effectively in a digital world. To date, no federal data has been identified as a source to address a priority MetroGIS Information Needs.
7. **Support Research to Quantify Benefits.** Facilitate research that develops creditable and flexible methodologies to quantify benefit received from framework collaboratives.
8. **Participate Directly in Operating Collaboratives.** Consider participating directly in regional collaborations, contributing to their annual costs just as financial responsibility is shared by state, metropolitan, and local governments and other partners.
9. **Address Information Policy Issues.** Leadership is needed to help resolve information sharing and data access policies, both at the federal level and within states. For instance, it is common practice in Minnesota to restrict redistribution of data as a condition of sharing. Circumstances are not very different within other parts of the country; only the Federal government is required by law to put data into the public domain. This conflict must be resolved to achieve the framework goals regarding data access and pricing as reflected in Circular A-130 from the U.S. Office of Management and Budget.
10. **Respect the Collaborators.** As the NSDI continues to mature, respect our time and limited resources. Our first priority is meeting the business needs of our respective organizations. NSDI-related activities must have relevance to our day-to-day operations and should not require expenditures or commitments outside of the scope of our business needs unless adequate compensation is provided.

APPENDIX A

MetroGIS
Policy Board Members

<u>Name</u>			<u>Organization</u>
Commissioner	Dennis	Berg	Anoka County (Vice Chairperson)
Board Member	Conrad	Fiskness	Metro Chapter of MN Association of Watershed Districts
Council Member	Donn	Wiske	Association of Metropolitan Municipalities (AMM)
Board Member	Antoinette	Johns	Technology Information Educational Services (TIES) <i>Consortium of School Districts</i>
Commissioner	Dennis	Hegberg	Washington County
Commissioner	Randy	Johnson	Hennepin County
Commissioner	Edwin	Mackie	Scott County
Commissioner	Willis	Branning	Dakota County
Commissioner	Victoria	Reinhardt	Ramsey County (Chairperson)
Council Member	Terry	Schneider	Association of Metropolitan Municipalities (AMM)
Council Member	(new appt pending)		Metropolitan Council
Commissioner	John	Siegfried	Carver County

APPENDIX B**Major Accomplishments of MetroGIS**

1. By Fall 1996, less than one year into the effort, consensus had been reached on principles to govern MetroGIS, an interim organizational structure with operating guidelines was in place, unanimous endorsement had been received from the policy bodies of each of eleven key stakeholder organizations, and a member from each of the eleven key stakeholder organizations policy bodies had agreed to participate as a member of the MetroGIS Policy Board to shape the policy for what has come to be known as MetroGIS.
2. Unanimous Policy Board endorsement was received May 1997 on thirteen high priority information needs common to MetroGIS stakeholders (Appendix E). These priorities serve as the framework for defining and investing in regional data solutions. A component of process to identify these priorities produced the MetroGIS Business Object Framing Model. The "fragments" pertaining to each priority information need are the starting points to define desired specifications for regional data solutions.
3. A regional data solution has been implemented for the top priority MetroGIS information needs: city, township, and county jurisdictional boundaries and a partial solution has been implemented for addresses for people, places, and things. Substantial progress has been made to identify regional solutions specifications for parcels, future land use, and census geography. This work should be substantially complete by fall 1999.
4. A partnership was established summer 1997 between the Metropolitan Council, Mn/DOT and The Lawrence Group (TLG) to provide free access to TLG's addressable street centerline dataset by government and academic institutions that serve Minnesota. MetroGIS Policy Board has endorsed this dataset as a primary source of addressing information (address matching) for MetroGIS stakeholders. In October 1998, this partnership as awarded a Commendation as an Exemplary GIS Project by the Governor of Minnesota.
5. The core functionality of MetroGIS Data Finder (www.metrogis.org) became operational April 1998.
6. Policy Board agreement was reached September 1998 on the functions that MetroGIS should support as a mature organization (Appendix G).
7. Data and cost sharing agreements were in place with all seven counties by fall 1998. Data shared is being documented by all seven counties and Metropolitan Council. The logs are being used by Dr. William Craig, with the University of Minnesota Center of Urban and Regional Affairs, for analysis of the benefits of collaboration and data sharing. Dr. Craig's study is funded by a NSDI Benefits Grant and is scheduled for completion fall 1999.
8. Several local GIS projects, with regional significance, are underway in conjunction with these agreements to enhance local GIS data holdings and system capabilities.
9. Standards have been endorsed by the Policy Board pertaining to metadata, addresses, regional projection and coordinate system, and a unique parcel identifier.
10. In 1998, an NSDI Framework Demonstration Grant was awarded for MetroGIS' Fair-Share Financial Model and Organization Structure Project and an NSDI Benefits Grant was awarded for Dr. William Craig's Data Sharing Benefits Study that uses MetroGIS as a subject. Dr. Craig is with the University of Minnesota Center for Urban and Regional Affairs.

APPENDIX C

Creation of MetroGIS: **Statement of the Metropolitan Council's Role**

Background: The MetroGIS Visioning/Coordinating Team (representation from all major stakeholder interests) accepted this role statement on January 25, 1996. On February 8, 1996, the Metropolitan Council unanimously adopted this statement of its role in the creation of the MetroGIS.

Statement of Leadership Role

The Metropolitan Council accepts a leadership role to create a metro-wide GIS; an entity through which widespread sharing and exchange of GIS data sets and technology can become a reality among public agencies and private-sector organizations within the seven-county metropolitan area. "Leadership" is defined as the following activities:

- Finance, coordinate, and support the strategic planning and decision making processes,
- Develop and maintain regional data sets (e.g., land use, census geography/TAZ, road centerline & census address range, soils, imagery, administrative boundaries),
- Provide support (staff and/or equipment) to the visioning/coordination team and to strategic issue teams,
- Finance and support communication with stakeholders (activity status and opportunities to participate),
- Selectively design, finance, coordinate, and staff projects that address local GIS and MetroGIS program needs,
- Facilitate the execution of data/cost sharing agreements among stakeholders,
- Participate financially in a fair share of the long term maintenance of the MetroGIS,
- Any other activities consistent with the strategic plan and acceptable to all affected parties.

APPENDIX D**MetroGIS**
RESOLUTION OF ENDORSEMENT

WHEREAS, it is in the public interest for public and private sector organizations to minimize duplication of effort and to implement technology which improves organizational efficiency and which minimizes the costs of carrying out their missions.

WHEREAS, Geographic Information System technology (hereafter referred to as "GIS") is a tool that all government organizations can utilize to improve organizational efficiency and to minimize costs regarding management, query, analysis, and dissemination of geographically-referenced data. (Refer to Exhibit A for a definition of terms.)

WHEREAS, sharing of geographically-referenced data among governmental organizations that serve the Metro Area would result in a number of intangible benefits that can not be accurately measured in dollars but nevertheless pay dividends for participation. These intangible benefits of participation in a multi-participant Metro Wide GIS include:

- 1) Improved cost-efficiency through reduced redundancy in data development and maintenance and through cost-sharing opportunities,
- 2) Improved decision making support and improved methods of analysis and presentation,
- 3) Access to data from other jurisdictions in a compatible format for analysis and query,
- 4) Improved communication with the public,
- 5) Improved management and retrieval of data,
- 6) Enhanced revenue opportunities from private sector for data consistent from county to county throughout the region,
- 7) Enhanced academic research capability,
- 8) Stronger bargaining position with vendors for purchases and support.

WHEREAS, the Metropolitan Council and the Minnesota Land Management Information Center (LMIC) co-hosted two GIS Forums on October 23 and 26, 1995, at which the concept of a Metro-Wide GIS (hereafter referred to as MetroGIS) and the Metropolitan Council's offer to facilitate its development were presented for discussion.

WHEREAS, over 150 persons, representing 88 different organizations (including all levels of government and some private sector interests), attended said GIS Forums and expressed strong support for: 1) the concept of developing a MetroGIS and 2) the Metropolitan Council's proposed role as project facilitator.

WHEREAS, a team of persons representing: 1) all governmental organizations and selected private sector interests serving the Metro Area and 2) diverse professional expertise was assembled in December 1995 to develop a shared vision for the MetroGIS initiative.

Resolution of Endorsement
Page 2

WHEREAS, said team of persons has come to be known as the MetroGIS Coordinating Committee.

WHEREAS, _____ County/Organization is represented on the MetroGIS Coordinating Committee by _____

WHEREAS, the MetroGIS Coordinating Committee unanimously approved a Statement of Intent and a Decision Support Structure for the MetroGIS initiative that are attached as Exhibits B and C, respectively.

WHEREAS, said Statement of Intent and said Decision Support Structure are the foundation philosophies from which MetroGIS is to evolve.

WHEREAS, an underlining principle of the MetroGIS Decision Support Structure is that participation in the decision making and eventual data sharing agreements by each of the seven Metro Area counties and the Metropolitan Council is essential to the creation and operation of a regional GIS, as described in the MetroGIS Statement of Intent.

WHEREAS, the MetroGIS Decision Support Structure recognizes the importance of cities, school districts, and watershed districts to be effectively represented in the decision making to move said regional GIS from concept to reality.

WHEREAS, the MetroGIS Coordinating Committee is hereby respectfully requesting _____ County/Organization to approve said Statement of Intent and Decision Support Structure, appoint a representative to the MetroGIS Policy Board, and affirm its representative to the MetroGIS Coordinating Committee.

NOW, THEREFORE BE IT RESOLVED, THAT the _____ County/Organizations Board hereby concurs with and approves said Statement of Intent and with the Decision Support Structure for the MetroGIS as approved by the MetroGIS Coordinating Committee and as attached in Exhibits B and C (*see page 2 in main body of paper*).

AND NOW BE IT FURTHER RESOLVED THAT the _____ County/Organization Board hereby appoints Commissioner/Board Member _____ to represent its interests on the *MetroGIS Policy Board*.

AND NOW BE IT FURTHER RESOLVED THAT the _____ County/Organization Board hereby affirms/appoints _____ to represent its interests on the *MetroGIS Coordinating Committee*.

Approved by the _____ County/Organization Board on _____, 1996.

EXHIBIT A

Definition of Terms

- 1) Geographic Information System (GIS) means a computer-based technology that consists of hardware, software, data, and personal designed to efficiently capture, store, update, analyze, and display all forms of geographically-referenced electronic information.
- 2) Geographically-referenced electronic data exist in three forms: graphic (parcel boundaries, street centerlines, planimetric [data captured from aerial imagery such as building foot prints, curb lines, and contour elevations]; non-graphic (tabular records that can be associated with graphic data-typical); and digital imagery.
- 3) The term "MetroGIS" refers to a stakeholder-governed entity that is in the process of being defined. Definition of this entity is intended to evolve through the implementation of the MetroGIS Decision Support Structure and as the participants come to understand the organizational and data needs of the other stakeholders.

EXHIBIT B

Statement of Intent for a Regional GIS (*MetroGIS*)

(On March 22, 1996, the MetroGIS Coordinating Team unanimously endorsed the following statement to guide the creation and operation of the MetroGIS.)

"Provide an ongoing, stakeholder-governed, metro-wide mechanism through which participants easily and equitably share geographically-referenced graphic and associated attribute data that are accurate, current, secure, of common benefit, and readily usable.

The desired outcomes of a regional GIS include:

- < Improve the effectiveness, equitability, responsiveness, and efficiency of participant operations.
- < Improve understanding of the dynamics of the seven county Metro Area and cooperatively chart courses to improve the quality of life and competitiveness for economic development.
- < Reduce the cost of data acquisition, management, and maintenance.
- < Increase credibility of data utilized in cross-jurisdictional decision making; minimize data redundancy."

APPENDIX E

Top Thirteen MetroGIS Information Needs

Adopted by Policy Board -- May 1997

Rank: Information Need Statement (*I need to know...*)

- 1....the boundaries and characteristics of a specified jurisdiction (*ex: city, school district, county, police and fire districts*). (**Jurisdictional boundaries**)
- 2....the street addresses for specified locations. (**Street addresses**)
- 3....about land use or development plans that have been officially adopted by public bodies. (**Land use plans**)
- 4... who has rights to a property, including ownership, leases, easements, right-of-way. (**Rights to property**)
- 5... the boundaries and location of a specified parcel. (**Parcel boundaries**)
- 6... the locations and characteristics of water features (*ex: lakes, wetlands, floodplains, aquifers, watersheds*). (**Lakes, wetlands, etc.**)
- 7....how a piece of land is being used, including whether or not it is vacant. (**Land use, existing**)
- 8... the boundaries and characteristics of census areas (*ex: census blocks, block groups, and tracts*). (**Census boundaries**)
- 9... where people live and how to contact them. (**Where people**)
- 10..the regulations that affect the use of a piece of land, such as zoning. (**Land Regulations**)
- 11..the locations and characteristics of roads/highways. (**Highway / road networks**)
- 12..the socioeconomic characteristics of an area's population (*ex: census tract, county, city*). (**Socioeconomic characteristics of areas**)
- 13..a unique identifying attribute of a land parcel, such as parcel ID. (**Parcel identifiers**)

APPENDIX F

Assumptions

MetroGIS Fair-Share Financial Model and Organizational Structure Project

The MetroGIS Policy Board has endorsed the following assumptions from which to devise a fair-share financial model and appropriate organizational structure for MetroGIS.

Financial/Cost Assumptions:

- Broader funding support for MetroGIS is needed.
- Fair user rates will be established based on perceived benefit to the user.
- Benefits to the user will be defined (financial and non-financial).
- User rates will be set to assure a financially stable MetroGIS.
- A flexible model will be developed as a tool for MetroGIS, allowing modifications based on MetroGIS' changing needs.
- Producers of endorsed primary data (data which is integrated into an approved regional data solution) that is contributed to the MetroGIS data pool will receive nominal compensation from MetroGIS for their participation in the form of a "supplemental data maintenance payment". This payment is to compensate the producer for sharing data to all government at no cost other than to cover modest data reproduction expenses and to defray costs attributable to sharing data with organizations outside of their jurisdictions.
- Producers of primary dataset will not be asked to support tasks or data related activities that exceed their internal business needs. They will be encouraged, but will not be required to update/enhance primary datasets that are inconsistent with regional specifications. (E.g. the amount of supplemental data maintenance payment will be proportionately higher for fully compliant primary datasets.)
- Regional data custodians will be compensated for all tasks in excess of their internal business needs.
- Data consumers will have free access to data obtained from MetroGIS' primary and regional data producers when by telecommunications transfer and shall not pay more than a modest fee to cover data reproduction costs for other means of data transfer.
- Not all primary data is of equal value in terms of counting toward defraying the costs of collaboration assigned to a particular organizational class (cities, counties, school districts, watershed districts, metropolitan, state, federal, and non government.) The model shall recognize the large investment counties have made to develop their GIS capabilities and the significant value of this investment to MetroGIS.
- Financial support for MetroGIS will come primarily from data consumers proportionate to the benefit perceived by organization class.
- Existing formal GIS cost sharing agreements among counties and units of government within their boundaries must be recognized in the fair-share financial formula.

Data Sales Assumptions:

- Intellectual property rights for producers of primary data contributed to MetroGIS shall remain intact.
- MetroGIS will not benefit from sales of data in the form contributed to MetroGIS by primary producers unless authorized by the primary producers.
- Data sales will be "zeroed-out" in the initial fair-share financial model.

APPENDIX G

Functions Appropriate for MetroGIS (Adopted by the MetroGIS Policy Board -- September 30, 1988)		Scope	Is Function Currently Provided?
Functions			
Coordination and Technical Functions			
1	Promote and endorse voluntary policies which foster coordination of GIS among the region's organizations.	Core	Yes
2	Identify unmet GIS needs with regional significance and act on these needs.	Core	Somewhat
3	Facilitate data sharing agreements and licensing among MetroGIS stakeholders.	Core	Partially -- Interim agreements
4	Develop and endorse standards for GIS data content, data documentation, and data management.	Core	Regionally significant data
5	Require standardized GIS data content, data documentation, and data management for regional datasets.	Core	No
6	Endorse standards for telecommunication protocol and networks.	Core	No
7	Provide a repository of GIS human resources information (centralized job posting/position descriptions).	Desirable	No
8	Develop master contracts for regional GIS projects, when appropriate.	Core	Demonstration Orbitalimagery Project
9	Promote development and exchange of GIS applications and procedures that serve GIS needs.	Core	Somewhat
Data Development and Distribution Functions			
1	Create and maintain datasets for MetroGIS based on identified priorities.	Core	Yes
2	Fill gaps in metadata based on identified priorities.	Core	Partially -- County Agreements
3	Provide a directory of data within region and a mechanism for search and retrieval of GIS data	Core	Data Finder
Service Functions			
1	Provide technical assistance to participants to retrieve, translate, and use data.	Desirable	Some -- Street Centerlines
Research Functions			
1	Undertake research to meet common regional GIS needs.	Core	Some
2	Promote collaborative funding of pilot projects that meet regional needs.	Core	Ortic project, I-35W pilot
Outreach Functions			
1	Identify GIS training and continuing education needs and encourage participation	Desirable	No
2	Advocate for MetroGIS needs and desires with state and federal policy makers	Core	Some - NSD/PUC
3	Maintain liaison relationships with committees/organizations with similar objectives to MetroGIS.	Core	Yes
4	Promote forums for MetroGIS stakeholders to discuss common GIS needs and opportunities.	Core	Yes
5	Publish MetroGIS newsletter.	Core	Yes
6	Maintain MetroGIS world wide web site.	Core	Yes
7	Market MetroGIS data and products	Core	No

APPENDIX H

North Metro I-35W Coalition
 8525 Edinbrook Crossing, Suite 5
 Brooklyn Park MN 55443
 Phone: (612) 493-8450
 Fax: (612) 424-1174
<http://www.i35w.org>

**USING GIS IN THE MULTIJURISDICTIONAL PLANNING OF DIVERSE
 METROPOLITAN COMMUNITIES**

Abstract: The North Metro I-35W Corridor Coalition (Coalition) proposes to present an overview of its aims and objectives in helping seven diverse suburban Twin Cities communities respond to rapid metropolitan growth and change. Three years ago, these communities asked themselves: "Can we compete in a global economy if we develop separately and continue to compete with one another? Doesn't it make more sense to share ideas and resources to collectively build more livable communities?" This presentation will focus on how and why the Coalition was formed and how it is managed and maintained. The Coalition will present an overview of its GIS Work Program, which encompasses a number of unique projects designed to enhance the use and effectiveness of GIS within the region. The presentation will detail some of the technical aspects of its development and management.

INTRODUCTION

In response to rapid metropolitan growth and change, seven diverse suburban communities—Arden Hills, Blaine, Circle Pines, Mounds View, New Brighton, Roseville, and Shoreview—have formed a joint powers organization, the North Metro I-35W Corridor Coalition ("the Coalition"). The Coalition seeks to construct an interjurisdictional planning and development framework that is integrated and coordinated at the municipal level. This effort has four primary objectives:

- ◆ expanding conventional land-use planning methods by applying livable community goals and objectives;
- ◆ approaching physical, social, and economic development issues in an integrated and multifaceted manner;
- ◆ working at a subregional level to bridge the gap between regional policies and local circumstances; and
- ◆ implementing the policies and strategies outlined in the Twin Cities Metropolitan Council Regional Blueprint.

To begin this work, the Coalition launched two major initiatives: (1) development of a subregional Geographic Information System (GIS) that is accessible to member communities; and (2) a Comprehensive Livable Community Urban Design and Transportation study that also addresses socioeconomic and environmental implications for the subregion's residents, businesses, and educational and cultural institutions. At the heart of the Coalition's work is its concern for maintaining and enhancing quality of life in its communities as the region continues to evolve.

The Coalition has bundled its activities into the following three livable community work areas that form a "Subregional Urban Design and Planning Framework."

◆**Building Metropolitan Towns:** joint actions that strengthen and create connections—physical, social, and economic—among communities.

◆**Redefining Metropolitan Competitiveness:** cooperative strategies that position the subregion to attract economic development and support a local economy that values and thrives in livable communities.

◆**Ensuring Healthy Neighborhoods:** coordinated initiatives to build neighborhoods that support individuals and families throughout their life cycles.

Currently, the Coalition is building a common base of information and data from which it can coordinate planning and implementation programs at the subregional level. The first phase of the GIS initiative has been completed. This puts into place the technological capability to share information across political borders and between departments and agencies. The Coalition also is commissioning studies in the areas of transportation and land use, housing, natural resources and the environment, economic development, and community outcomes. With the information obtained from these studies, along with data and applications from the GIS initiative, the Coalition will continue to refine and augment the subregional livable community urban design and planning framework and will begin to implement subregional programs and policies.

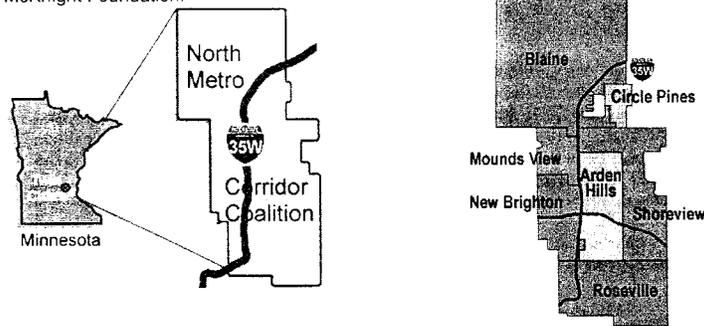
WHAT IS THE I-35W COALITION AND HOW IS IT ORGANIZED?

The I-35W Corridor Coalition is a group of seven Minneapolis/St.Paul northeastern suburban communities located within the North Metro I-35W transportation and employment shed. In December 1996, the communities of Arden Hills, Blaine, Circle Pines, Mounds View, New Brighton, Roseville, and Shoreview entered into an agreement that allows the cities to act jointly to help shape the future of this subregion.

The Coalition is led by a 14-member Board of Directors—the mayor and city manager or administrator from each community—each with one vote. It is assisted by a Community Development Directors Committee, which has one development director from each member city. The day-to-day running of the Coalition is managed by a hired administrator.

To enable the Coalition to remain focused on its objectives, the Committee has formed numerous Task Forces to oversee the development of specified elements of the Coalition work areas. One such group is the GIS Task Force which ensures that all aspects of the GIS program are coordinated and all goals are met.

Under the Community Partners Program, businesses and organizations may join as non-voting members. The Coalition participants include: Ramsey and Anoka Counties, four local school districts, the Minnesota Department of Trade and Economic Development, the Minnesota Department of Transportation (MnDOT), the Metropolitan Council, the University of Minnesota Design Center for the American Urban Landscape and the McKnight Foundation.



WHY HAS IT FORMED?

The Coalition has a broad and multifaceted work program, directed to resolving contemporary issues facing municipal governments in the Twin Cities metropolitan region.

Among the concerns shared by individual Coalition communities are:

- ◆ rising congestion on regional and local transportation networks;
- ◆ changing demographics;
- ◆ aging housing stock that is losing its marketability; and
- ◆ shifting economic development patterns and needs.

The operating assumption is that these issues are not confined to municipal boundaries and, thus, are best addressed and resolved through cooperative action.

WHAT UNIFIES THESE SEVEN COMMUNITIES?

The seven member communities of the Coalition share more than just an association with North I-35W—they are part of a subregional setting that has been shaped by common geography, patterns of movement, economics, and cultural connections. Here we identify several of the forces that continue to unify the communities and some of the common issues that could be addressed through subregional planning and collaboration.

Landscape and Natural Resources

Much of the subregion lies within the Rice Creek Watershed, which is characterized by the vast marsh and wetland complexes of the Anoka Sand Plain and the rolling hills and pocket lakes known as the North Ramsey Mounds. The physical forms of these two distinctive landscapes have shaped transportation routes and created islands of residential and industrial development oriented to such resources as lakes or gravel deposits.

Common Issues: Natural resources, the economic core that once drew subsistence farmers and early industrialists, now draw homeowners and businesses seeking amenities and quality building sites. Preserving, restoring, and enhancing these assets as a subregional network holds promise for ensuring property values and attracting new residents and businesses to Coalition communities.

Location and Movement Patterns

Communities within the subregion are conveniently located near job markets in the central cities and along North I-35W and 694. This is both an advantage and a challenge.

Historic transportation network provides multiple commuting routes which, although convenient for Coalitions residents, are equally attractive to outside commuters traversing the subregion. The resulting through traffic creates tensions in neighborhoods and along commercial corridors where cities are anxious to improve pedestrian and transit environments.

Common Issues: The subregional network of transportation systems has great potential to sustain and support economic development and redevelopment while enhancing the livability of Coalition communities. Realizing this potential will require interjurisdictional planning around a common set of transportation and land use planning principles.

Local Economy and Economic Development/Redevelopment

Although historically reliant on Minneapolis and St. Paul markets, employers, and labor pools, the subregional economy is now a competitive unit which draws shoppers and workers from adjoining communities as well as the central cities. Not immune to larger economic forces and trends, however, the subregional economy is on the verge of another phase of redevelopment and development as businesses become even more mobile and workforce training requirements change with increasing frequency.

Common Issues: Under these circumstances, economic development becomes more than site development and financial incentive packages. It broadens to include a full complement of strategies that range from workforce development to subregional approaches to business recruitment and retention to greater diversity in housing choice.

Housing and Community

Many of the Coalition communities began as lake cabin neighborhoods or post-war subdivisions for the do-it-yourself homebuilder. Over time, these neighborhoods blended and connected through the formation of school districts and new municipalities. Public institutions, along with religious and civic organizations, offered the social and political structure around which a larger sense of community has evolved. Now, these same organizations and institutions are being asked to work in new ways to address unstable property values and growing concern for the health of individuals and families.

Common Issues: Responding to this request requires cities to devise unconventional housing programs that address home maintenance and remodeling issues, public infrastructure improvements, and amenity enhancements and to join collaborative initiatives that follow families and individuals as they cross municipal boundaries for work, school, health care, shopping, and recreation.

COALITION FACTS AND FIGURES

Combined, these seven cities form the third largest community in Minnesota by population, with over 155,000 residents located in two counties and five school districts.

With 83 square miles of land, there are approximately 55,000 homes and 4,000 businesses with 85,000 jobs. It is estimated that the number of jobs will grow to 120,000 by 2010. In 1998 alone, there was over one quarter of a billion dollars in new growth.

There are 775 miles of streets, 43 miles of rail line, 3,000 acres of public parks and open space, and 16,500 acres of lakes and wetlands.

WHAT IS THE VISION OF THE COALITION? WHAT ARE ITS GOALS?

In its vision statement, the Coalition declares that members will jointly and cooperatively plan for and maximize the opportunities for regional community development, quality growth, and diversification in the North Metro through a system of collaboration. In addition to these three goals—regional community development, quality growth, and diversification—the Coalition has incorporated the Livable Community Goals established by the Minnesota State legislature in 1995. As a way of meeting these goals, the Coalition has developed the objectives outlined below.

Regional Community Development Objectives:

- ◆ Work cooperatively with MnDOT, the counties, and other agencies to plan for transportation improvement, mass transit needs, and other infrastructure improvements along the I-35W corridor to maintain and improve service and to help stimulate business growth and labor availability.
- ◆ Develop a joint marketing program among the members to attract and retain quality industrial and commercial tax base and employment.
- ◆ Develop a coordinated, collaborative GIS to efficiently share information and develop consistent and cooperative land use policies.
- ◆ Develop a current and comprehensive socioeconomic database that can be updated on a regular basis enabling the detailed examination of Coalition neighborhoods.
- ◆ Ensure an effectively trained workforce to meet the needs of the business base and ensure that transit options and employee mobility concepts are incorporated into the North Metro transportation system plan to serve member communities.

Quality Growth Objectives:

- ◆ Research the business base and the availability of development and redevelopment opportunities.
- ◆ Develop a code of ethics to be used by Coalition communities as an attraction and retention tool.
- ◆ Develop a collaborative and coordinated effort in other areas of regional municipal interest, including training, resource sharing, and program development.

- ◆ Research and identify contaminated sites; pursue funding sources for their redevelopment and work to ensure quality redevelopment.

Diversification Objectives:

- ◆ Develop a Coalition strategy to ensure adequate life-cycle housing opportunities in member cities.

- ◆ Pursue the use and distribution of all available resources to ensure that housing needs are adequately met.

HOW DOES IT PLAN TO MEET THESE GOALS?

Research and Inventory

The first strategy addresses the joint need to develop a shared information base. Cooperative planning and coordination is made difficult by conflicting or incomplete data on topics ranging from natural resources to socioeconomics to transportation. The Coalition seeks to break through this barrier by developing subregional data sets that provide uniform information and by developing common sets of planning terms that organize and utilize data consistently within the Coalition.

Joint Programs and Policies

The second strategy puts the shared information base to work in the form of joint programs and policies. Housing is a good example. The Coalition plans to use information generated from the housing inventory to understand the diversity of housing opportunities along the corridor, to develop subregional programs for addressing maintenance and renovation issues and, possibly, to adopt a common maintenance code for enforcement throughout the subregion.

Joint Funding

Joint funding is the final strategy envisioned by the Coalition. Like the other strategies, joint funding can be pursued in several ways. Joint applications can be structured around programs administered by the Coalition or for programs that cities administer individually according to specific needs. Also, there is the possibility of joint proposals to the legislature to enable Coalition cities to work in new and creative ways with existing financial tools.

HOW DOES THE COALITION ORGANIZE ITS WORK?

The ambitious goals of the Coalition and the unique partnership of its members require new and innovative methods of working. Guided by the policies and strategies of the Metropolitan Council's Regional Blueprint and by the Livable Community Goals established by the Minnesota State Legislature, the Coalition has drafted a Subregional Urban Design and Planning Framework to help direct its efforts. This framework challenges conventional planning and is built upon:

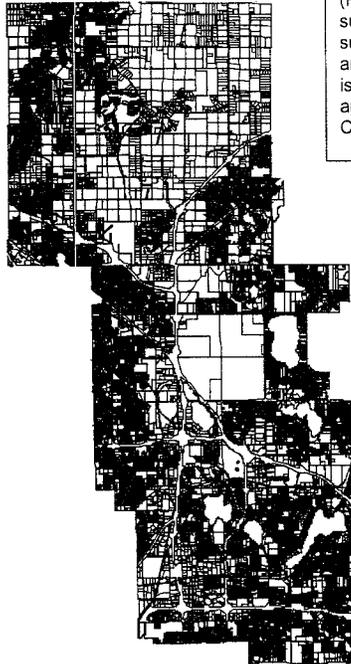
- ◆ a move away from individual projects and towards integrated subregional systems;
- ◆ information sharing across departments and political / jurisdictional boundaries; and
- ◆ partnership and collaboration in the face of common problems and challenges.

The Coalition's framework serves as a structure around which it organizes work plans, working groups, and financial reporting; sets priorities; creates partnerships; and links individual projects.

WHAT IS THE GIS INITIATIVE?

In 1997, the Coalition embarked upon the construction of its subregional GIS data base. The system provides a more efficient, more effective, and less expensive method of sharing and coordinating information between member cities. This shared data base helps the Coalition identify trends within the subregion, recognize the needs of its residents, and assists in developing programs and policies that address these needs. For example, manipulating this data allows users to:

- ◆ **analyze social demographic information** in ways that enable Coalition cities to evaluate how effectively policies, services, and programs meet such residents' needs as housing, transit and transportation, and job training;
- ◆ **identify sites suitable for development and redevelopment** by applying search criteria for querying the GIS base (incorporating information on soil types, floodplains, wetlands, transportation networks, zoning, etc.);
- ◆ **coordinate land uses** across city lines to avoid conflicts between new development and existing uses and maximize development opportunities;
- ◆ **develop traffic capacity models** and divert traffic to / from minor arterials to help relieve traffic congestion;
- ◆ **calculate the density of potential transit users** along selected routes and the community transit centers that will serve them;
- ◆ **inventory natural resources** to identify greenway corridors, potential acquisition sites for trails and open space, development and redevelopment sites linked to ecological corridors, and brownfield redevelopment opportunities;
- ◆ **assist new businesses** in locating within the subregion by displaying available spaces for lease or purchase; and
- ◆ **integrate and analyze diverse data sets** to provide comprehensive subregional and local information to aid decision-makers in their efforts to achieve Livable Community Goals.
- ◆ **enable cities to "get-up-and-running" with GIS** much more quickly and cheaply than would be the case if they were to undertake GIS implementation individually.



The foundation of the Coalition GIS is its parcel-level data base. Consisting of over 55,000 parcels, this base is supplied on a quarterly basis to the Coalition by two metropolitan counties (Ramsey and Anoka). The county support has been critical in the success of the GIS Initiative. A rich array of property-related attribute data is provided, fuelling many of the GIS applications developed to support Coalition decision-making.

BUILDING THE COALITON SUBREGIONAL GIS

Throughout the three-year period from 1997 through 1999, the Coalition GIS Task Force has been guided by the following general work plan:

- ◆ develop a fully integrated and maintained GIS parcel-level data base
- ◆ establish a dedicated Coalition GIS data server
- ◆ establish electronic high-speed data links between Coalition cities
- ◆ develop effective data dissemination techniques
- ◆ provide GIS training for Coalition cities at multiple levels
- ◆ identify and produce custom GIS applications to support the needs of the Coalition

To date, the Coalition GIS has evolved in the following way:

1997 – “Gathering the Pieces”

The first year involved the identification of potential benefactors, data suppliers and data integrators. The Coalition secured a grant from the Metropolitan Council’s MetroGIS initiative in support of the Coalition GIS as a subregional, intergovernmental pilot project (<http://www.state.mn.us/intergov/metrogis/>). As a part of the funding proposal, the Coalition will be sharing the following with other metropolitan local units of government: new GIS applications, approaches to data sharing, and data development strategies.

Agreements were set in place with Ramsey County, who since 1985 have been building and maintaining a highly-accurate digital parcel data base. A cooperative relationship with the Ramsey County GIS Users Group was also established. In addition, agreements were put in place with local cable commissions to secure cable infrastructure to allow rapid data upload and download between communities and the data server.

1998 – “Building the Base”

Phase 1 of the GIS Initiative was essentially undertaken during this year. This consisted of: developing automated parcel integrating and checking techniques; developing parcel integrity reporting methods in order to inform both the data recipients and the data providers about data anomalies; purchase and installation of the Coalition data server; establishment of links to Coalition cities through cable access; creation of data layers derived from county parcel base data and city attributes such as – zoning, existing land use and future land use; production of base mapping; integration of various digital data sets from providers at the state, county and local level.

An important factor in the successful building and maintenance of the base has been the hiring of PlanSight LLC in the role of GIS coordination. PlanSight staff work closely with GIS Task Force Members.

1999 – “Development and Distribution”

The Coalition has constructed a subregional intranet “Data Warehouse” that can be used to browse and access information at all scales, ranging from the individual parcel to subregional networks. This on-line service will enable member cities to download base data from the Coalition’s central GIS server to process locally, and to upload their own data to be shared with other member cities. The Coalition is utilizing several strategies to build its warehouse: (1) data sharing agreements with agencies and departments of different governments and non-governmental organizations; (2) acquisition of existing data sets; and (3) generation of new data through commissioned studies.

The Warehouse is essentially a “one-stop-shop” for all GIS needs. Users can review metadata and GIS procedures documentation prior to downloading the data of their

choice. This data could cover the extents of their own city or their neighbor, should they want to undertake a project which involves cross-jurisdictional issues. Subregional data sets have also been created.

Another major GIS product delivered in 1999 has been the "On-Line-Atlas". This is a static **internet** mapping product which can quickly and simply deliver address and other city base map images to both Coalition staff and also to the public. It is a precursor to live on-line, query-based web mapping which will be developed at a later stage.

The Task Force has drafted policies on GIS data storage, use and dissemination. Issues of data privacy and licensing are also under close scrutiny.

An important element for the GIS Initiative has been the education of its GIS Users. In-house needs assessments have been undertaken along with ArcView GIS training. Following this, individual one-on-one instruction in utilization of Coalition GIS data was conducted. An informative "GIS FLYER" is posted electronically to all users on a regular basis to keep them abreast of the dynamic nature of GIS technology.

Links have been established with the University of Minnesota Design Center (as a Coalition participant) in the development of their **Livable Community Information System**[®] (LCIS). This GIS utilizes base data from the Coalition GIS and follows data standards developed through cooperation with the GIS Task Force. The LCIS will identify physical, social, and economic characteristics of livable communities at the neighborhood, municipal, and subregional levels. Once these parameters are agreed upon, the GIS data sets that best describe and measure these characteristics at each scale will be "bundled," and applications developed to offer a multifaceted planning picture. For example, when a city council searches for the best location for a mixed-use development that includes affordable housing, staff can suggest a range of sites with access to transit lines, amenities, schools, health and day care services, livable-wage jobs, and basic goods.

1999 and beyond – "Where do we go from here"

The Task Force will strive to make the Coalition Subregional GIS as user friendly as possible through the continued refinement of the Data Warehouse. In addition, many new data sets will be added to the Warehouse as Coalition studies are undertaken. All consultants who produce GIS-related data will be required to follow data guidelines as directed by the Task Force.

MapObjects web mapping applications will be developed in the near future. This will be possible through a generous ESRI Local Government GIS Startup Grant.

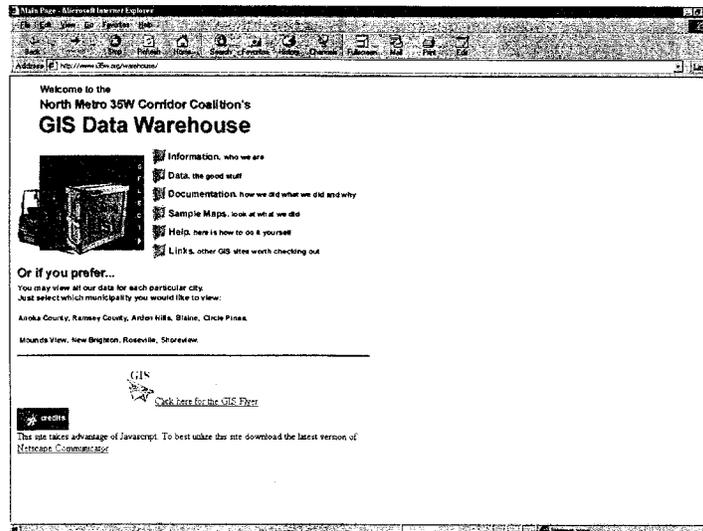
The results of a very exciting Socioeconomic Data Project will also be integrated with the GIS data base. This project is developing current and accurate demographics for all Coalition neighborhoods. It is an innovative approach which merges and synthesizes data from a large number of public data sets. Sources include Coalition partners such as: school districts (school census data), cities (utility data), and other state and local government bodies who provide drivers license and vehicle registration data, property tax data and other pertinent information. The data processing is being undertaken by Insight Mapping and Demographics who operate under a non-disclosure agreement which prohibits the sharing or distributing of household-level profiles. Data is summarized to a block-level and can be integrated with GIS to permit flexible user-defined rollup to any neighborhood, planning district or census area. Data to be delivered includes household and population counts, household type and age characteristics, household turnover data, housing data etc.

WHAT'S NEXT?

The work plan for the Coalition is constantly evolving as additional information about the subregion becomes available and priorities are recognized. Until the late spring of 1999, the Coalition will continue to oversee and receive feed-back from the five study areas outlined above. At the conclusion of this discovery period, the Coalition will aggregate and synthesize this information. By the end of 1999, a refined framework will prepare the Coalition for the next stage of work that begins to implement subregional programs and policies.

With its unique and innovative approach, the Coalition will continue to serve as a model of subregional planning, sharing its tools and ideas with other communities and planning bodies. The GIS Initiative is a perfect example this. Its techniques and products are made available to its member cities, the Metropolitan Council in its metropolitan-wide GIS effort supporting regional planning, to other Coalition participants and to the public. In addition, it brings those who utilize GIS technology together through the exchange of innovative ideas.

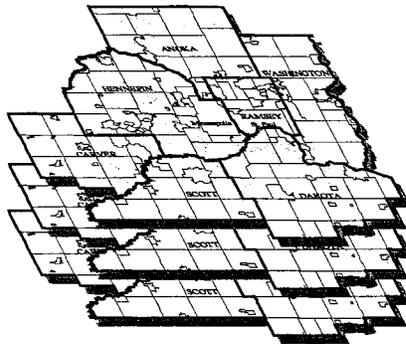
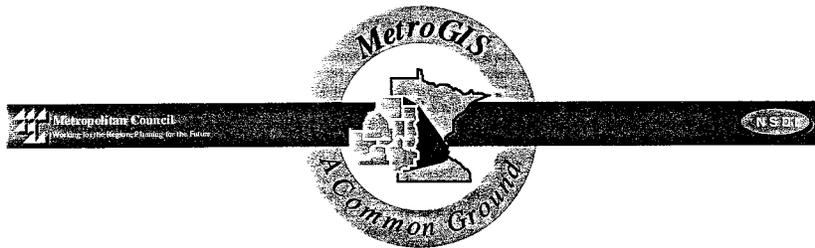
The Coalition has sought support from a wide variety of organizations and individuals, both from within and outside of the subregion. The North Metro I-35W Corridor Coalition truly is a collaborative effort, currently involving a number of local, regional, and state agencies and organizations. As the next stages of work evolve, the Coalition will continue to welcome input and assistance as it strives to maintain and enhance the quality of life for those living and working in the area.



Appendix I

MetroGIS

Benefits to Local, County, Regional,
State and Federal Organizations



*U.S. House of Representatives Subcommittee on
Government Management, Information and Technology
Oversight Hearing on GIS Policies and Practices - June 9, 1999*

MetroGIS: Benefits

Federal: U. S. Census Bureau

The Organization: The U. S. Census Bureau collects, organizes and distributes social, demographic and economic information for the United States of America.

The Issue: The Census Bureau relies on local input to assure complete and accurate information is available for the decennial census. Local agencies can best respond using GIS tools to speed the process, improve accuracy and assure quick response to census requests.

The Census Bureau uses the TIGER/Line file to support the mapping and related geographic activities required by the decennial census and sample survey programs. The lines in TIGER are used to form census block and other boundaries. While the TIGER data is sufficiently accurate for the Census Bureau and many other uses, its positional accuracy does not allow locally maintained GIS data to be accurately matched to census data. Local agencies can not use TIGER data to effectively fulfill Census Bureau request.

In the Past. Communities have reviewed census address lists and housing counts to verify their accuracy and manually reviewed and edited census boundary information using paper maps.

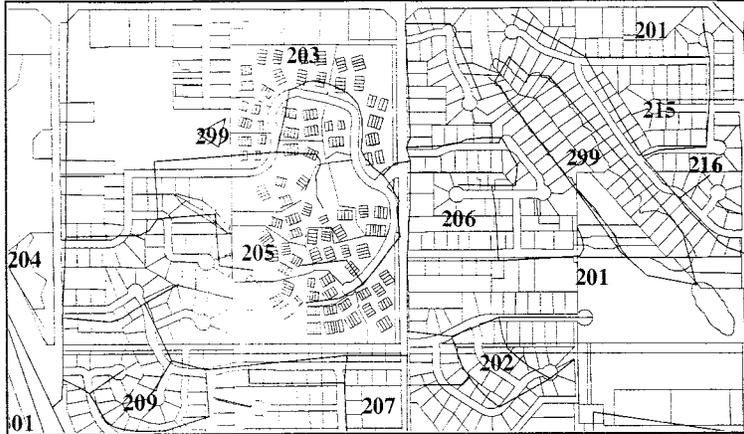
Today. While many of the same review processes continue to be used, a MetroGIS project is underway to assign census block designations to locally developed GIS road data. The road data, which forms many census block boundaries, is aligned to parcel data. By adding non-road boundaries to the road information complete census blocks can be formed. The result creates an accurate census geographical database that serves local needs.

In the Future. When the work is completed and census boundaries match parcel data, local officials will be able to directly compare the census blocks with parcel data. The number of housing units in a block can be derived from parcel data. Since the local parcel files are continuously updated, they contain the most current information available. Many Census Bureau requests can then be fulfilled quickly using GIS.

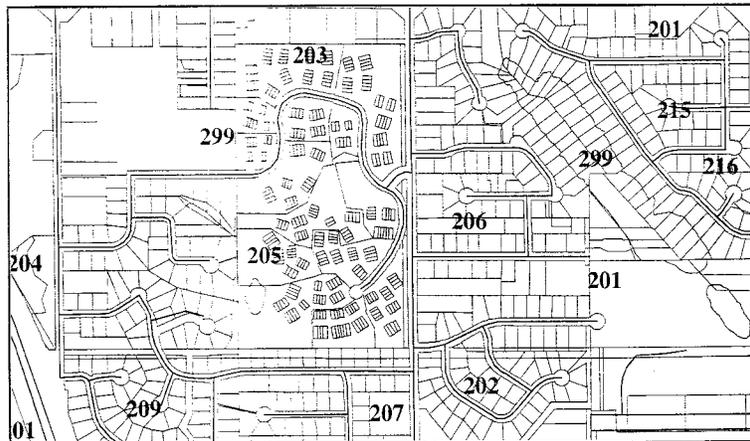
Value.

- **Automated procedures save time.** Automated procedures can be developed which will reduce the time local staff spend responding to Census Bureau requests for local input. Census Bureau requests often have short timelines making quick response critical. Requested information will be delivered quicker and with less effort than in the past.
- **Mid-decade estimates will improve.** Aligning census geography to local geographic data will make it possible to effectively use new parcel and land use information to estimate population and demographic change.
- **Accurate local geography lays groundwork for TIGER improvements.** An essential principal of the NSDI is to make local data available at the national level. By building census geography that matches locally developed and maintained geography, the foundation is built which will allow GIS information to flow from local government to the federal government.

**Matching Census Boundaries to Local Parcel Information
City of Arden Hills**



Comparison of TIGER to parcel data



Comparison of The Lawrence Group roads to parcel data

- | | |
|------------------------------|------------------------------|
| — 1998 Ramsey County Parcels | — 1990 U.S. Census TIGER |
| — 1999 Lawrence Group Roads | 101 1990 Census Block Number |

MetroGIS: Benefits

State: Twin Cities Metropolitan Area

The Organization: Food and Nutrition Service is a division within the State of Minnesota's Department of Children, Families & Learning.

The Issue: The Department of Children, Families and Learning (MnCLF) is responsible for determining eligibility for family child care providers participating in the Child and Adult Care Food Program (CACFP) in Minnesota. More than 40 million federal dollars are dispersed annually to over 15,000 providers located throughout the state who are administered by 11 sponsoring organizations.

Approximately 7,500 providers are located in Twin Cities metropolitan area. Geography is the basis for Tier I assistance. To be eligible, child care providers must be located in an area where at least half of the children are eligible for free and reduced price school meals, based on school data or 1990 U.S. Census Bureau data. Accurate locations of the child care providers had to be determined and referenced by geographic coordinates before eligibility could be resolved. This process was undertaken by the State of Minnesota's Land Management Information Center (LMIC).

In the Past: Prior to the availability of The Lawrence Group (TLG) data, geo-locating child care providers in the Twin Cities area was accomplished using address matching functions with the U.S. Census Bureau's TIGER street data. The process was typically only 65% successful, even less so in the high-growth suburban areas. Unmatched addresses required either a site visit by the provider's sponsoring agency, at which time a GPS based coordinate was determined, or a telephone call to the provider by LMIC staff. In the latter case, staff would work with the provider while viewing a digital map to best determine their location. This was a time consuming process.

Today: Geo-locating child care providers using address matching processes and the TLG data is typically 95% successful, minimizing additional staff time. Furthermore, the location is usually more precise than a GPS (non-differential) reading. The quality of the location can be very important since eligibility for federal funds may vary from one side of the street to the other.

In the Future: In late 1999, sponsoring agencies will be able to determine Tier I eligibility for potential and existing providers within the Twin Cities area via a MnCLF web site currently under construction. The TLG data will be the backbone for this "on-line" address matching system.

Value:

- **Reduced Costs.** Because the TLG address base is more accurate and up-to-date than TIGER, improved address matching results reduce the staff time required to locate eligible child care providers.
- **Improved Locational Quality:** Providers can be geo-located more precisely with the TLG data thereby reducing errors in eligibility determination.
- **Faster Public Service:** Using the TLG data via MnCLF's web site will make the eligibility determination virtually instantaneous thereby improving the service child care providers receive from sponsoring organizations.

MetroGIS: Benefits

Regional: Metropolitan Council

The Organization: The Metropolitan Council conducts long-range planning in coordination with local units of government and other organizations to guide growth and development in the Minneapolis and St. Paul metropolitan region. The Council also operates the regional transit service (Metro Transit), wastewater collection and treatment services, and the metropolitan housing and redevelopment authority.

The Issue: A proposed site for a new State Motor Pool and Metro Transit garage facility has been identified on the east side of downtown St. Paul. An environmental assessment work sheet (EAW) must be completed to determine the impact of this proposal. Using the most current and accurate information for this process is critical to a full and complete discussion of the issues the garage presents.

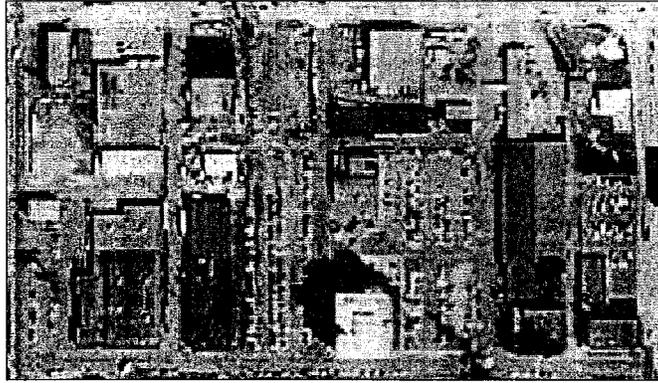
In the Past. Little digital information was available in the past. Producing maps which showed the location of utility services, roadways, neighborhood boundaries and environmental features required manual drafting of individual maps. This became especially complex when those features needed to be combined on one map.

Today. The Council requested relevant GIS information from the City of St. Paul. The information included digital ortho imagery produced cooperatively by the Capital Architecture and Planning Board and the City of St. Paul. This imagery was created using aerial photographs from the first cooperative project undertaken by the MetroGIS initiative.

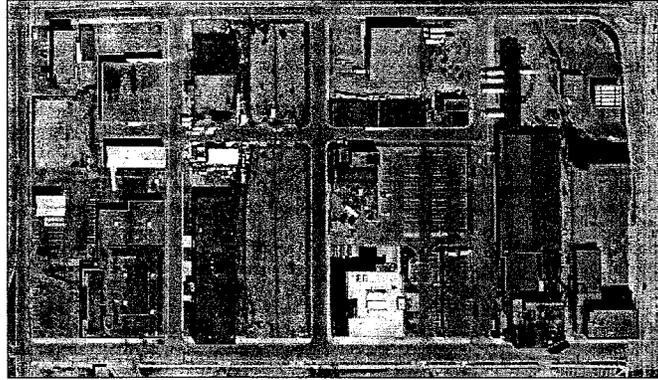
In the Future. Additional information such as local utility network and detailed street rights-of-way data will be available from the City of St. Paul as they complete additional GIS data and make it available to participants in MetroGIS.

Value.

- **Data Development Cost Savings.** The same data can be used by more than one organization. The original aerial photographs were shared with Ramsey County, which in turn shared the data with the City of St. Paul. The city cooperatively developed ortho imagery with the Capital Architecture and Planning Board and finally the imagery was shared with the Council for its EAW process. Four organizations have used the data each time adding value and increasing its usefulness to other organizations. A few thousand dollars extra would have been spent by each organization or they would have made due with less data. (Estimated Savings: \$8,000)
- **Increased Data Quality.** The amount of detail visible in available data has been increased. Without MetroGIS, the Council would not have the high-resolution information available for the EAW. Descriptive information would be less precise both for use in the EAW process and for public presentation of the information. It would take longer to explain the location and characteristics of the proposed site in public hearings or require additional expense in preparing materials for the hearings. (Savings: 1/4 hour of public hearing time and/or \$1,000 in extra graphic presentation costs).
- **Better Decision-Making.** As MetroGIS matures sharing data will become easier and each participant can focus on maintaining data critical to their mission. All MetroGIS participants benefit by easy access to high quality data produced by the organizations that know the data the best. Although detailed utility information was not available, the Council would have benefited from such data. The additional staff time needed to determine local utility alignments and impacts would have been avoided. The accuracy of that determination would also have been improved. (Estimated Savings: 8 hours of staff time. What is better decision-making worth?)

Which Image Would You Use for Decision Making?

Both of these images show the proposed site for a new combined State Motor Pool and Metro Transit bus garage. The above image is from 1991 USGS 20,000 foot aerial photography (DOQs). The image shown below is from a 1996 MetroGIS cooperative demonstration to collect aerial imagery at 5000 feet. Four organizations cooperated to produce the latter GIS product. None of the organizations paid for the entire effort, but all have access to the final product for decision making.



MetroGIS: Benefits

County: Hennepin International Trade Services

The Organization: Hennepin International Trade Services is an organization within Hennepin County government which provides services to businesses involved in international trade.

The Issue: A study of import and export businesses was conducted to determine ways in which Hennepin County can support the development of these businesses. While many of these businesses have headquarters in Hennepin County they frequently have facilities outside the county.

In the Past. Six months ago 88% of these businesses were located to within approximately one block of their true location. Accomplishing this task required more than 40 hours of staff time and the cooperation of Hennepin International Trade Services and the Metropolitan Council. Because of the lack of addressing data standards, incomplete data and competing priorities at the two organizations, the work was spread over more than one year.

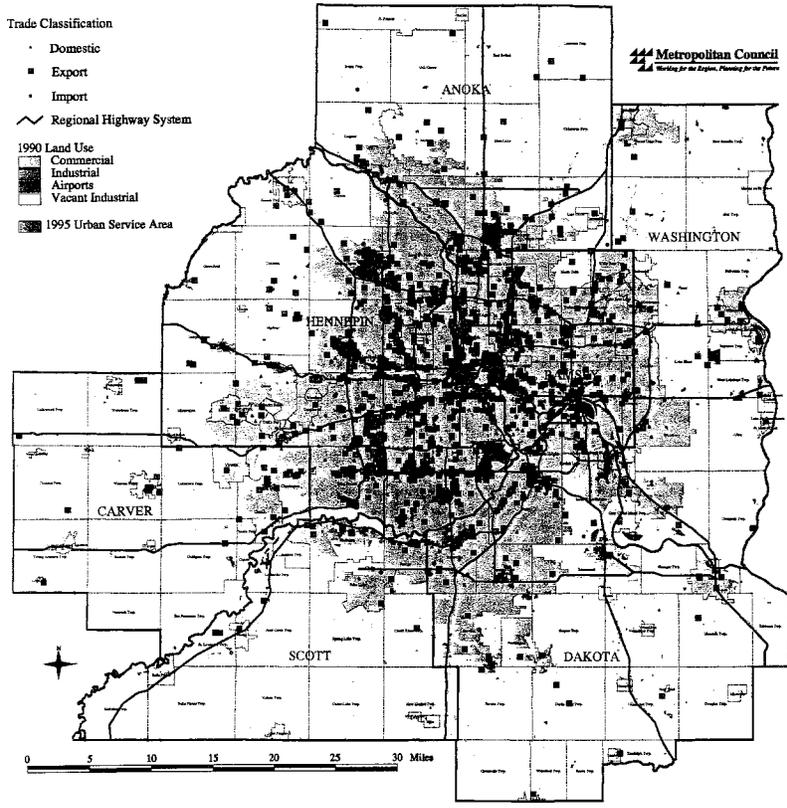
Today. With the use of TLG street centerline data made available through the MetroGIS initiative, the businesses can be located faster and with greater precision. The number of businesses which can be located with this process is the same or greater.

In the Future. Hennepin International Trade Services could produce a similar map in a few hours using addressing guidelines developed by the MetroGIS initiative and a future address matching application based on those guidelines. It would be possible for Hennepin International to regularly track import and export business development trends and assess the impact of their efforts.

Value.

- **Improved Data Completeness.** More import and export businesses can be mapped through an improved address matching process which uses TLG data and adheres to addressing guidelines. For example questions that could be answered more completely are: Where are all the medical equipment exporters located and what percentage of them are in Hennepin County?
- **Improved Data Quality.** The quality of information can be improved through the address matching process. As is often the case when data are first mapped in a GIS, some of the Hennepin International Trade Services data were incomplete. This became obvious when the first printed map did not show any importers or exporters in the eastern metro area. Corrections were made to the original data that improved the quality of the map and the data itself.
- **Reduced Staff Time.** Staff time required for locating import and export businesses will be reduced through access to region-wide street centerline data, standardized addressing specifications and shared address matching applications.
- **Increased Data Accuracy.** Improved precision means that the locational characteristics of import and export businesses can be more accurately described. A question that could be answered more accurately might be: Near what urban services and commercial and industrial establishments are electronic component assemblers located?
- **Increased Timeliness.** Shared data access, standards and applications also decrease project development time. By using data standards and applications that are meant to work together, Hennepin International would experience fewer delays due to process development time. By using shared data, standards and applications, Hennepin International would no longer be dependent on another organization to complete priority work.
- **Reduced Consultant Costs.** Hiring consultants becomes less costly when the consultants are familiar with MetroGIS data, standards and applications. The consultants can spend less time writing applications, developing data and organizing projects and more time producing desired results.

**Twin Cities Metropolitan Area
Locations of International Trading Companies
Headquartered in Hennepin County**



The original data table, containing business names, addresses and five-digit zip codes, was processed using postal coding software which assigned nine-digit zip codes to records for which adequate addresses were available. The resulting data file was then geocoded to the Metropolitan Council's "Zip+4" coverage using the ArcView 3.0 geocoding process. This resulted in an 88% match rate, or, geographically correct placement of 2,932 of 3,334 records.

MetroGIS: Benefits

Cities: Minneapolis Public Works Department

The Organization: The Minneapolis Public Works Department (MPWD) creates comprehensive engineering plans for all capital improvement projects, including: street, sewer, water and traffic improvements and coordinates GIS mapping for all City of Minneapolis departments. To perform these functions the MPWD builds, maintains and distributes comprehensive property, planimetric, topographic, utility, and digital ortho photography mapping databases within the corporate limits of Minneapolis.

The Issue: The MPWD only maintains engineering and GIS mapping data within the corporate limits of Minneapolis. However, many capital improvement projects and GIS requests extend beyond the City's corporate limits. A recent request for engineering and GIS mapping on University Avenue at the Minneapolis/St. Paul border illustrates the potential of MetroGIS.

In the Past: Prior to MetroGIS, similar requests were either overlooked or painstakingly completed.

Not only does the border between Minneapolis and St Paul separate two cities but it is also the border between Hennepin and Ramsey counties. Each of these four agencies has a unique GIS system, with distinct maps stored in different coordinate projections. In addition, capital improvement projects involve non-public utility companies, such as Northern States Power Company, the local electric utility, which also have data stored in a unique system.

Creating capital improvement maps beyond the corporate limits of Minneapolis was an arduous task for MPWD. It included finding the proper contact at each agency, who would extract the electronic map, and transmit it to MPWD. Then GIS technicians would convert the map to the local coordinate system and symbol nomenclature, and combine it with MPWD maps.

In General, only the highest priority projects warranted this kind of effort.

Today: The task is made simpler with the beginnings of MetroGIS in place. Certain map data sets, like the road centerline and municipal boundary files, are available via MetroGIS and are already loaded on the MPWD system. Agreements are also in place to make additional datasets available to all MetroGIS users. These map databases include property parcels, planimetric and digital ortho photography.

Working relationships built within MetroGIS have also helped MPWD identify the key data stewards in communities adjacent to Minneapolis.

In the Future: The value to all MetroGIS participants will increase exponentially with access to GIS data sets from multiple agencies. For example, data sets from multiple agencies were used to create this powerful yet sublime map. It not only shows what can be done with a mature MetroGIS central clearinghouse in place, it also shows what users will easily and quickly be able to do from their desktop.

Value:

- **Quick Turnaround:** With the central MetroGIS map clearinghouse available, it will be possible to create complex engineering and GIS maps that extend beyond Minneapolis limits in hours instead of days or weeks, which was the case without MetroGIS.
- **Reduced Costs:** Less handwork with quicker turnaround will translate into less cost.
- **Accurate and Current Data:** By sharing GIS data through MetroGIS, agencies that originate the data can easily share the best available information with others. A good example is the TLG road centerline data set that is available to MetroGIS participants. After the TLG data was initially loaded into the MPWD GIS system, the Minneapolis portion was compared against more accurate Minneapolis data. The corrections were sent to the data vendor and quickly implemented on the original TLG data. An updated TLG road centerline data set was returned to Minneapolis and loaded into their system. At the same time, the updated TLG data was available to all MetroGIS users.



MetroGIS: Benefits

School Districts: Lakeville

The Organization: Lakeville School District serves 11 individual schools in the counties of Dakota and Scott. Lakeville is a rapidly growing outer-ring suburb in the metropolitan area. The number of students being served by the school district is also growing as a result of the population increase.

The Issue: Decisions about where to locate new school facilities, programs, and school boundaries need to be made to meet changing student population distributions.

In the Past. Before MetroGIS, school siting decisions in Lakeville were made without the benefit of GIS data. Sites were analyzed for suitability. However, without access to GIS information about parcels, it was impossible for the school district to map the residence of pre-school age children relative to the potential new school sites.

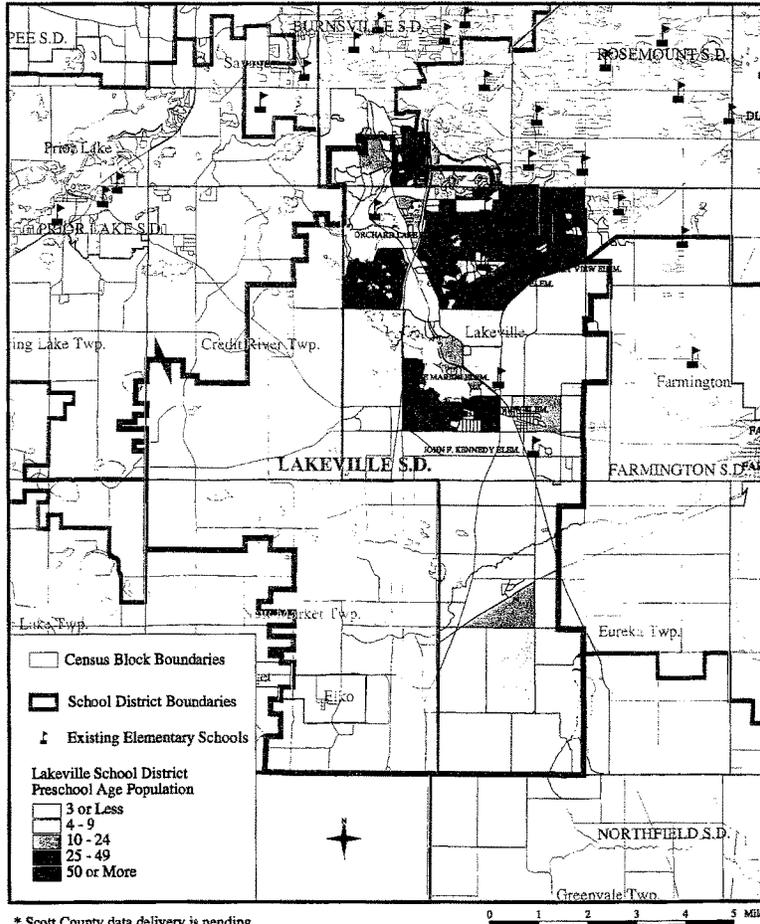
Today. Through the MetroGIS agreements, parcel data from Dakota County has been provided to the Lakeville school district. Scott County is expected to provide parcel data to the school district soon. The district will be able to analyze the distributions and concentrations of different age populations. Better decisions will be made about where to locate new facilities, where to target special programs and service delivery; and how to more efficiently route buses.

In the Future. As more and more data (such as the Street Centerline data set and socio-economic data) become available through MetroGIS, Lakeville school district will continue to increase its ability to match the needs of families with resources.

Value.

- **Reduced Costs.** The Lakeville school district will benefit from MetroGIS in a number of ways. The GIS data sharing agreements have created conditions which allow districts to obtain GIS files from counties and cities at a fraction of the cost that would have been incurred if the district had developed that information itself. Lakeville wants to build a GIS but is in a municipality that does not have existing GIS centerline data. Use of the Lawrence street centerline data through the MetroGIS initiative has added a valuable data set to Lakeville School Districts GIS.
- **Common Language.** Another less obvious benefit to Lakeville School District is that GIS is a common language that all units of government can use. By promoting this common language the MetroGIS effort has also facilitated greater communication between school districts, cities and counties.
- **More Accurate, Current Information.** Through the use of county parcel databases, The Lawrence Group street centerline data set, and other data available through MetroGIS, the Lakeville School District will be able to base decisions on the most current, accurate information available.
- **Identifying local unique characteristics and needs.** Development of a GIS using MetroGIS resources will allow Lakeville School District access to information specific to their geographic area. Local unique characteristics and needs can be more readily available than is possible with less specific data.

**1997 Distribution of Preschool Age Population
in the Dakota County* Portion of the Lakeville School District
Summarized by 1990 Census Block**



* Scott County data delivery is pending.

Data Sources: Lakeville School District; Dakota County; the U.S. Census Bureau; The Lawrence Group; Metropolitan Council



MetroGIS: Benefits

Watershed Districts: Ramsey Washington Metro

The Organization: The Ramsey Washington Metro Watershed District which straddles the boundary between Ramsey and Washington Counties is charged with managing water resources through regulations and construction projects.

The Issue: The Ramsey Washington Metro Watershed District advocates the sealing of abandoned wells to help preserve the quality of the region's ground water. Critical areas for sealing abandoned wells have been identified. However, determining which wells are within the critical areas is a complex task best completed with the use of a GIS and data available from other government agencies.

In the Past. Previously, the process of determining whether a well is in a critical area involved using paper maps and information about the nearest street intersection. County parcel maps have improved the watershed district's ability to accurately locate wells, but often well owners do not have enough information to locate the well. (E.g. property identification number).

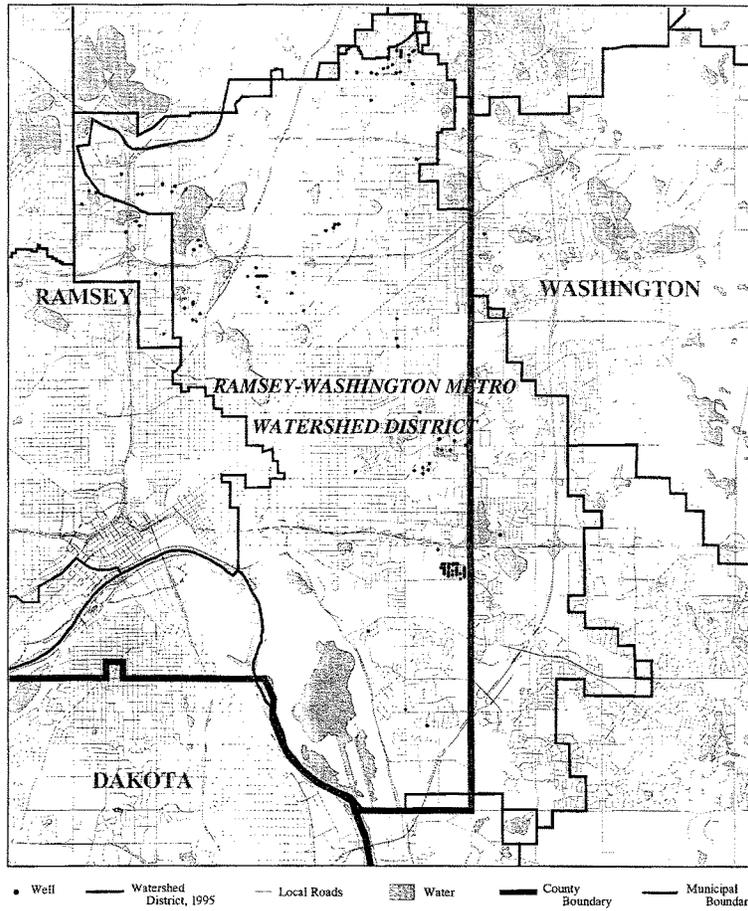
Today. The use of county parcel GIS data through MetroGIS data sharing has improved the watershed district's ability to accurately locate wells. The availability of street centerline data has provided another method for locating wells by using street addresses.

In the Future. Improving integration of street centerline and parcel data, establishing standards for sharing parcel data between counties and improving address information will all help improve the accuracy with which abandoned wells can be located.

Value.

- **Faster Public Service.** The use of both county parcel data and street centerline data increases the effectiveness of watershed district staff in determining a well location when a well owner calls in to inquire about eligibility for the well abandonment program. Staff time is reduced and citizens are satisfied with the service they receive.
- **Reduced Programming Costs.** It will eventually become possible through the MetroGIS initiative, to translate county parcel attribute data into a region-wide standard. This will increase the value of parcel data in well abandonment programs throughout the region, because the same computer programs can be shared between watershed districts. One well abandonment application can be written and shared among all interested watershed management organizations. (One program serves 10 organizations.)

Ramsey-Washington Metro Watershed District



The Ramsey-Washington Metro Watershed District straddles the boundary of Ramsey and Washington Counties. The well symbols represent wells which have been properly abandoned through the Watershed Districts well abandonment program.

DATA SOURCES: Ramsey-Washington Metro Watershed District; Ramsey County; Washington County; The Lawrence Group; Metropolitan Council

Mr. HORN. Well, thank you very much. We appreciate your statement there.

Another elected official is the commissioner and chair of Tillamook County, OR, who has been introduced, the Honorable Sue Cameron. I might tell you that I do know where Tillamook is; I have been there. I have not only bought the cheese, but I had an uncle who ran a newspaper there, probably before you were born, but we will talk about that later. OK, Ms. Cameron.

Ms. CAMERON. Mr. Chair, Congressman Kanjorski, members of the committee—

Mr. HORN. You want to bring that microphone a little closer?

Ms. CAMERON. Are we OK?

Mr. HORN. Yes, we have terrible microphones. We are in the 19th century.

Ms. CAMERON. On. There, is that better now? You can hear me?

Mr. HORN. Yes.

Ms. CAMERON. All right. I appreciate the opportunity to be invited to testify today. I came all the way from Oregon for this reason, and the reason I did that was because I felt it was so important to talk about the role of GIS in our community that it was worth the time and the justification from my constituents back in Oregon to explain why I came here today.

It is very, very important, and I would like to put this in context if I could. Tillamook, as you know, is the land of cheese, trees, and ocean breeze—and sometimes mud up to your knees. And that reflects the issues around our community. It reflects our timber-based economy; our dairy-based economy. In fact, we have more cows than people. And it also reflects our tourism—none of which you can build a strong economic base on in Tillamook County, and because of that, we actually have a number of problems.

We have a beautiful community, but we also have some issues. We have the fact that our fish have been listed as threatened and endangered. We have the fact that our streams don't meet the water quality standards of EPA and our local Department of Environmental Quality. We also have the issue of the fact that since 1996 we had \$63 million worth of damage from flooding, and we have a per capita income of about \$18,000 per year; that is one of the lowest in the State and the United States, and yet we try to survive in this process.

We don't just sit there and take it; we have been planning. We have so many plans: we have the President's Forest Plan; we have the Department of Forestry Plan; we have our flood hazard mitigation plan; we have our land use plans; we have our energy plans; we have any kind of plan you want to have. In fact, if I stack them up, they are probably taller than I am, and that is fine, and it tells us what to do, but our citizens are saying, "Enough of planning. Let us get on with it. Let us get the job done. We want to see some results." And based on that, we took an aggressive, assertive approach to dealing with those needs. We formed what we call a "performance partnership" made up of State people, Federal people, local people, citizens, and business, so that when we have a meeting, we have 50 entities represented in our small county, and people travel to Tillamook for those community meetings, performance partnerships. It is about partners working together to achieve re-

sults. That is a critical element, and probably one of the most important tools we have is GIS. We need to be able to bring the information to people in a way that they can actually understand it and visualize it. Our citizens have come to us and asked us for more GIS-based information.

Picture this, if you will: we have watershed councils. Citizens that have volunteered their evenings and their weekends and their after-work hours to try to fix their stream that they care about so that the fish are back and the bacteria and the sedimentation are taken care of. So, they sit in a meeting in the evening and on the wall is a projector with a map of that watershed, and in parts of that watershed you will see a green line, and it says, "These are the best salmon habitat areas in that river." Unfortunately, the line right before that is a different color that shows violation of sediment, violation of bacteria, and violation of temperature standards. Now, everybody in the room sees that those fish have to go through that part of the watershed to get to the best part for their habitat, and, immediately, the citizens begin to say, "Well, you know, if we are going to spend our time and our energy on this, we are going to put it in this area, because it is so obvious. We will work on this culvert; we will replant these trees; we will donate some land, and we will work on the issues surrounding that part of the watershed." And that is one application of GIS; it is not the only one. In our community, we can apply it in any way.

We have been lucky enough to develop over 300 layers of GIS information through our National Estuary Project, so we are able to see those maps now. Our next step is to put it on the Internet, so you can see our watershed from here; so you can see what we are doing, and we can share it with everybody else. We have been involved in this GIS approach, which we believe is probably one of the most powerful tools in bringing communities together around strategies, because if people can see the issue, they can understand where to best put their limited resources and their limited time.

Now, I have included in my testimony, which I am not going to go over today, a letter from a citizen. It is one page. I would suggest you take the time, and I think you will feel probably as I do. That letter is addressed to our Senator and copied to us, and I asked for permission to include it.

I would also suggest that one of the more exciting things for our community is to be involved in the Community Federal Information Partnership, and I would stress the word "community," because it really is about partnership, and that is an opportunity to be one of six pilots across the United States. A little bit of seed money to get our GIS information on the web to be able to provide to anybody who wants it to have that information, and that seed money has been incredibly powerful in our community, and I would like to give you an example. Two weeks ago, we had a hearing on our budget. Our county general fund budget is all of \$13 million, and that is not very much, but we had a line-up of people coming to us in our hearing, not asking about anything—roads or anything else—they were there to ask us to invest in GIS; \$200,000 so that we can actually do our base map and then employ the kind of people to not only digitize the information but analyze it and feed it back to the community for decisionmaking. So, our community took

the chance, and we are approving that budget of putting in \$200,000 to match with our public utility district that is going to put in another \$160,000. So, it is about leveraging. A little bit of seed money can go a very, very long way, and that way, we will be able to address the issues around our fish and our flooding and our water quality and our economic development.

So, I would urge, along with membership of NACO—and I have submitted a resolution on behalf of the National Association of Counties [NACO] asking you to support this kind of work—community information processes and projects—so that we can use GIS as a major infrastructure in our communities, to build strong communities, and I thank you for inviting us to testify.

[The prepared statement of Ms. Cameron follows:]

Tillamook County



Land of Cheese, Trees and Ocean Breeze

201 Laurel Avenue
Tillamook, Oregon 97141

503-842-3403
scameron@co.tillamook.or.us

**Testimony of Sue Cameron, County Commissioner
at the
Oversight Hearing of the House Subcommittee on Government Management,
Information and Technology
June 9, 1999**

AN EQUAL OPPORTUNITY EMPLOYER

Testimony of Sue Cameron, County Commissioner
At the
Oversight Hearing of the House Subcommittee on Government Management, Information
and Technology
June 9, 1999

Mr. Chairman and members of the Subcommittee, thank you for the opportunity of appearing before you to discuss the importance of the use of geographic information and GIS technology in helping counties and other local government jurisdictions address issues which they are grappling with. I am Sue Cameron and I am the Chair of the Board of Commissioners of Tillamook County, Oregon. Tillamook County is located approximately 1.5 hours west of Portland Oregon. We are a large county geographically, located on the coast of Oregon, and blessed with wonderful scenery, refreshing ocean breezes and a natural resource-based economy, with dairy and forest products as its mainstays. We have a population of only about 25,000 people; in fact, we have more cows than people! Our motto is, "Tillamook County, the land of cheese, trees, and ocean breeze! And when it floods, "mud up to our knees"!

Tillamook County has been faced with a number of problems over the most recent years:

- We've had over \$63 million in flood damages since 1996;
- none of our coastal streams meet the EPA requirements for water quality;
- our fish are on the threatened or endangered species lists;
- our per capita income is one of the lowest in the state and nation, at \$18,000/per capita per year.

We have done years of planning, through the Presidents NW Forest Plan, the Oregon Salmon Plan, our Flood Hazard Mitigation Plan, our Tillamook Land Use Plan and our National Estuary Plan, to name just a few. As a result of those plans, we have developed strategies, and we know what works. The challenge to us now, is to implement all of those plans and achieve results. Our citizens have said, "we know what works, let's get it done" and we agree.

In order to address our problems, we have formed what we call, Tillamook County Performance Partnership. This is about partners working together to achieve results. Our Performance Partnership is made up of federal, state, and local government entities, as well as business, non-profit groups and citizens. Our approach is to work together on common goals, leveraging effort and resources together. One of the fundamental approaches is to use good information to determine the most effective use of those resources. One of the most useful tools for truly understanding information is the Geographic Information Systems, which can present broad-based and specific information together in a way that people quickly understand how this information relates to the problem they are trying to solve.

We have found that one of the tools that counties such as ours can use is Geographic Information Systems (GIS). Several years ago, this technology was out of reach of communities like mine, due to expensive, sophisticated hardware and software requirements; however, in today's environment we do not need huge mainframe computer systems. We do not need the high-end software systems, nor do we need large staffs of computer information specialists, as the GIS industry has made huge advances in bringing GIS to the desktop. We do, however, need good computer-readable geographic data from those agencies and organizations that collect data about our county. We need that data to be accessible and shareable so that we can use data that others have, and they can use ours. One trait that makes data shareable is standardization. Data which is produced to known standards is data that can effectively have multiple uses. I am encouraged by the efforts of the Federal Geographic Data Committee to promote data standards and hope that you will continue to support this activity. We also need reliable, easy to use hardware and software systems that can work with other GIS systems. But most of all we need to be able to work with state, federal and other local government agencies to leverage our collective investments and have some seed funding that supports partnerships for better use of information and technology.

Why do we, a low-density rural county with none of the major urban area problems, need the same type of data and support as major population centers? Because the solutions to many of the issues we face lie in achieving a better understanding of place and in our residents having the ability to see the range of possible alternatives and their anticipated impacts. For example, in the past decade Tillamook (city), the major population center of the county has suffered two major floods. These floods have caused large economic losses and have damaged critical fish habitat. These two floods also have left our Tillamook Bay and its tributaries in a damaged condition that makes the area even more susceptible to flooding in the future. We have undertaken an aggressive program to use tools at our disposal to mitigate against future flooding and to restore our damaged fish habitats. We are using GIS as an important tool in this work. We are bringing together all levels of government, the private sector and academia to work in collaboration to address our community needs. We are working with as many others as we can to get the data we need, identify priorities and seek appropriate solutions. I have included in your packet, a citizen's view about the importance of GIS and how they used it for the Netarts Bay Watershed Council. I would encourage you to read it, as it really reflects a local citizen's perspective.

In Tillamook we are seeking to solve our own problems but we recognize that preventing flood damage, salmon restoration, and effective watershed management cut across administrative jurisdictions. Thus by looking at issues and solutions in a place-based approach we are able to get a common perspective with our neighbors, and with state and federal agencies. We are participating in a National Spatial Data Infrastructure (NSDI) Demonstration Project along with five other communities in different parts of the country. This Project is helping us cut some of the normal barriers we have in working together across sectors and levels of government. It is also helping us figure out ways of improving the use of geographic information and of building a long-lasting data infrastructure for all of us to use in addressing current and future problems within our county and surrounding areas.

While GIS is not going to answer all of our questions, it certainly is proving to be an invaluable tool for determining the best locations for making investments of greatest benefit to the community. We need your support to be able to do a better job. The National Spatial Data Infrastructure is starting to come into being and will be a geographic information resource of great value to communities.

The NSDI Demonstration Project as well as other activities of the Federal Geographic Data Committee and its many partners are showing the importance of all sectors working together to provide ready access to geographic information. I urge you to continue to support partnerships and collaboration. More often than not, incentives encourage us to work on our own, - help us break down those impediments. Most communities need a small amount of encouragement. We have found that seed funding to get an initiative started often brings significant results. In fact, our County, with a general fund of only \$13,000,000, believes so strongly in the application of GIS that during our recent budget hearings we dedicated \$200,000 to implement an entire system of GIS in our County, along with our Public Utility District, Department of Forestry, our Economic Development Council and our local Community College. This system will provide information not only on our ecosystem restoration, but our economic development, land use planning and our taxation and assessment departments. This is an investment in a more productive use of our limited resources. We liken it to the time when we made our first investment in computers. GIS is the way to streamline government processes while allowing citizens to have access to information for their decisions as well. The Community/Federal Information Partnership is an excellent idea and will help many communities get started. I urge you to support it as it is a small investment that will return many benefits for our communities and our nation.

I would like to close by again thanking Congressman Horn, Congressman Kanjorski and the rest of the Subcommittee Members for inviting me here today and for your interest and support in helping all of us build stronger communities for the future.

That's how science and technology, a nurse, a secretary and a retired merchant seaman, with a lot of help from a lot of very wonderful people, got the job done. Call it partnership or synergy or even alphabet soup, we proved something, not only to ourselves but to the entire country, and I'm very proud to have been a part of it. Make no mistake, I realize we have a lot more to do, but with that room full of people you saw today, representing a county of concerned citizens, and your support.....I think we can do it.

Sincerely,

Jim A. Mundell
(retired merchant seaman)

cc. Sue Cameron, Paula Ascher, Kerry Griffin, Rick Klumph, Mark Labhart, Bruce Apple, Bob Baumgartner, Rich Felley, Randy Stinson, Eric Mallery, Vic Affolter, Tom Ascher, Ken Bierly

Mr. HORN. Well, thank you very much. That is immensely helpful. We will have a number of questions about it later.

The last on this panel is Mr. Lawrence F. Ayers, Jr., the project panel member on the National Academy of Public Administration Study. Maybe you could tell us a little bit about your background, Mr. Ayers, and then go ahead.

Mr. AYERS. My background—I have 45 years in this business.

Mr. HORN. That is what I thought.

Mr. AYERS. I was the civilian Director of the Defense Mapping Agency as it came out of the archaic period and into the time of satellite and was on the team that wrote the specs for GPS. So, I have been around a long time. I left the Government in 1987 and have been with industry for the past 13 years focused on the civil applications.

I would say, though, that these past 2 years have been particularly exciting. I have had the privilege of working on the National Academy of Public Administration panels with some very distinguished colleagues, and I would suggest that when Secretary Babbitt held up that report, you note the membership of the people that were on that committee. We had good representation from local cities—Eric Anderson; we had representation from counties, States, and a good representation. But probably more important was that we interviewed a host of people. I think if you go back to the report you will see all of the different government organizations all levels—private sector, utility companies, and even some foreign people to get a good grasp of what the issue was. I would note, Chairman Horn, that you are a fellow of the Academy, so I am sure that you understand the process of the panels and the committees.

Mr. HORN. I have great respect for my colleagues, and I only wish I had the time to participate more.

Mr. AYERS. Thank you.

The second Academy panel I served on just issued their final report, and it addressed the limitations and disclosures of spatial data particularly as it relates to disaster, and I would like to talk about that a little bit, because we really have some impediments in the copyright, privacy, liability, and security issues that need to be addressed, and there are some significant conflicting laws up and down the line that ought to be looked at judiciously to see what we can do with this.

Over my years, I have seen the transition from the tools of making maps to go from, I think, as Secretary Babbitt said, the plane table to the satellite imagery, aircraft imagery, and one that I would highlight for you. You can't get all the spatial information from satellites. You need access to one of the more important data sources, i.e., transactional data. That is the data that occurs by people transactions daily—changing fire hydrants, traffic lights, digging holes, changing utilities, and even knowing where the Chinese Embassy is on the map. So, this transition has really brought us into the new realm of real time spatial information. That is where the action is now. The action is real time where you can deal with the spatial data in the natural resources, commerce, transportation, all of the areas that are terribly important and particularly in national disasters.

We talked a little bit about standards, and if you will allow me just a minute, I would like to talk to that. GPS, whether you realize it or not, really has set the national standard for the geodetic framework of this Nation. Now, today, if you go across this Nation, you are going to find a lot of data on different projections; each county and town typically puts their spatial data on a flat projection. But GPS operates on a projection that approximates the Earth's shape, and whenever you make the transition from a GPS position to the local datum, you are going to introduce a certain amount of error, but over time, I am impressed with the fact that people are beginning to describe land parcels with GPS coordinates; the users are beginning to locate the utilities with GPS coordinates; in fact the public has accepted GPS. So, it has become one of the basic frameworks. The second issue that has been talked about is the need for common definitions of features and attributes so the people, when they share data, recognize that their descriptions have some similarity. Finally, the need to document the source and quality of the data.

Now, the Academy panel addressed these areas in the two reports. I have the summary of the second report, which I think was submitted to the committee for the record. I would like to make a few comments. I think Secretary Babbitt did a superb job of highlighting what the recommendations were of the first report, and I would like to make a couple of comments. One, is we really did feel that the Congress ought to address a statutory base for a national spatial data infrastructure [NSDI]. Today, we are operating on a Presidential order, but I think it is probably more important—and we all agree—that it should have a congressional statutory base on it.

Second, the panel really urged that we have a truly National Council, the panel wrestled with that concept for a long time. The panel felt that the Federal Government had been doing a pretty good job reaching out, but there was not ownership at all levels by all stakeholders, and we felt that if there was a level playing field when everybody came to the table, and they spoke with equal authority and equal accountability; that a National Council was the way to go. We spent some time in the report describing that. Third, in the area that I have just described to you, the fundamental base to which all spatial data sits in—the GPS coordinate system, the shape of the Earth with its elevation data, the photography from which data is extracted—is spread all over the Federal Government, and we felt that there ought to be a single focus that is concerned with base data along with a national data clearinghouse. You should be able to go into any library or to any computer and ask by name or coordinate for spatial data and the system should tell you where it is, who has it, how much you have to pay for it, what accuracy is it, and who do I contact to go get it?

The fourth area that we addressed was the area of multi-level partnerships. I think that has been discussed very heavily. I would make one point. About 90 percent of the data for the national spatial data infrastructure is created at the local level. It is not created at the Federal level, and the fact that the local level is where information is credited and that the local level is where the transactions are occurring which will keep the data current—you want

current data, so when you tap into data to make a study, you don't want data 5 years old, you want current data—found that we—and the Federal agencies do projects using local data. We feel very strongly that the partnership is the right way to go and that the Federal agencies are in fact supporting the local people, because they are tapping into the local data for analysis and decision-making.

Mr. Chairman, I think that pretty well summarizes my thoughts. We would encourage you to support the current budget. We think the budget support for the matching funds and partnerships is the right way to go, and we would also encourage that some of the other Federal agencies need a similar program. Your committee might take a look at this need.

Thank you, and I would like to answer any questions you may have.

[The prepared statement of Mr. Ayers follows:]



NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

1120 G. Street, NW, Suite 850
Washington, D.C. 20005-3821

TEL (202) 347-3190 FAX (202) 393-0993
INTERNET: www.napawash.org

GEOGRAPHIC INFORMATION

BUILDING A STRONG FOUNDATION FOR THE 21ST CENTURY

STATEMENT OF

LAWRENCE F. AYERS JR.

NATIONAL ACADEMY OF PUBLIC ADMINISTRATION
PROJECT PANEL MEMBER

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION
AND TECHNOLOGY

COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT
U. S. HOUSE OF REPRESENTATIVES

JUNE 9, 1999

Chairman Horn and Members of the Subcommittee:

My name is Lawrence F. Ayers and I am currently Executive Vice President of Intergraph Corporation. In the past two years, I have had the privilege, along with several very distinguished colleagues, of serving on two expert Project Panels of the National Academy of Public Administration (Academy). Those panels wrestled with a number of complex geographic information issues. The first panel addressed the issue of the most appropriate roles for all levels of Government, academia, the private sector, and the public in creating, distributing and using national geographic or spatial data. The second panel addressed the limits on access to and disclosure of spatial data, particularly as it is needed in disaster operations. It is in my capacity as an Academy Panel member that I come before you today.

The role of the U. S. government has moved from an era of exploration and expansion using the tools of map making and surveying instruments, to an era of immediately updated spatial digital data derived in real time from precise navigation and imaging satellites, aircraft, and transactional databases. This transition is forcing all segments of the nation that create, distribute and use spatial data, to come together and address the issues of common projections, feature definitions, source, and quality of data. Addressing these issues is critical as we embrace on-line decision-making in areas such as public safety, land use, preservation of natural resources, commerce and transportation, and disaster preparedness. In other words, the data needed to run our national infrastructure.

The Academy Panels have produced two significant reports that focus directly on the issues we are discussing. They are :

- **“Geographic Information for the 21st Century Building -- a Strategy for the Nation” - January 1998, and**
- **“Legal Limits on Access to and Disclosure of Disaster Information” - April 1999**

Together these reports focus on the themes of my testimony today, namely:

- Policy and structural changes that would enhance the nation's ability to integrate geographic information among government agencies and across different government levels— as well as with the private sector, and
- Actions needed to resolve various data access and disclosure issues that, left unattended, will impede the development of useful and reliable information networks.

I would like to submit executive summaries of both reports for the testimony record.

ECONOMIC IMPORTANCE OF GEOGRAPHIC INFORMATION

Mr. Chairman, let me begin by emphasizing what the participants in these Academy Panels found as one of the most compelling points—the growing importance of geographic information.

- Geographic information is pervasive. It has notable effects at all levels of government and in economic sectors affecting over one-half of the nation's economic output—from real estate transactions to voting rights, from family farm management to national forest preservation, from truck routing and automobile navigation to provision of emergency services.
- Geographic information systems are changing how government does business as the complexity of societal interactions and the ease of data manipulation increases. The information age makes it possible and desirable to do many things with geospatial data that were previously impossible, and to gain new insights on a variety of public policy issues.
- The U.S. is in a highly advantageous competitive position internationally, is well situated to export the information-rich tools its strong commercial geographic information industry has developed. It also has companies that are recognized as worldwide leaders in the development and marketing of geographic information capabilities and products.

Thus, the future importance of geographic information—to the nation, to the economy, and to governance—is not in doubt.

BUILDING A NATIONAL STRATEGY

The Academy Panel that produced the January 1998 report found that the United States needs a truly **national geographic information strategy** for the 21st Century, and policies to support it. Technological developments, such as the Global Positioning System, satellite remote sensing data and orthoimagery, computerized geographic information, and the Internet, are revolutionizing cartography, surveying, and geospatial data collection, production, and analysis. New institutions, policies, and intergovernmental and public-private relationships are needed that support greater relevance and more rapid implementation of a coordinated geographic information database.

The Academy Panel strongly endorsed the creation of a truly **national spatial data infrastructure**. This infrastructure—the nation's geographic information system—was seen as the critical building-block for the creation of a 21st Century geographic database. **National—not just federal**—standards and policies, increased data accessibility and technical skills, and intergovernmental cooperation were considered essential. Geographic information was not seen as the responsibility of any one level of government nor of any one sector of the economy.

Therefore, the Panel recommended that—a new statute be drafted in cooperation with state and local governments and other organizations to create a **National Spatial Data Infrastructure (NSDI)**, establish a **National Spatial Data Council (NSDC)**, and better define federal agency roles and responsibilities for NSDI so as to meet the participating organizations' programmatic needs. The Panel recommended that this statute include:

- a list of congressional findings about geographic information
- a statement of national goals and a definition for the national geographic data infrastructure
- a charter for the NSDC

- consolidation of federal base geographic information functions
- modifications to existing law to facilitate geographic information partnerships, cooperative research and development agreements, and private-sector procurements
- amendments or rescissions of current law to modernize and conform existing program authorizations to the national spatial data infrastructure concept

The acceptance of an NSDI continues to grow among members of the geographic information community who seem naturally attracted to the idea of combining the resources of the various levels of government and the private sector to develop and maintain automated databases of geospatial information. The Federal Geographic Data Committee (FGDC) continues to be a useful resource to integrate activities at the Federal level, and recent steps to include non-federal representatives from the National Association of Counties, the National League of Cities and the International City-County Management Association, the National States Geographic Information Council, the Open GIS Consortium, and the University Consortium for Geographic Information Science in the work of the federal committee are helpful. But, it seems clear that federal entities as presently constituted are not the best vehicles for enhancing the nation's capacity to make the most effective use of geographic information in the future. This is why the Academy's Panel called for the creation of an extra-governmental **National Spatial Data Council** that would more easily be able to bridge the gaps among governmental levels, with the private sector, and with academia. This Council was seen as a private, non-profit group that would have a greater role in developing and coordinating national standards, operating a metadata and data clearinghouse, and promoting a research and training agenda for geographic information.

CONSOLIDATING CRITICAL FEDERAL FUNCTIONS

The Academy's Panel concurred that there is a continuing need for federal geographic data integration. The federal government is establishing standards vital to integrating both data and analysis, has a lead role in structuring compatible international standards, and is also the leader in developing a clearinghouse for geographic information. The Panel strongly

reaffirmed the need for coordinating these activities among the more than 40 federal agencies engaging in geographic information activities, even if limited to federal as opposed to national considerations. The Panel felt very strongly that, at least, the **federal base cartographic functions should be centralized** to provide a firm geographic foundation on which other data could be confidently and consistently geo-referenced. It voted to combine geodetic control, elevation, and orthoimagery responsibilities in a single federal entity on the basis that a "critical mass" would better organize the base cartographic foundation data needed to create a national spatial data infrastructure more rapidly and assuredly.

Therefore, the Academy Panel recommended that:

- **legislation be forwarded to Congress to transfer the National Geodetic Survey to the U. S. Geological Survey and to authorize the establishment of a Geographic Data Service, contingent upon submission of a reorganization plan prepared by a task force mandated by Office of Management and Budget.**
- **consideration be given to creating a performance-based organization in Department of Interior for federal surveying and land-title records activities.**
- **a reorganization plan be developed in cooperation with the NSDC to implement the Geographic Data Service and realign the federal field structure for basic geographic information.**

At the same time, the Panel recognized that the widespread utility and integration into multiple public and private purposes of geographic information illustrated the necessity for increasingly decentralized geographic information system applications.

GEOGRAPHIC INFORMATION PARTNERSHIPS

No magic formula was identified to easily sub-divide the responsibilities for geographic data across public-private and intergovernmental lines. The federal government is usually thought to be interested in smaller scales, such as the standard 1:24,000 national topographic map. But, its land management agencies have domain over one-third of the nation's land area in the form of national parks, forests, wildlife refuges, dams, and other public lands that require larger scale maps similar to those needed by counties and cities. Geographic data for business

reside alongside public voting and street address files needed for mail, census, tax, and emergency service delivery. The Panel was therefore reluctant to draw clear lines between public and private use of data, or among intergovernmental jurisdictions, responsibilities, and functions. The Panel deliberately chose not to devolve significant geographic information responsibilities to the states or local governments, to privatize major functions, or to mandate specific contracting out goals.

Instead, the Panel endorsed **geographic information partnerships** as the preferred mechanism in which both mutual interests and conflicting priorities should be accommodated and resolved. It particularly favored broad multilateral approaches that engaged multiple geographic partners in consortiums based on specific geo-based problems and experiences. The Panel wanted the major components of the geographic information community to work out these issues cooperatively in the coming years. It saw the proposed NSDC playing an essential role in developing a new consensus on how geographic information roles should emerge.

The Panel's specific recommendations were:

- **Geographic information resource managers should increasingly emphasize multilateral partnerships—interagency, inter-governmental, and with the private sector—to promote a robust NSDI and be a source of savings. Broad consortiums that involve multiple governmental levels and engage the private sector should be favored, and U.S. Geological Survey's unique authority to engage in innovative partnerships should be extended to other agencies.**
- **Multilateral partnering, including partnering modeled on that used in cooperative research and development agreements with the private sector, should be extended to agency operational activities and should be increased. Government agencies should avoid engaging in value-added activities beyond the research & development phase when they can be provided by the private sector at or near government cost.**

- **Outsourcing decisions should be made on the basis of the respective roles, responsibilities, and competencies of the governmental and private sectors. Cost-effectiveness is one of several factors that needs to be considered. On the other hand, arbitrary percentage targets for contracting out should be avoided.**

I want to commend the Secretary of Interior for the actions taken in the FY 2000 budget to initiate a new program of Community/Federal Information Partnerships and for identifying almost \$40 million to support these efforts. These efforts supplement a small program of community demonstration grants previously funded by the FGDC and are, I believe, responsive to the Panel's recommendations for promoting multilateral partnerships in developing the national spatial data infrastructure.

But, I also want to emphasize that the geographic data partnerships among federal agencies need greater attention. The Panel's examination of FGDC activities found many positive activities, but an overall lack of the strengths necessary to focus federal agencies effectively on rapid deployment of a robust NSDI. For example, some federal agencies that are active geographic information users and producers are not members of FGDC; some FGDC members are not actively participating in its activities; and some federal agencies are not using FGDC's standards. In addition, the Panel found that FGDC's strategy for implementing NSDI is not reflected in agency strategic plans and annual performance plans developed under the Results Act. The Panel recommended immediate action to **“develop coordinated goals, strategies, performance measures, and budgets for federal agency geographic information programs and activities..., as required by the Results Act, to help move the NSDI toward further and faster realization.”** Congress should monitor this activity carefully each year, because it has the greatest potential for making progress short of enacting additional legislation. FGDC and the Office of Management and Budget should play facilitating roles in coordinating these federal agency activities.

DATA ACCESS POLICIES

The Academy Panel also strongly endorsed current federal government policies that support very open, low cost distribution of geographic data. Market pricing and copyright protection of government data are not in the American tradition. While other nations and even some states and communities have embarked on this course, the Academy Panel rejected this approach because it tended to impede public participation in the nation's democratic institutions and was potentially competitive with private-sector economic activities in geographic information. The Panel specifically recommended that:

- **The federal government policy of promoting open access, especially for all data used in public policy decision-making, should be maintained and the states and localities should be urged to adopt similar policies.**
- **The federal government, possibly under the lead of the Federal Geographic Data Committee, should articulate a clear policy or draft legislation that allows the government to work cooperatively with the private sector to protect private-sector intellectual property rights for geographic information, particularly uniquely private and value-added data sets.**

OTHER LIMITATIONS ON DATA ACCESS

In an April 1999 report on data access issues associated with the creation of disaster information networks to be used in natural disaster and other emergencies, a second Academy Panel examined the problems of proprietary data, security, liability, and privacy in such a network. While this research examined these issues in the context of disaster information, the Panel's findings and recommendations are applicable to geographic information generally. In this very preliminary study, the Panel recommended that there was a need to **develop a series of "best practice" models to assist legislators, designers, and users of disaster information networks to simplify and mitigate data access and data disclosure issues. These models**

should be based on detailed studies, and should be designed to meet the special needs of each phase of disaster management.

The Panel believed that research is needed to identify good practices more precisely than was possible in its study. Further research should analyze current conditions, inventory the relevant laws and practices of the 50 states, analyze the pros and cons of alternative approaches, and highlight the most promising options. Some of the models that should be considered are:

- **State Legislation.** Suggested state legislation—and related policies and regulations—should be developed to amend differing state laws on freedom of information, privacy, trade secrets, geographic information systems, copyright, utility regulation, and electronic information security in ways that would facilitate the purposes of a disaster information network.
- **Federal Laws and Policies.** Amendments should be drafted to clarify and reconcile differing federal policies, laws, and regulations, including OMB Circulars and Executive Orders that relate to intellectual property, privacy, freedom of information, liability, and civilian use of information derived from classified sources.
- **Positions on International Issues.** Well-defined U.S. positions on the use of electronic databases and privacy protections should be developed to provide credible alternatives to the positions of other nations when negotiating international treaties on these issues.
- **Data-Sharing Agreements.** Model agreements—and models of supporting institutions, processes and practices—should be developed to facilitate fair, equitable, and effective data sharing, licensing, and pricing relationships among public and private data producers participating in a disaster information network.

- **Data Quality Assurance.** Models should be developed to facilitate adoption and maintenance of data quality assurance and certification programs to improve the accuracy, reliability, timeliness, relevance, completeness, and credibility of the information available through a disaster information network, and to help reduce the potential for liability of the network and its data suppliers and users.

- **Liability Limits.** To help limit liability, models should be developed concerning:
 - * disclaimers
 - * metadata standards to establish the accuracy, timeliness, and suitability for intended purposes of the data available through a disaster information network
 - * the use of outside companies to certify the quality of disaster management data
 - * legislation limiting liabilities resulting from the use of properly prepared and documented data

- **Partnerships with the Private Sector.** Models should be developed to facilitate the use of public data trusts, public-private partnerships, and other institutional mechanisms that could help to facilitate access to and disclosure of data through a disaster information network.

SUMMARY

Mr. Chairman, let me conclude by summarizing a few key points:

- geographic information is of rapidly growing importance in our economy and in governance
- federal entities operating with a constrained charter and within constrained resources have done a commendable job, but a truly national effort requires a new strategy for more directly involving all levels of government, the private sector, and academia.

- legislation setting forth national goals and establishing a National Spatial Data Council is needed to advance the development and maintenance of a national spatial data infrastructure
- consolidating similar federal activities in mapping and surveying in a federal Geographic Data Service would integrate basic geographic information functions and provide a stronger platform for building this infrastructure
- multilateral partnering among federal, state, and local governments, with the private sector, and with the academic community should be fostered whenever possible
- access to geographic data by the public should be facilitated, but there are critical issues involving proprietary data, security, liability, and privacy that need to be addressed by further study.

Mr. Chairman, I want to thank you and other members of the Subcommittee for the opportunity to present these views. I would be pleased to answer any questions you may have.

Mr. HORN. Well, thank you. Those were very pertinent comments.

As I have listened to all of you this afternoon and when Mr. Kanjorski and I are trying to piece a bill together in this area, one thought comes to mind is that we need a data room in Congress, and we might put it over in the Library of Congress or we might use a vacant hearing room around here, and any Member could come in and see what the impact of some particular point of coordinate and all that would be on that Member's district, and I think that would be very useful information.

The President ought to have a similar type of room. They have a war room down there for national security affairs, and I remember Senator Humphrey and I, 25 years ago happened to be on the same TV show, and he and I agreed that there ought to be. The President is not very well served by the data that is relevant to what a President needs to deal with and that he ought to have that kind of a, "war room," "peace room," whatever you want to call it. And under Franklin Roosevelt, it was there. The management group in the old era of the budget has just been decimated the last 20, 25 years. It has all become much more politicized. As I remember—I hope I am right on this—that it was an uncle of the President, Delano Roosevelt, that headed the national, sort of, physical planning operation under the Bureau of the Budget or within it—it was a national council—and that made, to me, a lot of sense when I was a student coming in 50 years ago, whatever, and we have lost all that, and I am very interested in what Mr. Kanjorski has asked us to do, that it makes a lot of sense to me, and it makes sense to anybody that is a practitioner, because you need those data just as the elected Members here want with examples of seeing how we can use those data in solving very controversial problems sometimes. But when you get the right data out on the wall, most people are pretty reasonable and say, "Yes, that makes sense to me."

Let me ask you, generally, all of you as what are the privacy or intellectual property issues that act as a barrier for public and private sectors to share geographic information and form effective partnerships? What can you tell us about that? Let us start with Mr. Bills.

Mr. BILLS. Well, I think one of the, I guess, sort of, central limitations is the number of Government agencies who undertake in many cases quite extensive and expensive efforts to create partial data bases, have sought to recoup many of the costs associated with that, and, so, as a result, some of the costs are quite high in southern California. Los Angeles County and some of the other counties actually charge about \$2 a parcel to local jurisdictions for that parcel data. If you are a city the size of Long Beach, for example, that is quite a substantial investment, and it really does inhibit the ability of local government to have access to what for most cities is really the central building block of their own GIS systems. And, so, again, that is where I think we need to sort of have pooling of resources so that we can actually share that data among a multiplicity of agencies. We want to make sure that the public is getting the most for its public dollars.

Mr. HORN. Mr. Sweet, any thoughts on this?

Mr. SWEET. I think two very, very quickly. One is that most of the local government officials in our region have seen this as a gold mine—and they have used those words; that they now have this data—

Mr. HORN. Get the microphone a little closer.

Mr. SWEET. I am sorry. I think many of the local officials in our region have seen this is as a cost recovery mechanism, and now they are trying to sell data which you can go to the courthouse and get for free on paper, but, now, to put it on the web or to put it into some digital format seems to make a different kind of data, and it seems to make it something that they want to recover costs for.

The other fear is that—and I think education can largely take care of this—is that information that is used in 911 dispatching and other types of activities that the courthouses are obligated to provide will become mixed in and then flow out in an unrestrained process. And I think in our area, largely, education has been able to deal with those issues.

Mr. HORN. Ms. Hall.

Ms. HALL. In our area, we have elected officials that are very concerned about the whole privacy issue around this data, because when you build a parcel map, you have all information about that particular household. What we are doing is we are doing a partnership or we are looking at developing a partnership with the private sector that the citizens can benefit by having this through—same-day bank loan approval, title searches done on the same day—so we are showing that from a—I hate to use the word “commercialization”—but to their benefit that their lifestyle, what their needs are will be enhanced by having that, and that is really the balancing act that we have been trying to address on this issue.

Mr. HORN. Commissioner Reinhardt.

Ms. REINHARDT. Well, Minnesota laws governing the data privacy and the intellectual property cost recovery were recently reviewed by the Information Policy Task Force and a report was presented to the 1999 legislature. There were several recommendations that were made in there, including many that were just plain common sense and others that were very controversial, specifically, those relating to cost recovery and indicating that the data that was being collected at great cost to the counties and to the local units of government had no commercial value, and, therefore, had to be simply provided for free. That is something that was not presented during this legislative session, but we are really going to deal with that issue of what is public free data and what can be charged for especially when you look at, again, the cost of collecting that data.

Mr. HORN. Commissioner Cameron.

Ms. CAMERON. Mr. Chair, I would agree with my previous colleagues on this issue. It is something that we are still exploring. I would give you a couple of examples, one of them being, as we start to look at our watershed, we look at the private timber ownership areas, and there is certainly some concern by the private sector that this information might be used to show violations. We are trying to focus the energy and the information more on what will they be able to achieve and how can they better provide and get

to the same results—better riparian areas—but it is in their interest, as well, as we do have some good partnership there, but it is a threat that sometimes if there is too much information out there, it may be used against them.

The other privacy piece comes with any kind of situation where you are dealing with Government information when you have agencies that may know quite a bit, particularly when you deal with social service issues, that there has to be some walls there where some information is accessible for those people that are dealing with families, particularly specific around health or mental health issues, and it might be within the purview of the agency information, which is already in the purview of the agency, but to not let that information out to the general public, and those kinds of things are where the real discussions are happening.

Our county tends to believe that it is very important to provide services to people in the community, and, therefore, it is a fine line between just keeping the costs of monitoring and the updating the system as well as trying to make sure that people have access to that information. So, it is still in the works for major discussion.

Mr. HORN. Mr. Ayers.

Mr. AYERS. Sir, I would say that it is like peeling an onion back. The more we studied the spatial data needs, the more we found. We did make an observation that I think is worthy of consideration. When you are dealing with disaster or catastrophe information needs you start dealing with privacy, copyright, liability, and security issue a little bit differently than for the general utilization of data. For example, elderly people, homebound, are not particularly excited about that being general information, but they are very concerned that they be looked after during emergencies. So, there have been some very cogent observations about a national security network or a national disaster network which would be like an intranet that would be able to have more information than you have in a general system.

The other observation I would make is that utility companies during disaster have been reluctant to share data because of the liability. I was speaking with the Wyoming Governor during this conference, and he made the observation that the Governors can in fact indemnify utility data during crises. Maybe this should be considered as a solution. The Academy report recommends that more study be undertaken.

Mr. HORN. Let me just ask one more question, and then Mr. Kanjorski can have the rest of the afternoon. You have mentioned pilot programs, demonstration programs, and some of you said, "Why don't we let the relevant Federal agency that knows more about this category." I would be interested in any thoughts that you have as to what kind of categories are needed to make sure that this system is relevant to the client, namely, you that are at this table who would have great need for it? Members might, executives might. Can you give me a little guidance on that? Mr. Bill.

Mr. BILLS. I guess I am a strong advocate of a project level approach; that is, that I think individual projects really determine the particular expertise that are required, and I think everyone that comes to the table with particular projects bring their own particular expertise so that I think in some cases, the Federal Government

can play stronger roles and others perhaps a more subsidiary role to some of the local or regional agencies. But, again, I think it is very important that we do help facilitate across the country these types of partnerships. I think we have some wonderful examples today, and we really should be having this across the country, and I think there should be a much more aggressive involvement of the Federal agencies in these, but, as I stated in my comments, I think that we all gain from that. I think the Federal agencies can gain, because they will learn. I think we, on the local side, can also, and so—

Mr. HORN. Now, do we have projects underway from Federal agencies that are represented on the committee that Secretary Babbitt Chairs? Are some of these occurring now within their current budgets?

Mr. BILLS. There are, I guess I would sort of urge strongly that there be an even stronger emphasis. I think that there are still enough examples in which Federal agencies have not been able to participate with the regional or local agencies for a variety of reasons. I think that really is the approach that we should take to make sure that we eliminate some of the redundancy in data collection, because data is very, very expensive, and I think, as was ably pointed out, it really has tremendous value to the community.

Mr. HORN. Mr. Sweet.

Mr. SWEET. If I had a single pot of limited resources to invest in trying to address the problem, I would try to address the problem toward coordination and education. I think that the duplication that we are seeing oftentimes is in the best intention. We simply don't know that "it" is has already been done or "it" is about to be done. In the latter of that case, where we can be timely enough to determine that "it" is about to be done, can yield some very significant savings which then can be rechanneled into other types of projects that would be used to increase the impact of the coordination activity.

Mr. HORN. Ms. Hall.

Ms. HALL. I think from our perspective, our frustration is we don't know everything that is being done at the Federal level. We just know bits and pieces of what is being done, and it is not being done in a coordinated fashion, and it is not being communicated in any shape in terms of a clearinghouse. And then we see at our local level that even though the feds have a map, we have to rebuild that map so that it has the accuracy that we need, which is 1 to 2 feet as opposed to the Federal map whose accuracy is 35 to 40 feet. But the Federal agencies need our data, and they need our—I mean, we have IRS agents that sit in our registered deeds office, five of them, every single day, to do nothing but look up information on our parcel information. That is all they do, and if we had some cooperation where they would help fund our parcel map or help in terms of our partnership, they could be linked to directly at the IRS building instead of sitting in our offices. HUD is very interested in terms of—we have 70,000 vacant parcels in Wayne County, not just vacant, but parcels that have been turned over to the State of Michigan; 70,000 out of our 900,000. HUD needs that information, and wants that information to redevelop those properties to put homeowners in it or to tear them down, because they

are blighted. So, I think the whole concept of partnership from the local level on up through consensus is really the best approach.

Mr. HORN. Commissioner Reinhardt.

Ms. REINHARDT. Well, I agree. I think that there are certainly lead agencies across the Federal Government that can assist with the collaborative efforts that are taking place around the country. We need to know is there an inventory of what services are—what is taking place right now so that you know where you can go and tap into those services, and the Federal Government or the lead agency at the Federal level knows where they can get information from us to avoid duplication of efforts. And, I think strong support for the collaborative working together is really the key.

Mr. HORN. Commissioner Cameron.

Ms. CAMERON. I would suggest that being one of the pilots that Secretary Babbitt Chairs that we were just awarded, we were excited. In fact, the opportunities of sharing information and trading information back and forth is phenomenal. We are actually going into a partnership right now with the Lackawanna Susquehanna partnership to work with us in Oregon to do some more work around the watersheds. It is a drop in the bucket, and it is a starting point, and we become very good at sharing best practices within a small cadre of pilots. We need to bring that beyond, and I think the Federal Government can play a wonderful role in helping us do that. You have got pilots in FEMA for Project Impact that realize there are other projects that are doing the other work, and you start to bring them together, and that is the role that you can play to help us.

But probably one of the most frustrating pieces for local county government, if you really want to take this full scale, is those base or parcel maps. It is an investment. When I talked proudly about the \$200,000 we are investing, that is at the expense of a vehicle reserve fund or our contingency fund, and those aren't easy locally. I think that it is incumbent upon us to provide good information for everybody in terms of maps, but I also think that the Federal Government can assist local government in helping us do that in a cost share way that makes sense. Currently, in Oregon, our Department of Revenue does cost share those base maps with us. We still have to come up with half money, and that is where it gets very difficult, but it is an investment, and so you have to shift money, and so it is a balance, and I guess, if you really want to take this full scale and you want to make this work throughout the community at the right standards that we can agree on and the right resolutions so it makes it all tie together, it is assisting in that very basic portion of those maps that counties need.

Mr. HORN. The grant you received was what? About \$250,000?

Ms. CAMERON. Actually, it was about \$100,000.

Mr. HORN. \$100,000. Was a match required?

Ms. CAMERON. It is in-kind match, and that is the only way we can participate. If it is hard dollar match—and I can give you an example of an Army Corps of Engineers study we are doing right now that needs \$700,000 for Tillamook County to do a model to help us deal with the flooding—we can't raise that kind of money through donations from our community or our budgets. So, the

hard cash dollar match is something that puts us all in a very difficult situation.

Mr. HORN. Well, you have given some good examples.

Mr. Ayers.

Mr. AYERS. I guess I would just make a point that it is a savior and a curse. In one way, when you have different Government agencies doing projects, the projects get very focused, and the data is collected only for the project, and it isn't considered as part of a national or a local general purpose data source, I think Mr. Sweet and the Honorable Cameron make that point. Now, I think that Secretary Babbitt and the FGDC and I believe that this National Council could put the emphasis that is needed to have projects collect data to national standards. It is going to be for integrating lots of activity as opposed to a single stovepipe projects.

Mr. HORN. Good. Well, I am now going to yield the rest of the day to my colleague from Pennsylvania, Mr. Kanjorski, and I will relax.

Mr. KANJORSKI. Thank you very much, Mr. Chairman, and I am sure we are not going to take the rest of the day.

So many good issues were brought out here. Let me just refer back to something that you brought up—privacy. I went home this weekend to Pennsylvania and much to my chagrin, I discovered that the Commonwealth of Pennsylvania was negotiating to sell the private information off unemployment compensation forms, which would disclose 80 percent of the incomes, the dependents, and some of the most private information in terms of personal affairs of Pennsylvanians. About 80 percent were being sold outright. And, so I heard one of the panelists say, "Well, there is some material that is available, so it should be free and other material is gathered and cost something," so there may be a return for proprietary interests in there, but I want to caution that some of this material is private, and no one really deserves it, and Ms. Hall scared me when she talked about the five IRS agents sitting in there, and if we gain the reputation that that is another forum that is big brother is in, we will be in great difficulty.

In listening to the overall testimony, I would—and I think everybody agrees—that we need the national protection to examine privacy, and whatever those standards are they should apply at the national level, the State level, and the local level. Is that correct? There is no disagreement; that is just generally across the profession? I think the County Commissioner Cameron made a good point of the need for a clearinghouse. We are constantly reinventing the wheel.

I happen to be more sensitive to these things in talking to my county commissioners, not only in my congressional district but across the State, and maybe I will use them as an example, so you won't be embarrassed, but I will say I am more in their camp than in others. I find GIS is starting to become "a sexy issue" for sort of being a techie, but nobody in elected office seems to know anything about it. When they are putting out a contract, they are trying to hire some consultant that will come in and tell them that they are going to cure all their wonders and do it well within a certain budgetary constraint, but the specifications of the contracts and what should be gotten and how it should be put together or

what it should serve, the elected officials making the decisions are almost absent of that basic information. Do you find that to be correct up and down the line?

Mr. HORN. The record will note the panel is nodding their heads. [Laughter.]

Mr. KANJORSKI. I can say Mr. Sweet came to my attention based in Pennsylvania on that very subject. We have this horrible problem of 2,500 communities in Pennsylvania and are always in the process of trying to get them organized in some way. In my congressional district, I have 176. Unfortunately, I don't have room large enough to meet with all my mayors and councilmen in the entire district, which shows you the problem in Pennsylvania. I would say probably 70 to 80 percent of these people have absolutely no idea as to how to go about writing the specifications for the GIS system. What Tom basically did was interact local communities, county governments, State programs, Federal programs to do a regional system, and it shows the interaction and multiple cooperation. That brought him to my attention. He has now assumed a role of being one of the six models of the Vice President's project across the country, and they will be now cooperating with Oregon and other States like that that are named that way.

I think the Commissioner makes a good point, even though we have a forum like this where we bring 300 or 400 people to Washington where they find their way here and they talk, they are energizing, but the rest of the country out there really is not anywhere near the standard of knowledge or information that these folks before us have, and yet the ideas that have spun out over the last 3 days, Mr. Chairman, really make your mind boggle as to what the possibilities are; what can be done; what correlation and, therefore, identified possible causal relations can be identified? What profiles can be established to indicate either problems with salmon or forests or the need for education or the county commissioner has discovered how to prevent child pregnancy? I do not mean to be facetious in that way, but just by identifying the numbers, she was able to get the community involved to understand they had a problem that they had to address and what simpler way to do that?

That would give us approximately 10 more minutes before we have to go and vote, I suspect. So, I am going to ask the members of the panel to make whatever observations you wish in terms of about a minute apiece, if you can, in what did you gain from this forum? Where is GIS? What would you like the Congress to do if you had your wish? What should we do to participate, to help facilitate, to help partnership, and to help open the doors? Whatever you individually have concluded after your use or study of this?

Mr. BILLS. Again, I—with danger of flogging my horse here—I think whatever we can do to encourage partnerships between levels of government I think is quite critical, and I think that that really is one of the most critical roles that this committee could play to ensure that the various Federal agencies and States and regional and local agencies do come together so that we can most effectively take advantage of the technology. Another point, really, is that we do need to have advanced mechanisms so that we know when other agencies are going to be preparing data so that we don't engage in duplications. So, how can we know if, for example, USGS is going

to undertake a study in 6 months and that they will actually be doing digital orthos for a particular area? So, ways in which we can communicate this information within the communities so that we can avoid this duplication, I think is—well, it is, actually—we currently have spatial data catalogs, so we already know—we have ways of knowing what data has already been produced, but we don't have good mechanisms as to knowing what data will be produced in a particular time period, and I think that that would also serve to help reduce some of the duplication.

Mr. HORN. When Mr. Kanjorski finishes his questioning, he has to vote. I am going to vote to keep this thing going, so this panel will be through when he finishes his line of questioning, and then the third panel we will bring up next. So, I will try to be back in 10 minutes.

Mr. SWEET. I am excited I think, first and foremost, what I would do is applaud your efforts. We now have GIS moving from obscurity to the forefront in being recognized as something that is going to have a significant impact in the way we manage our Government and the way we compete in the 21st century, and I hope that we can keep that in the forefront and not let it fly back into obscurity. On the other side, I think that the key to the success that we had in organizing nine counties, a dozen different boroughs and municipalities was that we were able to guarantee their independence while still getting them to work toward regional cooperation, and I think the guarantee of independence is what continued to bring them back to the table. I also think that the guarantee of independence at the local level was a significant if not the most significant fact in our ability to leverage the Federal investment dollars on a 10 to 1 ratio. That effectively enables you to fight your match problems. When you need it, projects with—when you need hard match, you can get it more readily when they think they are investing in their future, their own future, not somebody else's idea of what they should be doing, and those are the two things that I would concentrate on.

Ms. HALL. I am going to take a different stand. I think one of the things that this committee and you, as Members of Congress, could help do is educate your colleagues, because they know the value of GIS and what it does for them and their constituents, then they are out being the cheerleaders for this. I mean, right now, it is just a small group of people, and there are some elected officials that know the value of it. But it is how do you communicate that on a continuous basis, because the synergy that you develop from that and the excitement and then the support you get maybe from the Transportation Committee and in the Judiciary Committee and of course the Appropriations Committee, and that brings the value to all of us in what we do in the different aspects of governmental services that we provide. So that is one.

And, two, I still want to go back to somehow of a clearinghouse or a way that we at the local units know what the Federal Government is doing in terms of GIS. There are some that may know that, and I am not a technocrat; I am a higher level administrator, so I am not aware of it. If there is an easy way to get that information out to elected officials, I think that is important.

Ms. REINHARDT. Yes, and I agree with that, as well. I think the most important thing that needs to take place is the definition of what the benefits are, and it is not just at your level but also at the local level. When I go to my peers on county boards in Minnesota, when I talk about GIS, I, first of all, have to say exactly what GIS means and then talk about the benefits that can be accrued to them by participating in the data sharing and what it really means to them in their programs; what it means as far as health, and tracking—we had a recent case where there was mosquito-borne encephalitis, and we were able, within hours, to track down exactly where the problem was and to isolate and to talk to the people in that neighborhood so that they knew what was going on. That would have taken a week prior to metro GIS being in place. So, we need to make sure that people understand those benefits. When you get that understanding, then you can go after and be, I guess, more successful at forming the partnerships, at getting the financing in place, I touched on briefly the idea of the bridge financing, and I think that that would be critical from the Federal level. If you can get us started, you can get us established so that we can then show people what the benefits are, it will take off on its own. It will be a benefit all the way across the board, from cities, counties, State, Federal Government, and the private sector, as well.

Ms. CAMERON. I would like to agree with everything that is said, because there is no point in repeating that, but what I would say is when you talk about that match piece, the costs are fairly fixed, but the communities' ability to respond to those costs are not fixed, so there needs to be some way to look at how does a community, such as ours, one with the same kind of model as Napa Valley, CA, meet that match that has just become such a barrier. So, I would suggest any work that is being done in dollars, deal with that match.

And the last piece that I would suggest is that I heard some discussion about the appointment of a council, and I would highly recommend that. I think that is a very good approach to getting a sense of where to go from here, and that is involving local communities on that council, whether it be cities, special districts, counties, and the Federal Government as well as State and our private interests, as well, because I think that will help us delineate which strategy to pick first and get the support around that.

Mr. KANJORSKI. Ms. Cameron are you suggesting that having to come up with \$750,000 for a Corps of Engineers study may be impossible whereas the same type of study and the same type cost for Napa Valley or Los Angeles is minuscule? Would you be in favor of the Congress looking at something like a graduated local share contribution?

Ms. CAMERON. Absolutely.

Mr. KANJORSKI. Maybe taking unemployment income tax base into consideration?

Ms. CAMERON. Absolutely, and I would give weight to in-kind, because there is a lot of things communities can generate on an in-kind basis that we cannot generate in hard match, and when I talk about that \$700,000, that is over a 3-year period of what we would

have to pay on a \$3 million project to do the hydrodynamic flood model to help us mitigate the damage of the flood.

Mr. KANJORSKI. I think that is a decided disadvantage to small communities and less dense areas of the country. I also notice, throughout the rural areas of Pennsylvania, it is the same problem.

Ms. CAMERON. Right.

Mr. AYERS. I would just add one thing: I think the council, the idea of a national council and the area that you really didn't talk about is the private sector. I have seen where utility companies have joined in partnerships—PG&E in Baltimore, Commonwealth Edison in New York—in these regional studies and are quite willing to participate with money and efforts, and I would also say that many of the vendors are putting out pilot projects to get people started in using digital spatial data at no cost to get local governments to understand the benefits. So, I think the idea of a national council where the private sector is at the table is going to bring a lot of assets that you hadn't thought about before.

Mr. KANJORSKI. This is an interesting technology that it has so much private involvement at this point. Usually, the Government goes out and manufacturers something or starts something or creates something that takes many more years before—it seems to have a tremendous amount of private sector involvement at this time and helpfully—we live by these damn things.

Rather than try and squeeze any more questions, I am going to head over, and I just wanted to say, again, thank all of you on the panel for coming forward. I think you are doing a great service for this whole idea and this whole technology, and even though a lot of colleagues are not present today, do not be surprised, because they never are. These subcommittee hearings are usually one or two people, and, very often, just the chairman, if I may say. He has indefatigable abilities to spend time in doing issues like this, but a lot of this material does get read. It gets highlighted, and the staff people turn it over, and the thought process is started. I would say you have made an invasion in the Washington city, and that is good. Now, you can help me, and you can help my other colleagues that will become interested in this in asking at least the questions. Just keep calling and say, "Do you remember, Congressman, did you take care of that GIS yet?" He will think it is a disease or something. [Laughter.]

I will prep the attending position, and then he will reform over to us, and we will have him caught. So, you can be very helpful that way, and I know so many people who are with the conference are here. It is just great to see you here.

With that, I am going to recess the Chair subject to the return of the chairman so I can go and vote. Thank you.

[Recess.]

Mr. HORN. The Subcommittee on Government Management, Information, and Technology will reassemble, and we will swear in the third panel.

Panel three come forward. It is Mr. Jack Dangermond, president, Environmental Systems Research; Mr. Jerry Miller, senior vice president, chief information officer, Sears Roebuck & Co.; Mr. Bruce Cahan, president, Urban Logic, Inc., and Mr. Jack Pellicci, vice president, Global Public Sector, Oracle, based in Reston. And

I have a feeling that I might have murdered your name, so correct me.

Mr. PELLICCI. Pellicci.

Mr. HORN. Pellicci, yes. You can see I didn't learn phonetics very well.

All right. I think you have been here, so you see what other panels have done. When we introduce you, your full statement is automatically in the record, and we are going to swear you in, because we swear all witnesses in.

So, if you would stand and raise your right hands, we will do that.

[Witnesses sworn.]

Mr. HORN. The clerk will note all four witnesses affirmed the oath.

And we will start just on the way it is on my agenda, which begins with Mr. Jack Dangermond, president, Environmental Systems Research Institute, Inc. We are glad to see you here.

STATEMENTS OF JACK DANGERMOND, PRESIDENT, ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE, INC.; JERRY MILLER, SENIOR VICE PRESIDENT AND CHIEF INFORMATION OFFICER, SEARS ROEBUCK & CO.; BRUCE CAHAN, PRESIDENT, URBAN LOGIC, INC.; AND JACK PELLICCI, VICE PRESIDENT, GLOBAL PUBLIC SECTOR, ORACLE

Mr. DANGERMOND. Chairman Horn, thank you very much, and I appreciate the chance to talk with you for a few moments. I also want to thank you and your committee members for recognizing the importance of GIS and geography in governing.

I have a few comments, the first of which will be on the industrial applications of GIS and the GIS industry in general, and then a few comments on the compelling reasons in public sector and also in the university research community of why this is an important technology, and then I will conclude with a few comments about notions of Federal policy that I would like you to consider.

I am head of an organization that is about 30 years old. We build software. We have about 100,000 users. We are a small company relative to the software world; we are about \$300 million, but that business drives about \$10 billion of value added data software, hardware, application work, et cetera.

My comments that I want to make first are about the GIS industry. This is a growing industry, about 20 percent a year, and in that sense it is an American industry—almost 95 percent of it is American-based technology—and it drives not only these roughly \$10 billion of expenditures around the world each year, tools, and value added business, but it also has an enormous impact on business and also the public sector, and it is starting to show evidence of having an impact on the university and the research education community.

There is about 2,000 maybe 2,500 businesses in America, and they are located in almost every State that engage activity in what we would call GIS business. There is also about 2,000 community colleges and universities who are preparing America's work force for the use of GIS or the embedding of GIS in their work practices, and so it is a vital, growing effort.

Mr. HORN. Amazing figure, because there is about 3,000 institutions, and you are saying two-thirds are really involved in this?

Mr. DANGERMOND. Yes.

Mr. HORN. Well, that is good news.

Mr. DANGERMOND. It is really good news.

Mr. HORN. Then we just have to deal with the other 1,000.

Mr. DANGERMOND. Yes.

Mr. HORN. Interesting. Go ahead.

Mr. DANGERMOND. Or not.

The compelling reasons for the use of GIS in the public sector have been already articulated by my colleagues that presented earlier, but, generally speaking, they result in better decisionmaking, sometimes better policy, certainly better communication between the public sector and the community that they serve in the form of a visual language, and I like that idea, the idea that Government can be linked with the public they serve through this visual language called maps and geography.

I have come to the conclusion that GIS is a kind of social capital much like highway infrastructure, and I think it is useful to consider it in that context when we talk about building and investing it. It is a kind of social capital that actually all levels of government develop and work with and use, and this social capital is interesting because it is so shareable and has the implication of coordinating different levels of government in their work but also overlapping government on the private sector and also on the university research and education community to get sort of three for one but actually thousands for one investment in the data. In other words, it can be highly leveraged, and that, perhaps, is why there is such an enthusiastic following in the use of these tools and kind of visioning of what it might mean for our society. We will certainly have a great role to play in the global society, and it will show up quite strongly as the information society emerges.

In the private sector, I would like to make a couple of comments. My colleagues in the other firms will also reinforce some of these notions, I am sure. Currently, about half of the software that is being acquired in this field is by the private firms—oil companies, forestry companies, transportation companies—for improving their operations and also improving their decisions. They are able to cite locations of public and private facilities; they have made massive improvements in delivery systems, supply chain automation across geography; improved marketing so that the right products are being delivered to the right audiences; facility planning, natural resource management, and so on and a new one in agriculture—this is very valuable.

American business is becoming more competitive, one might say, because of the investments not only in the technology but also in these data sets, and the linkage between Federal data and many of these businesses in agriculture and transportation will be better articulated by some of my colleagues, but they are showing up as resulting in, perhaps, 10 or 15 percent greater efficiency that brings money back to the Federal Government and better tax rates or more tax collections, but it also improves much of the other public agenda items, like less transportation problems and so on, because of the adoption of these tools in the private sector.

Finally, I would like to conclude with a couple of comments about suggestions for a Federal program. Obviously, Federal mapping programs matter for the organizations and the institutions that build this infrastructure, at least at the Federal level. In evidence of them being cut back or problems with them or in the public press in Kosovo, that is a public one that the same kind of disasters or lack of investment in this infrastructure are showing up in lots of other ways; we are just not conscious of that.

So, my first point is, please, as the Napa study suggested, continue to invest in this investment; it has profound effects. Second, this should be a multi-department and multi-use and multi-mission coordinated effort, not simply one application. Third, there should be changing in the mapping programs' philosophies from mapping to data bases which are continually updated and used and shared. Fourth, Federal data must be continuing to be freely available, because it is a backbone for—this social capital is not only a backbone for other levels of government but also for the private sector and the university community. Fifth, we have invested roughly \$1 million or \$1.5 million through NSF in the last few years, for the last 15 years, as we have witnessed the growth of this industry from \$50 billion to \$10 billion. It is a pittance, a million or two a year. We need to increase the academic research funding maybe to \$50 million or \$100 million a year. Imagine the results that would happen, not only in the public sector but also in the private sector. This I encourage you to consider, and the support of the cooperative programs, like we have already heard, brings real results, and that should be done in a deliberate way supporting initially demonstration projects leading to more infrastructure development as it evolves.

Thank you, Chairman Horn.

[The prepared statement of Mr. Dangermond follows:]



Statement of Jack Dangermond,
President of ESRI, Inc.

Chairman Horn, Mr. Kucinich, and members of the Subcommittee, thank you for inviting me today.

Thank you also for your vision in recognizing the vital importance and the promise for our nation of Geographic Information Systems (GIS) technology and GIS "smart maps" that integrate Global Positioning System (GPS), remote sensing imagery, and database technologies.

My name is Jack Dangermond. I am President of Environmental Systems Research Institute, Inc. (ESRI), a closely held company that my wife, Laura, and I founded in 1969 in Redlands, California. ESRI is the largest supplier of GIS computer software in the world. In the United States ESRI supplies about 40% of the GIS software sold each year. ESRI has about \$300 million in annual sales of GIS software and other GIS-related services. Together with a thousand companies that are ESRI business partners, ESRI helps drive a GIS industry with global annual sales of about \$5 billion, including computer hardware, software, and GIS applications. More than 100,000 organizations use ESRI software.

Status of the GIS Industry

GIS technology was developed in the early 1960s and first commercialized by ESRI in the early 1970s. Today, hundreds of thousands of GIS users are doing real work with GIS technology in such fields as national defense, transportation, environmental protection, natural resources, urban planning, utilities, and education. GIS is catching the attention of elected public servants everywhere because GIS makes a difference.

GIS technology is marketed and sold throughout the world; sales of GIS technology increase at a rate of about 20% per year.

ESRI has business partners in all fifty states. These companies and those that provide GIS services create jobs in all fifty states. Every state also has community college and university GIS programs that are helping to prepare a U.S. workforce skilled in the use of GIS technology.

The use of GIS technology is growing steadily in such applications as crime analysis, business, and K-12 education. In the future GIS use will grow in fields like oceanography, medicine, and agriculture.

Vision of GIS Use for the Nation

GIS technology is important at all levels of government--from the federal government down to the local community. GIS permits the sharing of knowledge and information about place. It fosters better designs for communities, transportation networks, and other public works. GIS use encourages the sharing of spatial data between levels of government, between departments within government, and between the public and private sectors. GIS use also improves government efficiency: it promotes better decision making, helps the public understand the implications of public policy, facilitates public access to government, and enhances the communication of government information to the public. A GIS-enabled Internet promotes the Jeffersonian ideal of a civil society.

GIS in Private Industry

About 50% of GIS software sales are to business.

GIS promotes efficiency in business operations. GIS yields better decisions and improved management. It improves the siting and design of facilities, speeds the delivery of goods, improves banking services, rationalizes telecommunications planning, and improves utilities service to customers. GIS promotes efficient energy use and helps reduce traffic and air pollution by making transportation more efficient.

Federally created spatial data are important in GIS applications to business. Federal data help make U.S. businesses more competitive and serve as a resource for data providers that add value.

GIS is useful in public/private partnerships to promote economic development.

GIS: Federal Policies and Investments

Additional federal policies and resource investments are needed to maximize the benefits of GIS technology.

- The federal government needs to recognize the value of GIS and help create a Societal GIS.
- Federal mapping programs matter. They need congressional support.
- Federal thinking on mapping programs needs to change from “map it once” to the building GIS of continually updated databases used across agencies and all levels of government.
- The federal government should adopt a multi-department, multi-use, multi-mission, coordinated approach to creating federal geographic data. Federal agencies should be required to coordinate and integrate their activities in the creation of geographic data.
- Federal geographic data should continue to be freely available to the public through various forms of publication and the Internet. Free federal data are the foundation of the free availability of geographic data at all other levels of government.
- The Federal Geographic Data Committee (FGDC) should continue to encourage coordination, cooperation, and integration in data creation and data sharing at the federal level.
- Federal policy should encourage agencies to acquire commercial off-the-shelf (COTS) GIS software. Let companies like ESRI do what we do best, which is meet customers’ needs.
- Congress should be GIS-enabled. Congressmen and Senators ought to have ready access to GIS analysis and mapping capabilities: on their own desks and the desks of their staff members.
- Congress should support federal cooperation with state, tribal, and local governments in the use of federal geographic data. Congress should fund such efforts at cooperation. The Federal/Community Information Partnership is a good start in this direction.

- Federal policy should recognize and promote the value of GIS, the integration of GIS into future technology, and the application of GIS to the solving of complex problems.
- Federal policy should recognize the value of GIS software to the missions of federal agencies.
- Agencies should be encouraged to build their databases so that the data are interoperable with the data of other agencies.
- A portion of the funds invested in data collection should be used to ensure public and private sector access to the data.
- Federal policy should support heavy investment--via NSF, NIMA, and others--in fundamental research on geographic information and GIS solutions.
- The federal government should support cooperative funding agreements between federal, state, and local agencies for the collection and dissemination of spatial data.
- The federal government should support pilot projects to demonstrate the value of an integrated spatial data infrastructure to planning, management, policy making, and other government activities.

Future of GIS Technology

GIS allows and encourages the consideration of geographic phenomena--such as spatial location, adjacency, and pattern--by the information society.

The importance of GIS to society will grow and a societal GIS, a completely integrated database of geographic information about all aspects of society, available to all members of society, will be created.

Creating such a comprehensive information resource will require public and private collaboration. The Portals of Geographic Knowledge project, supported by the National Geographic Society and ESRI, is a step in this direction. We need to create GIS applications on the Internet for everybody.

“Geography Matters” in creating and managing sustainable economic growth.

Many familiar, everyday devices--like cell phones, video cameras, and automobiles--will be geographically enabled in the future.

In accomplishing all these aims the privacy of individual citizens must be protected.

Close

Chairman Horn, Mr. Kanjorski, members of the Subcommittee, thank you for your attention.

Mr. HORN. Well, thank you. I appreciate your perspective on this. Mr. Miller, the senior vice president, chief information officer, Sears Roebuck & Co.

Mr. MILLER. First of all, Mr. Chairman, I would like to say that I appreciate the opportunity to talk about this very beneficial technology.

Sears Roebuck & Co. is not a GIS company. We are a retailer, but not unlike most companies in this country, we do have objectives to reduce costs and improve customer service, and when you find a technology that enables you to do both simultaneously, you have a real win. And that is what we have found with this technology, and I am going to reserve my comments to address what Sears Roebuck has done with this technology.

We used it primarily to address our home delivery. We do sell quite a few appliances in this country, and most of those are delivered to the home—about 20,000 to 25,000 a day—and several years ago, we set out to try to not only reduce our costs in that endeavor but also improve our customer service ratings. At the time, we had about 43 different distribution centers that we used to deliver this merchandise to our customers, and we had not the best customer satisfaction in terms of our ability to deliver on time. With the use of this technology over the last couple of years, we have been able to reduce the number of distribution centers from 43 to 14, and we have been able to increase our customer ratings significantly. In fact, they continue to go up, and they are at an all-time high.

With the use of this technology, we have been able to increase the number of stops per vehicle, per truck. We have been able to route these trucks more efficiently. We have been able to decrease the number of miles per stop, and, as I mentioned, we have been able to significantly increase our customer satisfaction. Where before we were delivering—at least we were trying to deliver—within a 4-hour window, we are now delivering 95 percent of the time within a 2-hour window in 82 percent of the markets that we service. The fact that we were able to reduce our distribution centers from 43 to 14 enabled us to save tens of millions of dollars. Of course, that obviously increased our profit picture. It also enabled us to pay a little more in taxes back to our Government.

In addition to the application of increasing our performance in home delivery, we have also used the technology in our warehouse to improve the productivity of our warehouse. If you can imagine taking off the top of a warehouse and looking down from above, what you would see is not unlike the grids of a community, and we use the aisles as streets and the locations of inventory as addresses, and, again, we use the technology to increase our productivity of our picking in these warehouses. Sears is a large company. If we can increase the number of picks per person by one, we save \$500,000 a year, and we have been able to increase the number of picks significantly, because we have been able to route the forklifts better in the warehouse. In our business, an empty forklift is bad business. The idea is to try to maximize the use of your forklifts, and with this technology we have been able to do that.

I do feel a little humbled after listening to a number of the people here talking about some of the very significant uses of this technology in terms of applications to prevent teen pregnancy and

improve the water and whatnot. In fact, all we were trying to do is get Mrs. Jones' refrigerator to her on time. [Laughter.]

But it is a very significant technology, and we are very happy that we have found it, and, again, appreciate the opportunity to talk about it.

[The prepared statement of Mr. Miller follows:]

*Sears Enhanced Home Delivery System
Sears Warehouse Picking System*

This morning's orders: a refrigerator for Ms. Smith, a dining room set for the Blakes' 3rd floor apartment, and 4 stoves for the new development complex across the river. Ms. Smith needs the refrigerator Thursday afternoon, the Blakes schedule delivery of their dining room set for Saturday morning when the freight elevator is available and the development complex needs the stoves 3 weeks from Monday. But what's different about these orders? What is different is what makes Sears world class: we promise to the customer not only a delivery date, but a 2 hour time window. No more waiting all day. We bring to the customer a sense of predictability about their day. And in keeping this promise, we build customer trust.

Keeping these promises is absolutely critical to Sears, who makes these kinds of promises millions of times each year - over four million home deliveries are made each year by the nearly 1,000 trucks based at Sears 100+ Market Delivery Operations (MDOs). The business and IS sides of the Sears Logistics group harnessed their energies, insight, and dedication to find a way to make those promises stronger by enabling Sears to narrow the time window from 4 hours to 2 hours, give the customer more access to information and Customer Service at the Call Centers, while simultaneously improving the bottom line of Sears. Computer systems make a crucial difference in delivering better service, creating the threshold that distinguishes strong retailers from the weak. Sears Enhanced Home Delivery System (EHDS) is an example of innovative technology that allows Sears to make and keep promises to their customers and distinguishes Sears as a strong, growth retailer.

To succeed, the labor and time intensive delivery set-up processes had to be replaced. We needed to maximize the delivery process and create a "hands off" home delivery vehicle routing process. And in doing so, the efficiencies gained by these changes became the 'cornerstone for consolidation' which allowed Sears to further streamline operations by consolidating District Offices.

The result of having fewer District Offices was threefold:

1. cost reduction due to less trafficking of merchandise, and less labor;
2. productivity increase due to newly automated features;
3. efficiencies increased due to artificial intelligence.

Maximizing the delivery process had its own set of challenges. The initial problem: find a set of minimum-cost vehicle routes to serve a set of customers, each with their own time window for delivery. The solution was found through the creation of a geo-spatial heuristic algorithm which ultimately generates routes based on clustering results, and the ability to swap customer stops between routes in order to eliminate violations of time windows.

The delivery process manifested itself into 3 primary applications: routing, address matching and editing. Supporting these applications is an integrated database design. A primary goal (during the pilot) was the development and implementation of a 'common geographic database' which would support improved database maintenance, security and utility. Once such a database was developed, we achieved a more sophisticated analysis and output route production was achieved, ultimately resulting in improvements in management decision-making capabilities, customer service and personnel morale.

Sears Enhanced Home Delivery System
Sears Warehouse Picking System
Address Matching Application

Input to the application is the set of a day's delivery tickets from Point of Sale (POS). Addresses on these tickets are verified and located on a map. This module automates almost the entire address matching process.

This critical capability of address matching process uses several sources of information. Annually, census data is incorporated into the various geodata models and published. Sears builds the repository by taking value added census-based information, and adds to this the Post Office Zip+4 standardized mailings to create more exact street addresses. This automated address matching process results in a high level of first pass 'hit rates' or successful matches. For those addresses that don't match on the first pass, a Sears associate in the District Office uses a GIS tool, including geographic data and displays, to find the correct or complete address information. The significance here is that the Sears associate may be in St. Louis, MO and is completing address information for a delivery in Minnesota.

The output of this application will be the delivery stop locations to be used by the Routing Application.

Routing Application

The technology used by the Routing Application within EHDS is fundamentally using street network level maps to solve business problems. The Routing Application supports this goal by producing truck delivery routes based on customer-generated delivery locations.

The geo-spatial heuristics used by the routing application will process partitioned network stops and find the least-cost path to each stop in the cluster from the distribution center. While generating the routes, the real street network and network impedance items will be used by the routing algorithms. The street network contains the geometry such as intersections, ramps, etc., and classifies the streets as highways, thoroughfares, neighborhoods, etc. These classifications carry associated characteristics or limitations, called impedances. For example, a highway may be limited in speed to 50 mph, or a thoroughfare to 35 mph. These kinds of variables are important pieces of information when calculating delivery times, the promise we make to the customer.

The primary output products will be delivery routes with stop order and estimated arrival time per stop, reports containing route information, and maps displaying the delivery stop locations. The application will also provide the ability to display and query network data to aid in the route generation process. This system also outputs information to the Customer Service Call Centers where 'night-before' calls are made to the customer to verify the delivery and the time window.

Editing Application

The purpose of the editing application is to obtain a higher matching rate in the address matching application and to improve the quality of routes. The value added census data and Post Office Zip+4 are updated annually, but this may not be current enough to allow Sears to keep its promises. Therefore, Sears created the process, utilizing GIS, to allow for making changes or additions to the geographic information. As Sears trucks move about on the streets, they have the capability to inform

*Sears Enhanced Home Delivery System
Sears Warehouse Picking System*

the system of changes in roads due to construction, new streets being formed in developing subdivisions, etc.

How did this solution address a Corporate Need?

Sears business solutions are examined on three fronts: Will they make Sears a compelling place for our customers to shop? Will they make Sears a compelling place for people to invest, and create Shareholder Value? Will they make Sears a compelling place for associates to work? This system succeeds in all three areas:

- Compelling Place to Shop: Making aggressive promises and keeping them with the customer
- Compelling Place to Invest: Millions of dollars in cost reduction due to the ability District Office consolidation
- Compelling Place to Work: More efficient routing and loading of trucks allows for drivers to maximize time spent and provides more predictable work day + associated salary

Another important element of this application is that it gives Sears more control over its delivery services. Prior methods relied on "local knowledge" as the geographic database. This "local knowledge" was more often than not, a retired home delivery driver employed by the third party firm contracted to handle that markets delivery driver operation. Instead of having a third party carrier plan delivery routes, Sears associates now manage all aspects of home delivery and remain "on call" if drivers hit unanticipated snags, such as road closures. Drivers can then notify the Sears Service Center, and the Service Center associates alert the customers to a possible delay.

The Sears solution to residential routing utilizing GIS makes our solution innovative and unique.

This is enabled through total, integrated systems feasibility by

- using topological street network within route building algorithms
- providing the ability to modify and/or add geographic features, such as address ranges, new subdivisions
- providing a routing solution to accommodate customer preference time of delivery within a 2 hour window
- and finally, by providing totally 'hands off' routing solution

Heuristic algorithms are as old as the traveling salesperson. What is new and distinguishes this work from all others are two key innovations: (1) adjustments made to these geo-spatial algorithms to account for the Sears volume; and (2) until now, these geo-spatial algorithms did not take into account time windows. They could determine how to get the merchandise to a location, but not when. Our promise to the Sears customer is the "when."

The first step in building this geo-spatial routing solution was to produce a matrix of travel times that includes distance, road conditions, traffic patterns and "time to customer" (need to include time to move merchandise into the residence: a refrigerator will probably take less time to deliver than a dining room set to an apartment).

*Sears Enhanced Home Delivery System
Sears Warehouse Picking System*

The geo-spatial algorithms will then divide a day's deliveries into 'clusters' with borders and finds a good sequence of deliveries. It then manipulates the borders, swaps deliveries, tinkers a little more with the variables and re-optimizes the routes. When further swapping no longer produces appreciable reductions in travel time, the program delivers the 'best guess' routes.

Warehouse Picking Opportunity

The same technology was used to increase productivity within warehouses. Since the interior layout of a warehouse is similar to the grid pattern of cities, the same logic and processes were applied to running the forklifts! Now that the home delivery operation had been improved to provide customers with more accurate delivery times and allow for a total of more stops for single home delivery truck, we searched for improvement for in other Logistics processes. In order to support the increase in home deliveries that were enabled through the use of the new Sears Enhanced Home Delivery System (EHDS), it was necessary to improve the entire process starting with the warehouse merchandise picking operation. Without an improvement at the beginning of the process, the total potential that could be provided in the home delivery arena would not be realized.

It was decided to use the algorithms and GIS tools that had become familiar through the EHDS development to solve this new problem. The entire warehouse, including doors, merchandise storage locations, and aisles was digitized to look much like a residential area. This data would be used in the same manner as the streets and home addresses had been used in the development of the EHDS system. There was now a geographic database to work with, which could be manipulated to optimize the warehouse operation similar to the manner in which the home delivery operation had.

This new application was designed with the goal of identifying the priority of the outbound trucks destined to the delivery markets from the warehouse by understanding the time that was necessary to pick and load for subsequent dispatch to its final destination. Some basic information, (time of departure, unit to unit matrix, and daily order data) was used to identify the loads that needed to be on the road first due to the distance they needed to travel to market. In addition to determining the priority sequence of the loads, there was a definitive cut-off where ANY truck must be loaded. This time constraint was determined as being the latest time that a load could leave the warehouse and still arrive at it's destination in time to insure a successful home delivery to the customer in the time window that had been promised.

As the load priority was determined, it is then the job of the geo-spatial algorithms to determine the best picking sequence based upon what merchandise was required and where it was located within the warehouse. It also determined the optimal warehouse dock location of where the out trailer to-be-loaded in conjunction with and based upon the optimal merchandise picking locations. Once this was completed, the algorithm considers the maximum capacity that can be handled by the respective merchandise handling equipment on a single journey in order to maximize the use of the equipment and minimize the number of journeys to complete the merchandise picking operation for a single outbound truck. Through the use of spatial data, geo-spatial heuristic algorithms, and the GIS itself, this system is able to provide the most accurate and quickest picking plan available .

*Sears Enhanced Home Delivery System
Sears Warehouse Picking System*

Merchandise Put Away Application

It was also determined that the logic which had been used to provide an optimized picking application, could be used similarly to create an optimized merchandise put away application. In this instance, the inbound merchandise that was obtained from inbound shipment notifications received from the sources is the driving force. The warehouse spatial data and item inventory levels are used to determine where space is available to identify the optimal locations as to where the incoming merchandise should be put away. Similar to the picking operation, the optimal warehouse dock location (door) to place the inbound trailer was determined based upon the optimal merchandise storage locations selected to put the new merchandise away. As with the merchandise picking application, the maximum capacity of the material handling equipment is considered along with current available space in the warehouse are used as additional factors in determining the optimal plan to put a trailer load of merchandise away.

Future Enhancements

Current plans for the warehouse optimization processes are being made to combine the merchandise picking and put away processes into a single process. This would achieve a definite advantage in the warehousing environment. In today's environment, material handling equipment is predominantly running empty 50% of the time. If the equipment is being utilized for merchandise picking, the trip from the warehouse dock locations (door) to the initial merchandise storage location (bin) is empty. Conversely, if the equipment is being used for the merchandise put away operation, the trip from the final merchandise storage location (bin) to the warehouse dock locations (door) is empty. By consolidating the picking and put away processes, the amount of time the equipment would be running empty would be minimized, achieving the optimal use of the equipment and personnel. In order to achieve this, the merchandise picking and put away processes will be merged into a single dynamic optimization process. This process will take into account ALL open tasks that are available to work in the warehouse and dynamically optimize the material handlers to their next task based upon all the constraints already in place. This new process is currently under design and is expected to be implemented in 2000.

Sears Enhanced Home Delivery System
Sears Warehouse Picking System

Through this use of technology, positive results have delivered value to the customer through merchandise delivered on time and value to the Sears Shareholder. Value also comes to the Sears Associates who take great pride in their work through the innovative use of technology and the benefits the organization gains from it.

- Previously, it took one or more individuals up to 3 hours to locate street addresses for the next day's deliveries and assign them to specific trucks. Now it takes about 20 minutes and the initial match rate has risen from 55% to 90%
- Consolidation of District Offices from 46 to 14 resulted in
 - Performance improvement due to less redundancy (what was done in several offices is now done by one person in one District Office)
 - Annual cost reduction in the millions in labor and transportation
- Decreased miles per home delivery keeping fuel and equipment maintenance expenses low.
- Adding more stops per truck, increasing the utilization of equipment to support an increased market share
- Improved to a 90+% success rate of meeting the 4 hour window for delivery from 78%
- Have implemented 2 hour delivery promise time window in 75% of the markets serviced
- Have increase productivity in warehouses through optimized picking and put away.

Mr. HORN. Well, thank you. That 2 hours is impressive, I must say. I was wondering, had you put the Mayfair on top of the—

Mr. MILLER. The Maytag repairman? [Laughter.]

Mr. HORN. Maytag, whatever it is.

Mr. MILLER. No, he really doesn't do a whole lot as the ad says.

Mr. HORN. OK, we will give them equal time someday, too. [Laughter.]

Go ahead, Mr. Cahan, the president of the Urban Logic, Inc. Tell us a little bit about that.

Mr. CAHAN. Sure. Urban Logic was started when I was living in a building in New York that was the subject of an explosion of a steam pipe in 1989. That steam pipe was wrapped in 220 pounds of asbestos. It showered a historic neighborhood just north of Greenwich Village with that asbestos. As a result of that experience, I wondered, "Well, who knows what is down underneath the city." I thought I would bring you this, the World's Fair 1939 edition of Fortune magazine. In it you will see an article describing "Under The Asphalt of New York." If I could just read from that 1939 edition, it says, "New York is a maze of pipes, conduits, tunnels, sub-basements, swamps, and vaults. The guts, nerves, and arteries of a great human organism for which there exists no map." It is still true.

Mr. HORN. That is amazing. What is that copy worth in the rare book market? [Laughter.]

Mr. CAHAN. I will pass it around after the hearing.

I thought I would highlight my testimony instead of read it, Mr. Chairman.

First of all, you had a thought that it would be a good idea if Congress had their own geographer, and I was told yesterday at the Geodata Forum that in the 1830's and 1840's, it did and that his name was David Burr. I think the same function existed back then as you might be suggesting.

Mr. HORN. Was that with the Library of Congress?

Mr. CAHAN. Yes. That was actually suggested to me by a cartographer of the Library.

Second, although it doesn't, perhaps, in scale reflect what Tillamook County is investing, New York City, to my knowledge, is investing a minimum of \$5 million for parcel maps. So, we are talking large sums of money that are being invested as a foundation for the future now. So, you must act now to capitalize on those investments. I would impress the urgency of that facet. And that \$5 million doesn't include applications; it is just to capture the digital data.

If I could turn to some recommendations. Certainly, the regional development of spatial data makes the most sense for local, regional, because with that high velocity of use, reuse and cleaning of this data—which is what you have heard in the prior panels—you are getting a lot of value added. It is the constant use of this data that creates its new value. We would recommend that since Federal agencies have mandates for data collection—you should think about the fact that you already have hundreds, probably thousands—we are trying to inventory them for you and staff—of data mandates—some of which can be performed using spatial data and are being performed using spatial data. So, we are talking

about aligning investment patterns as much as new mandates. We are talking about how to satisfy your existing set of Federal requirements as a customer from locally-generated data.

Five capacities, I would suggest, would help, and they would need national support: developing Internet portals for citizen participation, so they can truly gain access to these tools without having to go through the learning curve that we all had to go through; finance strategies such that Federal dollars are pooled—such as the C/FIP represents—so that you can actually see that 1 to 10 leverage; system quality standards and system quality strategies through the whole arena of development of this data and use of this data—public, private, and non-profit. A lot of the community service organizations use this data to treat and administer health and human services programs; procurement strategies at the local level that don't distinguish between buying a stapler and buying technology and working through those procurement channels.

And then some legal strategies—Mr. Ayers talked about that; others have. We need to look at common privacy, copyright, liability, security. Again, if it helps the subcommittee, this is from the President's Commission on Crucial Infrastructure Protection—and now I think the Crucial Infrastructure Assurance Office of the President—and they have looked at the issue, not only of how to protect against misuse of this kind of information, they are also looking at how this information helps to contain and remediate other threats to our urban environment. That it is implicit in the responsibility we have for dealing with this technology.

Finally, I would ask that we study the economics at work at play in this technology and the aligning of investment patterns that I have urged you to consider. Those economics are different in every State. Each State has a different freedom of information law; it has a different political climate for those economics and data recapture charges for data collection. You might want to come up with model licensing and model approaches that reflect your own policies here in Washington.

Thank you.

[The prepared statement of Mr. Cahan follows:]

Bruce B. Cahon
President

Urban Logic, Inc
1330 Avenue of the Americas
Suite 2200
New York, NY 10019

tel: 212 399-9700
fax: 212 582-8080
email: bbc@interport.net
<http://www.urbanlogic.org>

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Supplemental Written Testimony

Nation's Founding Principles require Good Information

This country is founded on principles of *democracy, free competition* and *personal freedom*. How one business grows or harms a neighborhood, how new communities grow and old ones revive, how modern infrastructure replaces its predecessors. The Executive, Legislative and Judicial branches of our federalist government work to balance growth issues in light of our founding principles. *Above all, do no harm* is constitutionally implicit in managing this balance.

Managing this growth requires sensitivity, and carries the responsibility to predict the regional impacts of government and corporate policies. Over our two centuries, government and business have developed specialized tools to sharpen their policy-making goal and improve their program's implementation. Agencies recruited and trained people whose specialized engineering, planning, budgeting, and program management knowledge applied and improved these tools. Organically, as program or business transaction opportunities arose, this special knowledge was replicated and the tools adapted through all levels of government, industry, academia and non-profit activities.

In the pre-Digital Economy, people and the resources to carry out these specializations within government were grouped functionally (road projects went to the transportation department, pollution control projects were under the environmental department and housing was built by the housing department). Of necessity, each functional area built, kept and managed the paper-based index cards, hand-drawn maps, written reports and information required to perform its *mandated function*.

Over the past 30 years, the tools shifted from paper-based to computerized, demographic (people), programmatic (function-specific) and geographic (place) databases to perform these mandated functions. While technology shifts rapidly, changing how large public or private institutions implement technology comes slower. People trust doing things the old way because it worked. They trust the new way when it works faster and cheaper to do the old tasks (*efficiency benefits*) or better by letting them do things they could not do before (*effectiveness benefits*).¹

Our Digital Economy is fueled by tools and cooperating relationships to amplify the efficiency and effectiveness of Data being collected *once* and used *many* times. To capture these benefits *internally*, the migration to digital in government is profound inside Agencies. There is a far-reaching economic, human and community value of sharing digital information (A) between governmental functions at

the federal level, (B) inter-governmentally among the federal, state, regional and local governmental agencies, (C) commercially and (D) with the public. However, agency perceptions of the *mandates* that generated functionally valuable information internally are only now changing to fuel this externally far greater value chain.

Spatial Data's Role in Government & the Economy

Geography is no longer a high school course of memorizing lists of things that happened in places far from home. In our Information-based Economy, geography drives powerful software applications called geographic information systems (GIS). Everything happens *somewhere*. GIS uses that *somewhere* like the 3-rings in a binder to find, sort and use layers of Data about the people, places and values we care most about. Spatial Data as public information – the sort that fuels a participative democracy – means more when you see how program or business affects your own or someone else's backyard.

Much of the data collected by governments, utilities, engineering firms, real estate developers, environmental consultants, health care organizations and other groups describes the neighborhoods and context where they operate. This is *Spatial Data* because it captures the essence of a certain space or place, describes its location and fundamental attributes and is used to compare and relate conditions in one place to another.

Why Federal Spatial Data Policy is Important to Your Constituents

Spatial Data and its supporting Technology (software and hardware) in the federal government deserves your attention now for many reasons, including:

- 1) Federal Government Agencies will not be able to continue to carry out their Mandates or Missions *effectively, efficiently and equitably* without using robust Spatial Datasets to appreciate the local context for anchoring their programs, initiatives & priorities
 - a) Cities & Counties' input into Census, Transportation (TEA-21) and Environment (EPA)
 - b) Federal law enforcement cooperation with Police Departments in multiple jurisdictions
- 2) It is *effective, efficient & equitable* for citizens, communities and business to use Spatial Technologies & Data to demonstrate and seek relief from the unintended effects of agency decisions & regulations
- 3) Today's investments (particularly by non-federal governments) in Spatial Data create the platform for the next 20 years of Technology implementation
- 4) Traditional federal air, ground and water transportation and other infrastructure programs fund most of the cost of local projects. Planning takes years, yet may represent only 1% of the overall project budget.² Without good Spatial Data the planning process drags on, sometimes through the courts, resulting in dissatisfied commuters, increased congestion and more expensive construction costs. As local project costs increase, the federal share will increase.
- 5) New federal initiatives in response to local needs find a doubting audience for yet more local resources to be committed to working with a maddening gaggle of federal agencies' requests for Data sharing. On the other hand, the federal government as a whole fails to leverage multi-Agency funding of specific, "stove-piped" Spatial Datasets being built locally in fulfillment of Federal mandates.
- 6) Cross-cutting Spatial Data development activities between federal agencies and intergovernmentally would be seen as a wise investment. Primary agency missions must be always the first priority. But local governments, banks, insurance companies and other companies have used "data-mining", "data warehousing" and other organizational techniques to pool Spatial Data. They expect Washington to participate regionally and nationally in these trends.
- 7) Managing Emergency Response via Spatial Technology save lives and property
- 8) Makes Neighborhoods safer and reduces the impact of threats to urban & suburban security

- 9) Appropriate Federal procurement standards would demonstrate leadership & assure that investments in Spatial Data today are not obsolete, “stove-pipe” legacy data tomorrow.

The Nation looks to its leaders in Washington to balance many factors and competing interests. As critical tools for managing real problems, Spatial Data and Technology help decision-makers make decisions *effectively, efficiently and equitably*. A few examples are:

- a) **Effectiveness.** Improves the quality of life where we live: from the neighborhood to the nation.
 - i) Environmental protection: Is the area around schools free of biomedical waste?
 - i) Growth management
 - ii) Economic development
 - iii) Disaster preparedness and mitigation
 - iv) Public infrastructure management
 - v) Transportation planning: Has transportation spending reduced travel time?
 - vi) Public safety: Are we winning the war on drugs?
- b) **Efficiency.** Helps government, industry and communities re-engineer their business services operations and practices.
 - i) The US leads the world in the development of GIS hardware and software
 - ii) The US has high-quality, detailed geographic data available under competitive pricing schemes.
 - iii) Use of GIS and spatial data makes good sense for business:
 - (1) Sears Logistics: Cost savings by smart routing of vehicles
 - (2) Domino’s Pizza: Target marketing by linking demographic data to geography
 - (3) Blockbuster Video: Add ideal business locations
 - iv) Use of GIS and spatial data makes good sense for government:
 - (1) Save planning and development costs.
 - (2) Prevent future costs and possible damage.
 - (3) Maximizes productivity & longevity of municipal assets
 - c) **Equity.** Citizen access to software that analyzes Spatial Data is an enabling (Jeffersonian) technology.
 - i) Citizens are getting involved in the public policy process
 - ii) Makes better use of community services aimed at America’s citizens in need
 - iii) Plans access routes and easier urban designs for the physically-challenged
 - iv) Watershed & Riverkeeper Councils
 - v) Environmental justice assessments of how to address poorer neighborhoods paying too high a price for affluence elsewhere
 - vi) Public-participation GIS: Are poorer neighborhoods getting their fair share of federal infrastructure or other program dollars?

Trends Favoring Regional Spatial Data Infrastructures

Three essential attributes of Spatial Data suggest that Congress treat it as *regional* infrastructure:

- First: Like politics, all Spatial Data is really *local*, describing people, places and things that change quickly. “*All Data is Local*” in terms of accuracy and updating because local businesses, governments, non-profits and academic institutions continuously create, fund, use and clean data to plan, build and improve infrastructure, environmental, development and other standard public and private projects.³ This requires maintaining the Data close to its source. The local town register knows a family or business moved and property was sold because deeds were filed; the local building department knows that a new building is being planned because a building permit was requested. Thus, organizing and financing a successful

National Spatial Data Infrastructure must leverage distinctly *regional* capabilities and markets for building quality information.⁴

Second: To be trusted outside the agency or company that built the Spatial Data, the pedigree of how that Data layer was created and modified (its **Metadata**) must be captured. Like the Data itself, the Metadata that explains where the Data originates and how it was massaged into a database is best captured closest to the author of that Data.⁵ U.S. Metadata Standards (pioneered by a collaboration of Federal agencies, universities and vendors) have been adopted by the rest of the world, and industry software now automates capturing Metadata at lower cost.

Was the map layer created in 1950 or yesterday? At what scale or accuracy were the Data points collected and by whom using what aerial or ground survey equipment or satellite remote-sensing? What compass setting North was used for latitude and longitude?

Up until recently, as a relic of consolidation, we had a separate Topographic Bureau to maintain the legal street names for each of New York City's 5 Boroughs. The five Topographic Bureaus used different compass settings North reflecting the settings they used in 1887 when the Boroughs consolidated into The City of New York we know today. A user of historic maps in one Borough would want to know when the mapping conventions changed and whether they were reflected in the historic or modern maps.

Third: Spatial Data (with its Metadata attached) is infinitely reusable. Our Digital Economy is fueled by tools that leverage data through reuse. The data is collected once and served up many times in a variety of contexts. Because of the local need for great accuracy 24 hours per day/7 days per week, revisions to Data (and Metadata) occur frequently at the local level. This continual reuse improves Spatial Data *transactionally*, as it used. This improves the information available to Congress, Federal Agencies and citizens, and the quality of policies and programs of greatest interest locally.

For example, take the measurement of the width of Fifth Avenue today at the intersection of 57th Street. This piece of data is used by business (utilities need it for locating and repairing underground cables; cellular companies for cell site coverages; surveyors for new); government (the City's Transportation Department oversees the repaving and repair of this street section and tries to plan to minimize traffic congestion bottlenecks; the Finance Department assesses the value of property along the street segment; emergency response teams use the streets to care for the ill and secure the Fifth Avenue Parade crowds; the Transit Authority for bus stop placement and routing).

Spatial Data has Economic value ideally leveraged in the *1-to-Many* paradigm of the Digital Economy. The utility and quality of Data increases as the Data makes its way through the Economy, as input into a wide variety of useful purposes beyond the original governmental or private reasons for its collection.⁶ The more people are able to discover it and use it, the more value it has.

A review of research studies suggests that 7 commercial, financial, legal and political relationships account for regional variations in Spatial Data supplies and sharing practices. The Technology's implementation depends in varying degrees on:

1. Executive leadership and finance options supporting Spatial Data development⁹
2. Legislative programs & mandates that preserve traditional, single-agency/function stovepipe era (instead of cross-agency) information collection and management practices
3. Cooperative understanding and organizational experience to see cross-cutting nature of Spatial Data instead of narrow focus on internal data for agency mission¹⁰
4. Technology Investment Management that plans and treats Spatial Data like other capital assets within overall program budgeting¹¹
5. Knowledge of Spatial Technology's Interoperability¹² to reduce technical justifications for maintaining separate islands of data
6. Procurement rules that do not differentiate Technology purchases from buying staplers, airplanes or buildings
7. Balance struck among legal rights, responsibilities and risks inherent in public data policies¹³

Urban Logic's Spatial Data Finance Research

As Secretary Babbitt described for you in greater detail today, the National Spatial Data Infrastructure (NSDI) is taking shape under the guidance of an intergovernmental, representative steering group known as the FGDC (Federal Geographic Data Committee). FGDC has recognized that a robust NSDI requires aligning the ongoing investments that multiple institutions inside and outside the Federal government make in Spatial Data.¹⁴

Under a 1998 CRADA (Cooperative Research and Development Agreement) with FGDC, we identified Private Sector options for building the NSDI. We reviewed finance and business structures that will supplement, re-channel, reduce and leverage the public sector's Spatial Data investment. Our Report: *Using the Economics of Spatial Data to Fund the NSDI* is in draft form and is being circulated for comment. I would be pleased to provide the final Report to this Committee and its staff when it is completed.

This research suggests finance and commercial tools and structures exist that would take advantage of the economics of Spatial Data, reduce the federal Government's outlay for Spatial Data and improve the quality of Spatial Data available for federal decision and program support, thereby making federal programs more focused and effective in solving local problems.

OUR METHODOLOGY

The Spatial Data and Applications inherent in the NSDI blend elements of physical infrastructure, community development and service bureau transactions. Therefore, Urban Logic studied 21 analogies that point to new ways to use these attributes of Spatial Data to pool private and non-federal government investments in the National Spatial Data Infrastructure. The analogies fall into 7 categories:

1. Securitization
 - Fannie Mae Standard Underwriting & Mortgage Market-making
2. Pooled Loans
 - EPA Revolving Funds & State Infrastructure Bond Banks to build Environmental facilities locally
3. Community Infrastructure Public Goods
 - Airport, Surface & Mass Transportation

- Power Plant "Take or Pay" Arrangements to remove the credit risk of early demand for infrastructure
- 4. Community Development Loans & Investments
 - SBA's Small Business Investment Corporation (**SBIC**) Program to leverage private equity capital and pool bank Community Reinvestment Act lending activities
 - SBA's Certified Development Company Fixed Assets Loan Programs
 - Commerce's Economic Development Agency Revolving Loan Program
 - Local Initiatives Support Corporation (**LISC**) where tax incentives pool equity capital to revitalize commercial strips and residential neighborhoods
- 5. Non-Profit Bond Pools
 - New York State's Non-Profit Facilities Fund to pool bank expertise & resources in making non-profit loans
- 6. IPO: Initial Public Offering Private Equity
 - America Online & Netscape separately, and then merged
- 7. Service Bureaus operated by Private Companies, Associations & Government
 - American Bankers Association CUSIP Bond identification procedures operated by Standard & Poors
 - Bloomberg LP's financial news service
 - LEXIS-NEXIS's general and professional legal and news archive service
 - MEDLINE medical abstract service operated by the National Libraries of Medicine
 - New York Clearinghouse Association's interbank check & payment processing service
 - SABRE travel reservations and logistics service
 - Universal Code Council's UPC Bar Code registration and scanning procedures
 - VISA credit card and electronic payment processing alliance of financial institutions

To develop a more flexible approach to federal participation in a multi-sector NSDI consortium we studied

- Performance Based Organization (**PBO**) approach used by the UK Ordnance Survey and now being applied to the federal Student Loan and other programs, and
- Employee Stock Ownership Program (**ESOP**) used to reduce staff at the Office of Personnel Management and the enabling personnel information services contract

OUR PRELIMINARY FINDINGS & RECOMMENDATIONS

Preliminary findings and recommendations in the Report include:

- Use parallel networks of privately-led, publicly-accountable Service Bureaus to leverage Spatial Data transactions into the NSDI just like Service Bureaus process credit cards, mortgages and many other commercial transactions
- Users in the Internet marketplace for Spatial Data value finding trustworthy data at reliable sources. **Branding** a Spatial Dataset's quality will implement minimal federal Metadata & Data Content Standards
- Develop parallel sets (at both National and Regional levels) of 5 crucial capacities to foster Spatial Technology transactions to adopt consistent investment standards:
 - Internet Portals,
 - Finance,
 - System Quality,
 - Procurement and
 - Legal Strategies
- Use the National public/private organization to
 - support Regional Data Sharing institutions and Service Bureau initiatives

- create financial, procurement, federal contracting and other solutions on behalf of its state, county, regional and local client/members
- treat the 5 Capacities as creating 5 lines of business well-suited for the private sector to lead, co-develop and co-fund
- Permit the commercializable aspects of the NSDI to flourish
- Finance portions of the NSDI like physical infrastructure using bonds, revolving loan programs and other debt structures that provide capital to build Regional Data Consortia as Service Bureaus
- Recognize the Spatial Data portion of Data Mandates imposed at all levels of government on subsidiary levels, corporations and citizens
- Where appropriate to (A) drive market investment, (B) reduce government outlay and (C) increase Spatial Data supply and quality choices for government, recharacterize Data Mandates as “Take or Pay”, “Revolving Loan” or other arrangements that represent cash flow revenues that attract core capital locally for Regional Data. This would expand procurement and regulatory options and foster private equity investment in Spatial Technology.

Expand the Capital Approach to Spatial Technology

Urban Logic urges this Subcommittee to see federal Technology capital investment planning as an ***incremental, transactional process***. Using a capital approach means adopting underwriting and investment criteria that reflect commercial-off-the-shelf, market-driven technology standards. If two government or private users adopt the same market-driven, open technology standards, presumably the Spatial Data investments they make should be in formats and software that are compatible, and the data can be shared up and down the value-adding governmental and private sector information chains.

- Market incentives (including governmentally mandated Spatial Data activities) push prudent Technology investment criteria to be collaboratively formulated and used.
- Once these criteria are operative, ongoing planning and finance activities by state and local governments and private industry can be aligned and leveraged to create national Technology architectures like the NSDI: National Spatial Data Infrastructure.
- Technology architectures and aligning processes being established today will chart the course of Technology investments for the next 20 years.
- Using multi-sector ***Investment Criteria*** (as much as technical standards alone) as the aligning principle to drive Interoperability will maximize the Economy’s Return on federal Technology investments.

Specifically, we suggest that Congress consider taking several steps in sequence:

- A. Study the Spatial Data Mandates that run through federal, state, local and tribal functions. Study the implicit Technology Investment patterns spawned by the Mandates. Learn how those Mandates are being serviced and Technology investments aligned and pooled through Regional Data Consortia or other modern mechanisms that leverage the 1-to-Many nature of Digital Information.

The Subcommittee Members are familiar (and in some cases responsible for) examples of Regional Data Consortia in various stages of development that include

1. SCAG: The Southern California Association of Government’s Data Center,¹⁵
2. SANDAG: the San Diego Association of Governments’ 25 year GIS initiative,¹⁶

3. PAMAPS: The Pennsylvania Marketing and Planning Center and PAGIS: the Pennsylvania GIS Consortium,¹⁷
 4. OGETA: The Open Geodata Consortium in Atlanta,¹⁸ and
 5. The NSDI Community Demonstration Projects that FGDC has launched over the years to chart a path for embedding regionalism as a cornerstone of the NSDI Framework.¹⁹
- B. Study the Sources and Uses of Spatial Data in a Digital Economy by business, non-profit and academic institutions to better structure data sharing, outsourcing, commercialization and other programs (in accordance with prudent security, privacy, intellectual property and other policies). Include in this Study, Spatial Data's ability to promote practical access to the essential community information implicit in the goals of EFOIA: Electronic Freedom of Information Act.²⁰
- C. Review the role of federal Metadata standards as the minimal standards needed for Spatial Data to be trustworthy, portable, shared and transactionally valuable among the widest possible Regional user base at the least individual expense.²¹
- D. Support federal agency participation in Interoperability Partnerships with OpenGIS Consortium and other representative professional Industry bodies to automate the burden of Metadata creation, accelerate the technical capacity to integrate meaningful Spatial Data coverages and provide the consensus-derived interfaces that will make Spatial Technology an integral part of the National Information Infrastructure (NII). This would appear to further the Interoperability goals of the CIO Council.²²
- E. Support federal agency attempts to think Technologically beyond their individual Data Mandates and Missions as stove-piped channels by pooling Spatial Data along crosscutting, functionally useful lines of greatest impact at the Regional level.²³ Federal participation in Emergency Response Information Consortia, Information about physical infrastructure available through One-Call Laws, Livable Communities Initiatives and Disaster Information Networks are prime current examples. Provide funding and stronger Congressional approval for federal work along cross-cutting functional areas.
- F. Fund pilot programs to test the economic viability of repackaging and servicing similar Data Mandates through federal Participating Memberships in Regional Data Consortia, such as C/FIP: Community/Federal Information Partnerships and other financing mechanisms.
- G. Use the new 1-to-many paradigm to authorize federal Agencies simplify how businesses, non-federal governments and others to comply with the spatial component of their federal Data Mandates. Spatial Data supplied through Regional Data Consortia would assure a continuous, coherent National quilt of Spatial Data capacities to support this simplified Data Mandate compliance. Ongoing data and system quality could be assured by requiring Consortia to adopt plans for conforming to the *minimal* federal Metadata and industry Interoperability specifications and procedures needed.
- This is analogous to the economies of the Single Audit Act Amendments of 1996, which this Committee considered last month.²⁴ That Act permits streamlined non-federal government, private sector, non-profit and research responses to auditing \$300 billion in federal domestic assistance payments.
- H. Building on the FGDC's body of work, authorize an appropriately flexible National set of Strategies (in partnership with the other sectors of the Economy) to develop pooled, private sector-led Internet distribution, finance, bulk procurement, and other options on behalf of the Regional Data Consortia.

- I. Use this same National partnership to identify, analyze and reduce inter-governmental, legal, licensing and other barriers faced by private sector data sources, distributors and users operating through (or independent of) Regional Data Consortia while maintaining prudent security,²⁵ privacy, intellectual property and other policies.

Data Mandates

Our NSDI Finance Research forced us to find the sources of cash flow that either a debt or equity structure would use to attract market capital to leverage the existing governmental and private capital commitments to Spatial Technology. For example, any bond purchaser would require that his bond principal be repaid with interest out of a predictable series of revenues and intergovernmental transfers flowing regularly into a Regional Data Consortium or Service Bureau. So too, any equity investor in the data, services and other products made available through the Regional Service Bureau would want to see the likelihood of profitable return on her investment.

Although we identified multiple sources of cash flows for Spatial Data, one institutional source appears to be “hard-wired” into the statutes and regulations that have grown up to define governmental programs at all levels. We are currently attempting to inventory these “Data Mandates” in the U.S. Code and the Code of Federal Regulations (CFR) using our “data mining” approach to tracking down and mapping these mandates.²⁶

The Paperwork Reduction Act of 1995 (PRA) required the Office of Management & Budget (OMB) to review and the Office of Information & Regulatory Affairs (OIRA) to publish changes in the information collection burdens imposed by federal Agencies.²⁷

Due to the sheer volume and variety of Spatial Data required, every time a federal agency creates, uses or mandates Spatial Data, it causes the data to be either (A) in a unique format that suits its immediate mission, purpose and program, or (B) in a standard form that

1. lets multiple Agencies save by reusing it in the future for other purposes;
2. spurs the private sector to disseminate and invest in software to use the data; and
3. enables more meaningful citizen participation in government programs by proliferating Spatial Databases grouped functionally (i.e., road, bridge and commuter information grouped on an Internet transportation website; air and water quality measurements and Remediation plans grouped on an environmental website; nutritional, worker safety and climate data on an alternative health site).

We are only in the early stages of this Data Mandate mapping research. However, to give you the flavor of where this research is going and how crucial Spatial Data supply is to operating the federal Government, our preliminary analysis of CRS’ searches of CFR sections reviewed by OMB under PRA’s Information Collection process suggest that Data Mandates exist in every CFR Title with a majority of these Mandates requiring Spatial Data or being made more effective by using Spatial Data.

This Data Mandates analysis also points to some statutory placeholders for such intergovernmental Technology development initiatives, such as the Intergovernmental Cooperation Act,²⁸ the Clinger-Cohen Act, the Unfunded Mandates Reform Act (UMRA) and the Government Performance and Results Act (GPRA) to name just a few.

Leveraging Federal Spatial Technology Investment Policies

Federal Spatial Technology Investment patterns detected in two decades of research were summarized and extended in last year’s Report on NSDI issues by the National Academy of Public

Administration (the **NAPA Report**).²⁹ This Report “identified 12 major public purposes of the federal government that now rely on [Spatial Data]”,³⁰ and found that “[Spatial Data] functions performed by federal agencies and their present locations [inside the federal government] are as much an accident of history as they are a logical choice to meet today’s and tomorrow’s [Spatial Technology] needs.”³¹ Estimating that \$1 billion is spent annually on narrowly-defined federal Spatial Data,³² NAPA concluded that the Spatial Data by-products of these federal functions facilitated National Economic Sectors from real estate to insurance to agriculture to defense worth upwards of \$3.5 trillion.³³

With Congress’ encouragement, the federal Government is becoming increasingly adept at taking a capital planning approach to *its* Technology investments.³⁴ So too are other levels of government,³⁵ following examples in the banking and other industries.

Spatial Data Interdependencies in Light of Y2K Experience

Thinking about developing Spatial Data as shared infrastructure maintained and used across all components of the Economy (not just within the source institution building Spatial Data) is a logical extension of the lessons that Congress and the country learned from the Year 2000 (Y2K) Problem. Congressman Horn, this Government Management, Information, and Technology Subcommittee catalogued the interdependent nature of data exchanges threatened by the end-to-end Y2K issue showing up in a data exchange partner.³⁶ The Senate Committee found systemic data interdependencies and intergovernmental business processes threatened by Y2K concerns.³⁷

This Subcommittee found Data Interdependencies implicit in assessing and improving the system-wide effectiveness of Y2K Remediation among non-federal sectors.³⁸ However, for federal Technology functions that are dependent on quality, accessible and interoperable Spatial Information, this is a pattern of Data Interdependencies worth exploring and exploiting.

Y2K represented a National Technology Investment policy by default. The expensive Y2K lesson teaches us to manage Spatial Data usage through a “Best Practices” Framework that guides rational regional, national and international market development of this important component of Information Infrastructure. Regional Data Consortia, consistent National Spatial Technology investment and procurement criteria, and Spatial Data standards and Interoperable systems to support “back-up” sources of Spatial Data supply and development all represent informed responses to the Y2K experiences.

Interoperability Enhances Institutional Data Sharing Capacities

As Spatial Technology use has grown, businesses and government have demanded that the software, hardware and integration tools work more seamlessly, allowing the software from one manufacturer (e.g. Intergraph’s GeoMedia, MapInfo’s MapInfo, or ArcInfo by Jack Dangermond’s company ESRI) to spatially process information maintained in Oracle as an Internet-ready database.

To eliminate time-consuming bulk data conversion,³⁹ reduce investment in hard disk storage and hardware requirements and make sure only the most recent source data is used, the leading Spatial and Database Technology companies and their major government client customers have formed OpenGIS Consortium (OGC), a non-profit research and development organization. Led by its President David Schell, OGC’s mission has been to create Interoperability Specifications to which compliant software products are now being certified. The Subcommittee will recall asking the private sector Technology industries in 1996 for a similar “*Good Housekeeping Seal of Approval*” certification process to accelerate design and testing of Y2K solutions.⁴⁰

We already have 3 elements for success: FGDC's leadership in providing a process for (1) federal Metadata Standards and (2) Spatial Data Content Framework and the OGC's management of (3) the OpenGIS Interoperability Specifications process provide a powerfully adaptive Technological Framework for moving Spatial Information tools and supplies into the 21st Century.

Simultaneously, this Interoperability reduces the justifications that some bureaucracies and private utilities and other institutions historic used to create stovepiped islands of data. No longer would it be true to avoid data sharing's economic and quality justifications by saying "They *can't* use my data; I *can't* use their data."

As contrasted with other proprietary Technology Platforms, this Open Framework promotes the competition of multiple vendors using common Technology standards to design better products in the marketplace. The United States is the leading Spatial Technology supplier to the world. Earlier hyper-competition in the GIS industry encouraged customers to depend on single-vendor solutions, resulting in island of Technology across governments and businesses.⁴¹ Today, increased competition using Interoperable platforms drives innovations in product value, functionality and service, and in turn should strengthen the US lead in this technology market.⁴²

Closing Comments

Our research suggests that finance and commercial tools and structures exist that would take advantage of the Economics of Spatial Data, reduce the federal Government's outlay for Spatial Data and improve the quality of Spatial Data available for federal decision and program support, thereby making federal programs more focused and effective in solving local problems. The research also suggests the benefits and feasibility of new or modified non-federal enablers/capacities to spur dissemination of publicly-held Spatial Data.

We do *not* propose eliminating the thousands of federal Data Mandates that have grown up to reflect 225 years of democracy by national government working to facilitate better local communities.

Instead, we believe that Congress should examine how access to Regional Data Consortia or other pooled data investment strategies would reduce the burden and increase compliance with federal Data Mandates across the board.

Simultaneously, we believe federal participation in Regional Data Consortia that improve compliance with federal agency Data Mandates could be achieved without significant additional outlay. Given existing federal Field Office operations regionally, this federal participation would assure that Data available through the Consortia would per se qualify for federal agency program purposes.

In this way, federal programs would pave the way for building Regional Data Consortia that finance themselves based on growing their commercial revenue potential and tapping market capital sources (Wall Street public finance and private equity).

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Appendix I

Lessons from the Streets of New York

Everyone has a story as to how they became involved in Spatial Technology. Mine is truly accidental.

On a hot summer day in the middle of August 1989, the asphalt covering an ancient steam pipe in underneath 20th Street at Third Avenue in the Gramercy Park area of Manhattan exploded in a geyser of steam that showered the historic neighborhood with 220 pounds of asbestos wrapping. Several people died in the explosion, the neighborhood was reconfigured as a quarantined war zone and the residents were turned into nomads, separated from their comfortable urban surroundings, possessions and lifestyles. As I recall, the cost of the asbestos cleanup in the middle of a bustling neighborhood soared above \$70 million.

I lived in the building closest to the blast and wondered how New York City could have survived so long without a more thorough understanding, and map, of its underground infrastructure and how to coordinate the repair and rebuilding of that very infrastructure that gives the City much of its competitive advantage. After some research, I learned about Spatial Technology and saw how it would accelerate rebuilding America's neighborhoods and infrastructure in ways that might have avoided the Gramercy Park steam pipe explosion.

It has been almost 10 years since then, and I have come to understand in New York (and elsewhere) why Spatial Data is so essential, distributed and functional. For purposes of illustration, three charts explain these issues.⁴³

Chart 1 shows the 17 "flavors" of data needed to run New York City.

Chart 1: The Data It Takes to Run New York City

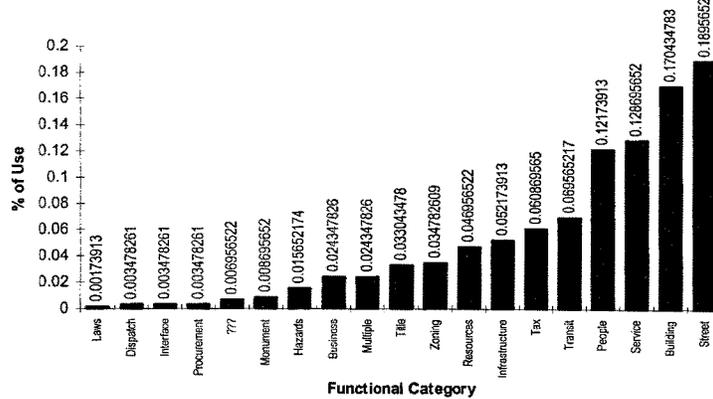
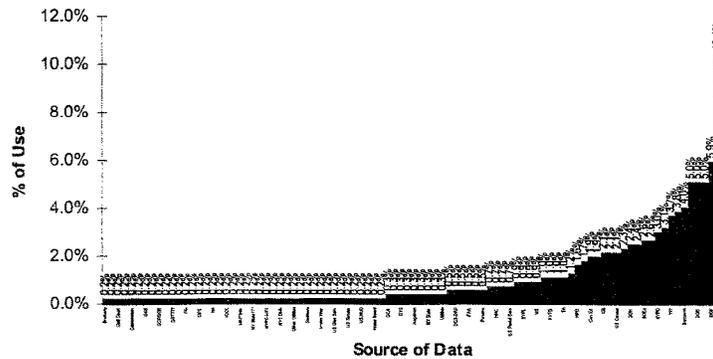


Chart 2 shows that for these 17 types of data, agencies, businesses and community groups retrace their steps to 150 sources of information. While 35% of this data was available from 5 key

Departments (Buildings, City Planning, Finance, Environmental Protection and Transportation) the rest was scattered. Chart 2's long tail resembles "Data Soup" where just a pinch of data from a source in the tail is needed to qualify or explain the data available from the major sources on the right of Chart 2. The use characteristics shown are from 1990-91, so presumably the number of Spatial Data sources has increased since then.

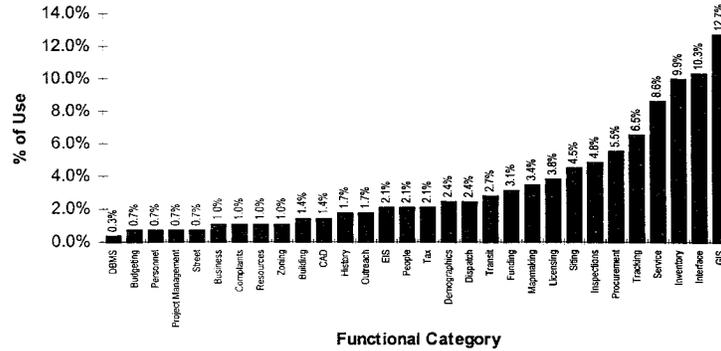
Chart 2: Sources for This Data



The contrast between the first Chart (users needing a handful of types of data) and second chart (the multitude of places and formats in which such data is kept) suggests the benefits of letting users get their Spatial Data from a service bureau.

Even then, I knew that data is not smart enough to ask for itself, people are using the data to perform tasks that are fairly uniform across users. Chart 3 highlights the reasons Spatial data was being collected and to perform what functions.

Chart 3: Applications Driving Demand for Data

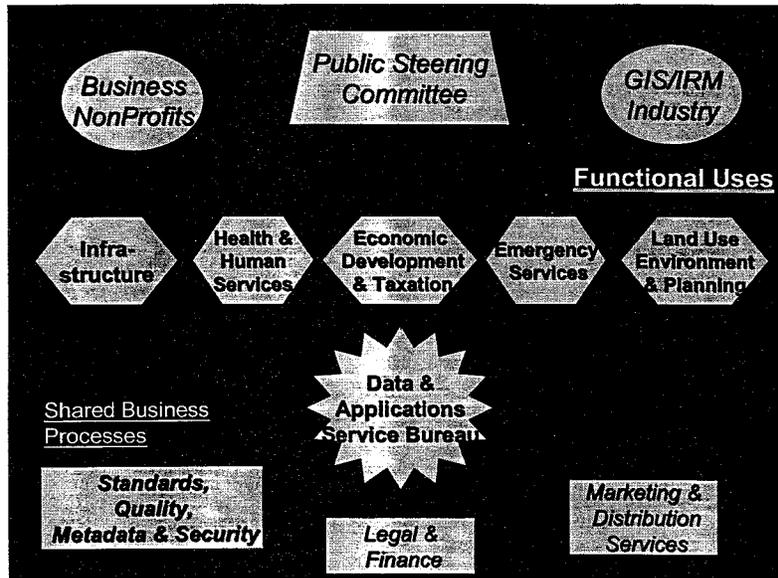


In planning a comprehensive decision-making toolkit, the interviews showed that functional user applications drive the types, quality and updating of data, like a Swiss Army knife of applications.

At the time (1992-93), Urban Logic imagined forming a consortium of data users and sources like a commodities exchange for data with rules for the exchange. Now those "rules for the exchange" would reflect appropriate Metadata and Interoperability standards.

Today, our view for forming NYMAP as a Service Bureau follows a more compact form to take advantage of these standards (see next page), and reflecting:

- Government and private sector organized as a Steering Committee.
- Representation of the utilities, universities and other businesses who depend on the availability of Spatial Data for the long term.
- Access to the expertise of Technology vendors early in planning and administering the Service Bureau without the risk of violating City procurement rules
- Grouping 17 types of Spatial Data in Chart 1 under 5 functional categories that reflect both public and private activities (none dominated by public or private interests)
- Streaming appropriate data and applications through the Service Bureau or developing that data and application inside the Service Bureau to increase the efficiency, effectiveness and equity of Spatial Technology investments
- Using the Internet responsibly as the preferred way to distribute and access data
- Working to solve common business processes that each Spatial Data user would otherwise work individually to resolve
- Public access options would be designed to assure personal privacy and avoid increasing security concerns, while enhancing the public's right to know how its government business is being conducted.



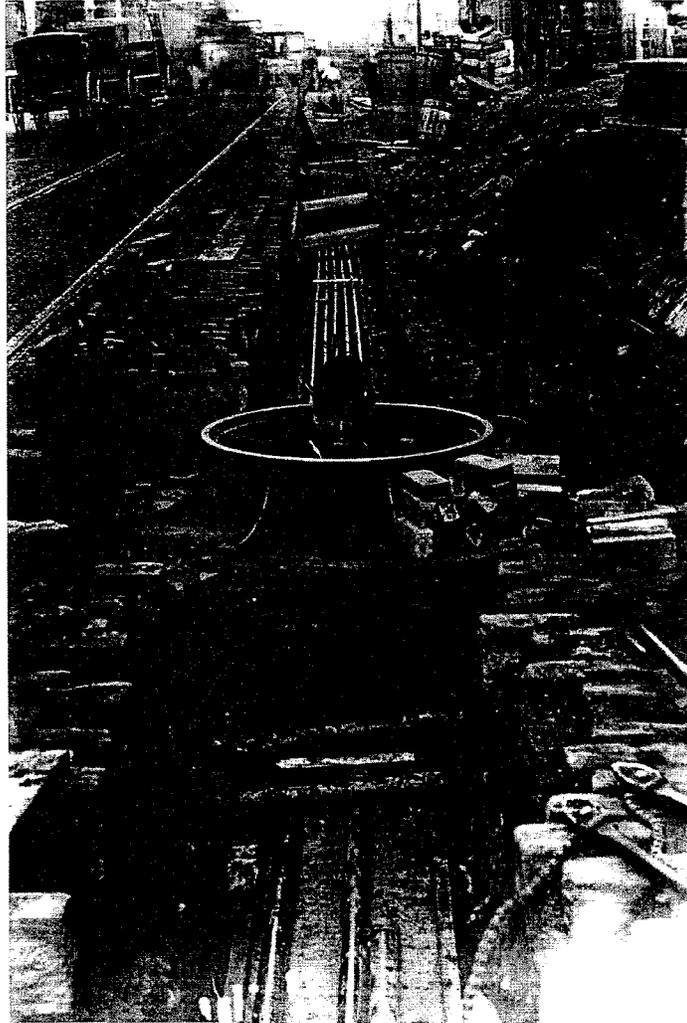
Surely, Someone Knows Where the Infrastructure in New York Is

Lest you think that there is no one who knows where the buildings or infrastructure is in my hometown. I must speak from my own experience. The construction crews know where the infrastructure is. The engineers who help City public works, transportation and environmental agencies, utilities and the private developers plan their activities against the backdrop of 200 years of City street work, they know.

But their knowledge is separate and not pooled. The One-Call Law of New York State (in some areas of the country you may not have as Mis-Dig or Call-Before-You-Dig Laws) requires all parties to spray-paint the streets with the outline of their underground infrastructure. The knowledge gained when the street is opened, and underground conditions actually visible is not captured and pooled for the benefit of infrastructure owners. Nor are the City's records of its underground streetlight, emergency communications and other up to date enough to participate in One Call. The result in New York (and other cities) is continued opening and closing of streets for repairs that drag on when site conditions surprise architects, contractors and owners and all these parties must step back to modify the work plan.

These continual changes represent a special opportunity to fill in the blanks left by history in our knowledge of how great urban areas (old and new) are built and rebuilt. This is just one example of the special *transactional* opportunities for Regional Data Consortia to continually assemble very accurate Spatial Data supplies.

Alternatively, we could find the people who know where everything is. Here is the expert on a day in the late 1890s for a small area in Downtown Manhattan.⁴⁴



You cannot bring him back to ask where he dug his tunnel and what conduit he laid at what depth that fine day. That institutional memory may be lost. If you could find him, he might tell you he dug the tunnel 15 feet from a street lamp that has long since moved. So his monument for telling you where the tunnel is would probably be incorrect.

It might be better to recreate the knowledge of where this proud worker's manhole is *at little cost as* we dig today. Just the kind of idea that would keep our skilled utility worker of today would appreciate to keep him safe and let him be more productive.

Footnotes

¹ Stephen Gillespie, *Measuring The Benefits of GIS Use: Two Transportation Case Studies* (URISA Journal, 6:2), at pp. 62-67; and Stephen R. Gillespie, *A Model Approach to Estimating GIS Benefits* (unpublished). Gillespie's model was used in Montana to inventory State and County Benefits in implementing GIS in single Departments without a Data Consortium. Similar benefit models have been suggested in France (Michel Didier, *Utilité et Valeur de L'Information Géographique* (Conseil Nationale L'Information Géographique, 1990) and the United Kingdom (Coopers & Lybrand, *Economic Aspects of the Collection, Dissemination and Integration of Government's Geospatial Information: A Report for Ordnance Survey* (May 1996)).

² Based on discussions with Dan McHugh, Capital Planning – Information Engineering, New York City Transit Authority.

³ The Basemapping activities and skills of the US Geological Survey, Census or other Federal entities have been key enablers for this local Spatial Data momentum. The quality of these Federal activities maintains a reference grid for local activities. However, these historically Federal efforts stand to benefit from collaborations at regional levels.

⁴ Federal – Regional/Local data sharing is as likely as not in many places around the country. A recent study found that only 50% of the respondents share Spatial Data with federal agencies, while 60% share with other governmental units in the same region. Money was the key barrier to GIS use in *Geographic Information Technology in Cities and Counties: A Nationwide Assessment* (American Forests, 1998), at <http://www.amfor.org>, p. 65.

Metadata explains where the Spatial Data came from, who collected it, how old it is, at what scale it was gathered and other characteristics that help future users of the data determine whether one dataset is better for a particular purpose than another. Metadata is a procedural but necessary component of data-sharing, and individual institutions have begun to see operational efficiencies and revenue potential in collecting Metadata. For instance, Metadata is a prerequisite for web-based spatial data discovery and access. To understand how Federal Agencies depend on Metadata generally, see the CIO Council's Report on Metadata (February 1999), at <http://www.cio.gov/metadata.htm>.

⁶ As mistaken digging for pipes and other infrastructure routinely proves and change orders mount for site conditions unmarked on successive maps where detail has been edited out to accommodate only the maker's current purpose, a digital or paper map only represents a snapshot of the reality reflected in the layers of data chosen and supplied at a moment in time. The same aging and unintentional editing of data affects census, transportation, title, survey and other layers of Spatial Data used in every part of the country. As reuse of the same Spatial Data occurs within a community, the collective memory fixes and adds back mistaken or lost details, and supplies new detail.

⁷ See, <http://sun1.giac.montana.edu/mjgac.html>.

⁸ See, <http://www.nysl.nysed.gov/gis/repository/cntvmap.htm>.

⁹ Money was the key barrier to GIS use in *Geographic Information Technology in Cities and Counties: A Nationwide Assessment* (American Forests, 1998), at <http://www.amfor.org>, p. 65.

¹⁰ As Wyoming Governor Jim Geringer may have mentioned today, the Western Governors' Association (WGA) represents 18 states and American Samoa. WGA has adopted as set of *Enlibra* Principles that express the massive shift in regional and state government thinking about difficult environmental, growth and other issues:

1. **National Standards, Neighborhood Solutions** - *Assign Responsibilities at the Right Level*
2. **Collaboration, Not Polarization** - *Use Collaborative Processes to Break Down Barriers and Find Solutions*
3. **Reward Results, Not Programs** - *Move to a Performance-Based System*
4. **Science For Facts, Process for Priorities** - *Separate Subjective Choices from Objective Data Gathering*
5. **Markets Before Mandates** - *Replace Command and Control with Economic Incentives Whenever Appropriate*
6. **Change A Heart, Change A Nation** - *Environmental Understanding is Crucial*
7. **Recognition of Benefits and Costs** - *Make Sure Environmental Decisions are Fully Informed*
8. **Solutions Transcend Political Boundaries** - *Use Appropriate Geographic Boundaries for Environmental Problems*

Western Governors' Association (Policy Resolution 98 – 001, February 24, 1998) at

<http://www.westgov.org/wga/policy/98001.htm>.

¹¹ For instance, using a capital approach to review qualifying projects and priorities, Massachusetts has been issuing Technology Infrastructure Bonds since 1992. See, *An Act Relative to Providing Capital Outlays for the Acquisition and Upgrading of Major Information Technology Systems* (House Bill #6073, September 24, 1992).

¹² *Interoperability* describes the ability of one software to use Spatial Data developed and stored on another vendor's software platform without converting the original data to the second format. This spares users much of the dysfunction that characterized earlier software versions. Generally, OpenGIS Corporation, <http://www.opengis.org/techno/guide.htm>.

Increasingly, corporations in all Technologies (not just Spatial) are entering into cooperative arrangements to supply their consumers the Interoperability. See, *Revising Capitalism: Cooperative Innovation Steals Corporate Thunder* (New York Times, June 5, 1999), at

<http://www12.nytimes.com/yr/mo/day/news/arts/competition-vs-innovation.html>.

¹³ These include each state's (and in turn each regional, county and city government's)

- a) Freedom of Information Acts, its treatment of Spatial Data and State views about increasing Spatial Data access and tools as satisfying the Act's broader intentions
- b) Copyright - State and local claims to Federal copyright protection for Spatial Data and informed understanding of such copyright,
- c) Data Responsibility - Privacy protection, computer matching and personal, physical and cyber-security concerns relating to the types, scale and accuracy of Spatial Data
- d) Data Liability - State Tort, Contract and administrative law doctrines regarding Spatial Data dissemination and development for particular or foreseeable purposes
- e) Disclaimers, Immunity & Waivers – Validity of disclaimers, immunities and State waivers of sovereign immunity regarding the creation, handling and dissemination of public data

¹⁴ Alignment at the federal level, means reviewing the statutes, executive orders and agency policies that are so many and so varied in requesting Spatial Data as to pepper state regional and local data sharers with unintended logistical support requirements. The challenge is to reduce the burden and increase the effectiveness of making regional information resources available to support national initiatives.

¹⁵ See, <http://www.scag.ca.gov/data/datactr.htm>.

¹⁶ See, <http://www.sandag.cog.ca.us/ris/eis/aboutgis.html>.

¹⁷ See, <http://www.mapcenter.org/index.html> and <http://www.mapcenter.org/pagis/pagis.html>.

¹⁸ OGETA has attracted federal, state, regional, city, industry and utility members. See, <http://www.ogeta.com/members.htm>.

¹⁹ See, <http://www.fgdc.gov/nsdi/docs/cdpproi.html>.

²⁰ See, Opening Statement of Rep. Stephen Horn, Chairman, Subcommittee on Government Management, Technology and Information, *Implementation of the Electronic Freedom of Information Act Amendments of 1996: Is Access to Government Information Improving?* (Hearing June 9, 1998), at <http://www.house.gov/reform/gmit/hearings/testimony/980609o.htm>.

This hearing is about access to Government information. James Madison articulated the importance of this issue in a statement that deserves all the attention it will receive here today:

"A popular Government without popular information or the means of acquiring it, is but a Prologue to a Farce or a Tragedy or perhaps both. Knowledge will forever govern ignorance, and a people who mean to be the governors, must arm themselves with the power knowledge gives."

²¹ By creating an implicit "Truth in Advertising/Caveat Emptor" norm of reasonable commercial behavior for Spatial Data providers to meet in offering their Spatial Data, workable Federal Metadata Standards as "Best Practices" may ease industry product liability concerns and thus remove some legal uncertainty in offering Spatial Data products in the marketplace.

²² See, CIO Council's Strategic Plan (page 1) puts the highest priority on Interoperability, <http://www.cio.gov/fy99fina.pdf>.

²³ Again, the CIO Council's Draft Federal Information Technology Framework points to the benefits of taking this cross-cutting direction in standardizing, investing in, managing, securing and leveraging the Government's Enterprise Approach to Information Technology. See, Federal Architecture Framework

Subgroup of the CIO Council (Version 1.1, February 1999), at <http://www.itpolicy.gsa.gov/mke/archplus/frame.pdf>.

²⁴ As computer data sharing becomes the norm, these economies will be more easily reached. See, Statement of David L. Clark, Director, Audit Oversight and Liaison, General Accounting Office, and Statement of Auston Johnson, Utah State Auditor, House Subcommittee on Government Management, Technology & Information, *Hearing on Single Audit Acts of 1996* (May 13, 1999), at <http://www.house.gov/reform/gmit/hearings/testimony/990513dc.htm> and <http://www.house.gov/reform/gmit/hearings/testimony/990513aj.htm>, respectively.

²⁵ In connection with prudent consideration of security concerns, government at all levels have much to gain from cooperatively structuring public Spatial Data access policies and procedures to maximize legitimate use and reduce the threat of illegitimate use of the Technology. See generally, the work of the Crucial Infrastructure Assurance Office (CIAO), at <http://www.ciao.gov>, and specifically, Remarks by Richard A. Clarke, National Coordinator for Security, Infrastructure Protection, and Counter-Terrorism before the American Bar Association Committee on Law and National Security (November 12, 1998) speaking about *Terrorism, Cyber Security and the Bill of Rights* <http://www.ciao.gov/sbclarkeaba1198.html>.

²⁶ We are aware of the Information Collection Budget of the United States Government required under the Paperwork Reduction Act (the ICB), and would like to have used it for purposes of "Mandate Mapping" statutory and regulatory requirement for Information Technology investments by non-federal sectors of the Economy. The ICB reflects hours of information collection marginally increased by new regulatory action of the Federal Agencies, it does not present absolute levels of investment in Information Technology traceable to specific Statutory or Regulatory requirements.

To date we have not found an existing inventory of the flow of Information Technology investments triggered by governmental mandates. This would appear to be hinder the goals of the Clinger-Cohen Act, the Unfunded Mandate Reform Act, the Intergovernmental Cooperation Act and other recent policies aimed at improving joint Information Resource Management and Development activities among the Federal government and state, local, county and city governments.

How We Are Performing the Data Mandate Inventory

With the help of Congressman Kanjorski's staff (Karen Feather, Chief of Staff, and David Boslego), we have been working with CRS (Congressional Research Service) to find sections of the CFR (Code of Federal Regulations) that mandate the use or creation of Data (spatial and non-spatial).

Getting the CFR sections in downloadable format is just the first of a multi-step proprietary process that Urban Logic developed relying on a unique combination of 5 types of software:

1. LEXIS-NEXIS identifies the appropriate CFR sections, and downloads them into separate ASCII text files.
2. PKWare compresses the ASCII files for transmission & storage, and prior to use uncompresses them for analysis.
3. An ASCII Conversion utility combines multiple ASCII files so they can be processed all together
4. A data parsing software takes the free text LEXIS-NEXIS search output of pertinent CFR sections and allocates it to specific fields to serve as input into a relational database
5. Microsoft Access (relational database software) lets us build a database of CFR sections, tag each section with its Spatial Data mandate code, analyze the entire Code of Federal Regulations' output, group sections requiring similar data and generate reports for purposes of finding Data Mandates that might be serviced using National and Regional Service Bureaus.

Using Steps 3, 4 and 5, we are performing the same analysis on the U.S. Code as downloadable from the House website.

We plan to use it on state and municipal laws and regulations. In the end, we should be able to track Data Mandates as they migrate, morph and expand through all intergovernmental layers and institutions. Because the analysis is automated, it can be updated and re-run as needed to yield updated information.

I mention our automated methodology because we believe that this data mining technique has applications in other work before the Congress and the Administration, and we would urge you to explore these techniques to efficiently find opportunities to service traditional governmental concerns using modern/pooled resource development.

²⁷ Generally, 44 USC 3504, <http://uscode.house.gov/uscode-cgi/fastweb.exe?getdoc+uscview+t43t44+1768+7++paperwork%20reduction%20act>.

²⁸ 44 USC §6506.

²⁹ National Academy of Public Administration, *Geographic Information for the 21st Century: Building a Strategy for the Nation* (January 1998).

³⁰ NAPA Report, p. xiv.

³¹ NAPA Report, p. xix.

³² NAPA Report, p. 4.

³³ NAPA Report, Table 2-1, pp. 12-13.

³⁴ Under GPRA, the Federal Acquisition Streamlining Act, the Clinger-Cohen Act, the Government Management Reform Act and other Congressional initiatives, CIO Council, CFO Council GAO and OMB are leading Federal efforts, see *ROI [Return on Investment] and the Value Puzzle* (February 1999), at <http://www.cio.gov/roi.pdf>, and GAO's Executive Guide: *Measuring Performance and Demonstrating Result of Information Technology Investments* (March 1998), at <http://www.gao.gov/special.pubs/ai98089.pdf>.

³⁵ See Remarks of Wyoming Governor Jim Gehringer at the National Governor's Association's Governing Conference on Managing Technology (March 30, 1999), <http://www.nga.org/InfoTech/RemarksGeringer031999.htm>. Generally, see PTI: Public Technology Inc. (<http://www.pti.org>), NACo: National Association of

³⁶ House Subcommittee on Government Management, Technology & Information, *Summary of Oversight Findings and Recommendations* (October 8, 1998), at http://www.house.gov/reform/gmit/v2k/v2k_report/summary.htm.

6. Organizations are Dependent on the Year 2000 Preparedness of their Data Exchange Partners.

The constant exchange of data between all types of organizations makes each organization dependent on the Year 2000 preparedness of its data exchange partners.

Federal agencies and State governments use thousands of electronic data exchanges to communicate with each other and other entities. Much work remains to ensure that Federal and State data exchanges will be Year 2000 compliant. As of August 1998, over half of the Federal agencies reported that they have not finished assessing their data exchanges. Furthermore, only two agencies had completely identified and reached agreements with all of their data exchange partners. They were the National Science Foundation and the Nuclear Regulatory Commission.

One witness before the subcommittee illustrated the extraordinary level of connectivity between organizations and therefore the shared nature of the Year 2000 problem by describing a routine international transaction between a buyer and seller: "[Y]ou have two port authorities, maybe a railroad, you have a couple of trucking companies, two banks, an insurance company, warehousing facilities . . ." And then there is the transactional side: "[T]he flow of paper, the purchase orders, the releases, the shipping documents, the money, the customs inspections. All of this is done electronically."

One witness before the subcommittee articulated the importance of data exchanges this way: "Fixing internal systems is but one leg of a multi-legged stool. It is one thing to be able to say that all our systems are millennium ready, it is a whole other thing to be able to say that after their conversion, they still have the ability to talk to one another." This witness, who spoke from the perspective of the health care industry, spoke in disturbing terms about the Year 2000 readiness of data exchanges in that field. "[T]he billing and collection function for services rendered in health care is one of the most complex processes in our industry. . . I believe there is a very high probability of failures at this billing and reimbursement interface."

7. Data Exchanges, Testing, and Contingency Planning Have Received Far Too Little Attention.

Based on hearings and analysis of agency quarterly reports, the committee found that many organizations are focusing solely on fixing their own computer systems, paying little or no attention to their data exchanges with other organizations, the need to thoroughly test their systems once repairs are completed, and the need for contingency planning even if the repairs are on schedule.

Organizations must ensure that their systems can reliably exchange data with other systems and that they are protected from errors that can be introduced by external systems. To achieve this goal, agencies must perform end-to-end testing for their critical core business processes. The purpose of end-to-end testing is to verify that a defined set of interrelated systems—which collectively support an essential function—work as intended. In the Federal Government, agencies that administer benefits payment programs exchange data with the Department of the Treasury which, in turn, interfaces with various financial institutions to ensure that benefits checks are issued.

In the process of preparing for the year 2000, many systems in the end-to-end chain will have been modified or replaced. This makes testing more complicated but also more important. It makes it more difficult to isolate, identify, and correct problems. Organizations must therefore begin working with their data exchange partners as soon as possible to conduct end-to-end tests.

Business continuity and contingency plans should be formulated to respond to both predictable and unpredictable failures. Predictable failures include systems where renovations are already far behind schedule. Unpredictable or unforeseen failures include systems that fail despite having been on schedule for compliance before January 1, 2000 or even having been certified as Year 2000 compliant. Organizations that develop contingency plans only for systems currently behind schedule are not addressing the need to ensure the continuity of even a minimal level of core business operability in the event of unforeseen failures.

Moreover, contingency plans cannot focus solely on internal systems. Most organizations depend on data provided by business partners, as well as services provided by the public infrastructure (power, telecommunications, transportation, water, et cetera). One weak link anywhere in the chain of critical dependencies can cause major disruptions to business operations. Given these interdependencies, it is imperative that contingency plans be developed for all critical core business processes and supporting systems, regardless of whether these systems are owned by the organization. Further, those program managers responsible for core business processes should take a leading role in developing business continuity and contingency plans because they best understand their business processes and how problems can be resolved.

³⁷ Senate Special Committee on the Year 2000 Problem of the 105th Congress, *Investigating the Impact of the Year 2000 Problem* (February 24, 1999) at pp.113-5, <http://www.senate.gov/~y2k/GenGov.pdf>.

STATE AND LOCAL GOVERNMENT

Overview

In addition to the 50 state governments, there are 3,068 county government jurisdictions and approximately 87,000 other local government jurisdictions within the United States. These state, county, and local governments deliver the majority of the essential services upon which citizens rely each day. These include police, fire, and emergency medical services response; financial support networks, including welfare and Medicaid payments; unemployment insurance payment systems; disability claims; and basic utilities, such as water and wastewater, sanitation, and local transportation systems. While the prospect of preparing federal government systems is daunting, the challenge of assuring the Y2K preparedness of these other sectors of government is even more mammoth. The consequences of failures in this sector are as potentially grave to the public as failures in the vital sectors of power and telecommunications.

Initiatives

Several of the largest intergovernmental councils and professional organizations are actively engaged in Y2K awareness programs. The National League of Cities, the National Association of Counties, and the International City/County Management Association, in conjunction with Public Technology, Inc., are sponsoring a Y2K awareness program entitled "Y2K and You." The Metropolitan Washington Council of Governments has published a Year 2000 Best Practice Manual. These programs are good examples of what an effective dialogue between state, county, and local governments can achieve. In his testimony before the Committee on October 2, 1998, the Honorable Michael O. Leavitt, governor of Utah and vice chairman of the National Governor's Association (NGA), described several NGA initiatives aimed at assisting the states with Y2K preparation. In July 1998, the NGA held a "Year 2000 State Summit" which focused on state, local, and private sector coordination and on establishing a common agenda to increase public confidence in state services. The NGA has also published an issue brief entitled "What Governors Need to Know About Y2K," which Governor Leavitt stated "outlines the steps governors should take as chief executive officers, guarantors of public safety, and public leaders." Both the State of Texas and the State of Pennsylvania have been recognized as having two of the most extensive and well-developed state Y2K programs. New York State Governor George Pataki has also been leading the call for Y2K preparedness in his state.

Assessments

The assessments of Y2K progress in the sector of state and local government are not optimistic. The National Association of State Information Resource Executives (NASIRE) is conducting a continuing survey of individual state Y2K preparedness. The Gartner Group has also conducted a state

government Y2K survey. The National Association of Counties (NACO) recently commissioned National Research, Inc. to conduct a random survey of the Y2K status of county governments. The General Accounting Office (GAO) is examining the status of federal to state data exchanges. These include the vital connections through which funding from the federal government is provided to the states for various aid programs. Unemployment, for example, is federally funded, but state administered. The Department of Labor reported in December that the following states were behind in remediating their unemployment systems: Connecticut, Delaware, the District of Columbia, Hawaii, Illinois, Kansas, Louisiana, Massachusetts, Missouri, Montana, New Hampshire, New Mexico and Vermont. In his testimony before the Committee on October 2, 1998, John Thomas Flynn, CIO of the State of California, and president of NASIRE stated that compliance among the 50 states with all aspects of mission critical legacy systems ranged individually from under 10% complete, to more than 90% complete. According to the NASIRE survey results, just under half (24) of those responding had completed remediation of at least 50% of their mission-critical systems. Mr. Flynn noted that no state had declared itself 100% complete as yet.

Data provided by the Gartner Group indicate that only 50% of the states are evaluated as at Level III Status under the Gartner Group's scale. A Level III rating indicates that the state has completed its project plan; has assigned resources; has completed a detailed risk assessment, remediated; and has tested 20% of mission-critical systems, conducted vendor reviews and has completed contingency plans. Thirty percent of the states are listed at Level II, indicating that they at least have developed an inventory of operational dependencies. Ten percent of the states are evaluated as Level I, indicating that they have begun their projects, are aware of the problem, and have begun conducting their inventories. The remaining 10% are evaluated as "uncertain," indicating they were unaware of their Y2K preparedness status.

The GAO has advised that as of November 1998, 33 states had completed 75% of their verification of federal data exchanges. GAO found that as of June 30, 1998, approximately one half of the state disability determination systems had not been renovated, tested, and certified Y2K compliant.

Additionally, over 90% of state Medicaid, 70% of state Temporary Assistance for Needy Families and 75% of the state Food Stamp Program systems were not Y2K compliant as of August 1998 according to GAO statistics. Survey data recently released by NACO, collected from 500 counties, indicate that only 50% of the respondents have countywide plans to address Y2K issues. Of the 16 counties with populations over 500,000, all but one have a countywide plan. Seventy-four of the 119 counties having populations below 10,000 reported that they have not prepared a Y2K plan. Fifty-four percent of the counties surveyed reported that they have no contingency plans for Y2K disruptions. Twenty-two percent reported that they had prepared Y2K contingency plans. Fifty percent of the largest counties in the survey stated that they have contingency plans, while only 19 of 119 counties in the smallest population group (population below 10,000) had one. The 500 survey respondents reported a total cost estimate of over \$283 million for Y2K compliance. A survey published by the Office of the New York State Comptroller in September 1998 indicates that 100% of New York's counties have made preparations for Y2K. Twenty-six percent of the cities, 54% of the towns, 48% of the villages and 61% of the fire districts reported that they had not made Y2K preparations.

Concerns

The [Senate Special Committee on the Year 2000 Problem] has serious concern about the Y2K readiness of state and local governments. This concern is supported by all of the previously cited surveys, which, when taken, together indicate a vast disparity in the readiness level of the individual states, and a disturbingly low overall level of preparedness on the part of county and local government jurisdictions."

38 Statement of Joel Willemsen, Director, Civil Agencies Information Systems, Accounting & Information Management Division, U.S. General Accounting Office (January 20, 1999), at <http://www.house.gov/reform/gmit/hearings/testimony/990120jw.htm>.

³⁹ Database management is a continual process. Interoperability saves users having to monitor source data for changes, and then having to re-reference and re-cover the source data.

⁴⁰ See reference to Testimony of Harris Miller, Information Technology Association of America, in Report on the Committee's Oversight Review March 20, 1997, *Oversight Hearing: "Year 2000 Risks: What Are the Consequences of Information Technology Failure?"* (held jointly with the House Science Subcommittee on Technology), at http://www.house.gov/reform/gmit/v2k/v2k_report/llreport.htm.

⁴¹ See, fn 12.

⁴² For the sake of full disclosure, Urban Logic, Inc., is a member of OpenGIS Consortium, and has encouraged the Consortium to focus on intergovernmental applications and other solutions deliverable to federal and non-federal communities.

⁴³ These charts are from Urban Logic's compilation of interviews in 1990-91 that The City of New York conducted with the help of IBM to find spatial applications in one agency or utility that could be readily transferred to another. The City of New York has worked with computer mapping for over 30 years, and has a rich experience with the technical and procedural elements involved. At the time of our work, there was no NSDI Framework nomenclature so the chart labels are our own, and likely would be changed were the study to take place today.

To avoid creating any confusion: Urban Logic was never hired or paid by The City of New York to do the work reflected in these charts. We did the work to justify forming a Data Consortium. The City used Urban Logic's study report (of which these charts form a part) as one justification for its current base mapping project, the first step in what many hope will be a Data Consortium.

⁴⁴ This picture comes from a thesis by Columbia Urban Planning graduate student Tim Reason, *Forgotten Rights and Responsibilities* (1996). Urban Logic collaborated with Tim on his thesis and used it to build on our research into the New York City's street franchise rights. The picture shows iron pipe being laid on Greene Street near Spring Street in the late 1890s.

Mr. HORN. Thank you very much.

Our last witness on this panel is Mr. Jack Pellicci, the vice president of Global Public Sector for Oracle, based in Reston, VA.

Mr. PELLICCI. Thank you, Mr. Chairman, Congressman Kanjorski, for this opportunity to share Oracle's views with you on this very important topic.

GIS data, GS spatial data, and, as we call it, spatial data, must be readily available to citizens, to governments, industry, and academia in order for us to, at the national level, the local level, and globally contribute to economic growth, the overall competitiveness of the Nation, and then the quality of life in our communities.

A little bit about Oracle—Oracle is the world's second largest software company. We are the largest data base company with about 45,000 employees in about 145 countries with over \$9 billion in revenues. Over 55 percent of the world's relational data is in Oracle data bases. We invest about \$1 billion a year in R&D, and over the past several years, we have been investing significantly in managing spatial data seamlessly with other types of data.

Now, it is estimated that 80 percent of the information in the world has a spatial component, and a critical success factor in managing the spatial component of that information is that it must be done the same way as the other data types, such as relational data, image, audio, and even video in order for it to be user-friendly, to be more easily accessible, and to be more cost-effective.

We like to say our job is to ensure that spatial is not special. Data formatting standards are important but so are information management standards which allow the integration of that data with other data types for processing, manipulation, and distribution. Oracle has been a pioneer in the standards for relational data bases, and today we are supporting the development of interoperability standards in geospatial and GIS as part of the Open GIS Consortium, which is made up of both industry and Government representatives, and we are also active in a number of other forums which promote ease of access and ease of processing all types of data.

Now, many of the initiatives you are being asked to support will improve the access to and the delivery of community services for citizens. What I like to call spatially enabled communities are critical to our national competitiveness, and Oracle strongly supports the adoption of the interagency proposal to advance the national spatial data infrastructure.

Oracle believes that the Internet changes everything. We are in a new era with a new economy emerging quickly. Spatial data has to be available on the web and over the Internet. Much work is being done in this area today, and the web integration test bed at the Open GIS Consortium is putting a lot of attention on this aspect of providing access through a web browser. As we standardize the data, we must also extend the data architectures. It is not just about data formatting; it is not just about data standards; it is about the architectures that support the users, and that architecture must be a self-service architecture.

Over the last several years, I have been working to support as an advisor for the National Performance Review and the National Partnership on Reinventing Government, and I have told Vice

President Gore, who we have worked with and talked to, that it can no longer be about service to the citizen; it is about service by the citizen. It is about empowering citizens to do it themselves. In this age of declining budgets, in this age of streamlining, when you have got people who want to do it, empower them to do it. And the new metric is now citizen or customer self-satisfaction, not just citizen satisfaction; grading ourselves on how well we allow citizens and customers to do it themselves. So, with the half-life of technology approaching 3 weeks and time being measured in Internet years, which are 3 months, hopefully, this committee will push for rapid adoption of the FGDC initiative.

Thank you.

Mr. HORN. Thank you very much.

One of the things that we have heard today is many groups seem to be promoting the idea of making greater use of partnerships to work on common problems and issues. What will it take from your perspective, the perspective of everybody on this panel, to make such partnerships work between the public and the private sector? Mr. Dangermond, any thoughts on that?

Mr. DANGERMOND. The first thing that occurs to me is that the partnership between the Federal Government and Sears is rather intriguing. It is an unconscious relationship. These tens of millions of dollars that Mr. Miller talked about saving a year result in actually tens of millions of dollars of new tax money coming back to the Federal Government to help pay for and subsidize the investments that they made in the development of the Street Centerline File for America, the first and, perhaps, best-known geographic infrastructure investment that we have made as a public investment. This is a partnership; it is a financial partnership. It is one that actually works. It is not one that is directed by Congress, but it is amazing, and it rides on the fundamental policy that Government data is free so that we don't look at the little economics of charging toward disks or simple copies of data but we look at the big economic implications of developing a spatially literate society that is economically more efficient and saves money and time. What Mr. Miller did not mention is that by saving 15 percent of the traffic drive time, which was off the bottom line, he also cuts traffic in cities by 15 percent; he cuts economic expenditures by our society in energy by 15 percent; he also cuts air pollution by 15 percent, and so on. This kind of an intriguing connection of partnership, perhaps not what you asked for, Mr. Horn, but it is one that I really buy into that almost volunteering partnerships, there are countless numbers of them like this that have emerged.

In a more proactive way, what can we actually—what can you actually do to direct partnerships? I like to use the metaphor of footprints. Footprints are very important, and when I talked about the idea of funding some small demonstration projects that show the value case or the benefit case as the Vice President is doing through this Federal and local government, and as you heard the previous panel talk about, I think these are extremely important, because if the value case is there, it will take off like fire, and, by the way, it is. It is happening in the public sector and also in the private sector where the—it is almost like a group of volunteers who have a common interest. So, you need to just catalyze it by

throwing a few seeds out there, the true—what is this on the back of a rudder—Trimtab. Throw a little Trimtab and the rudder moves a big steamship moves. These Trimtabs of partnerships and demonstration projects have phenomenal interest.

Mr. HORN. Mr. Miller.

Mr. MILLER. I never really thought that Sears Roebuck had a partnership with the Federal Government, but I suppose we do.

Mr. HORN. We are your friendly Government. We are here to help.

Mr. MILLER. Yes, you are. I guess the only comment that I would have is that whatever the Federal Government has to do to continue to embrace this technology and support the development of it, work on developing standards with this technology and keeping the costs down. Obviously, Sears is a very large company, and we, perhaps, can afford to do some things that other companies cannot. I supposed if this technology was more expensive, a number of companies would not be able to utilize it; in fact, we may not even have elected to use it. So, anything that the Federal Government can do to keep the costs down would be something that we would certainly support.

Mr. HORN. Mr. Cahan.

Mr. CAHAN. Mr. Chairman, you asked what makes partnerships work? And, if I could, I would refer you to some charts on pages 17, 18, and 19 of my written testimony. Basically, the first chart—if I can hold it up for you—I apologize for this—talks about the 17 flavors of data it takes to run the city of New York—based on a study the city started and we completed. Yet it would appear that the agencies—and this was 30 city agencies and some utilities—go every day to 150 different places to get the 17 different flavors of data it takes—data they need—data that is very embedded in the Framework that has been proposed by FGDC. You have got streets data and buildings data and services districts and people/demographics data, ultimately.

There is a curious thing about this chart. First, a third of this supply chart for data in New York comes from five key agencies—environmental, city planning, transportation, buildings, finance—the tax group, as citizens know—and then there is this very long tail, and that means that the tail says this is like “data soup.” It is like an herb that you have to throw into your data mix when you are trying to make sure you covered all your bases from liability or a policymaking point of view; that I have gone out and I have recaptured what has changed about these very small sets of data.

And then we found that there are a couple of drivers: the data is not smart enough to ask for itself. Applications are driving, functions are driving this appetite for data, and the main function, it turned out, was to explain to somebody else, for you to explain to your constituents—a business to explain to you—what the context for those decisions that you are making—that they are making—is all about.

So, I think if you consider our evidence from the New York study, you will realize that standards have a role as underwriting or investment criteria in aligning multi-sectoral investments in spatial data.

Just one example that may crystalize for you why it matters in Washington if New York gets its GIS house in order or any other city. Assume that you send us some transportation money very often and that our subways are built with your money. A majority of the capital costs is from you. Well, 1 percent of those budgets goes to planning, and that planning is all about using GIS, and if we don't have the right data to do that plan, then the project is delayed. You can't put two people on the express and local track flagging down traffic the same day. So, then the cost spirals and the cost goes up, and they come back here to you, and, ultimately, some part of the cost for missing data or the poor data that didn't show up that day comes out of the Federal Treasury. I can't tell you how much, but it is implicit, and so you do have a great stake in using local data, both for the benefit of the local community as well as the fiscally responsible functions that I think you perform.

Mr. HORN. Mr. Pellicci.

Mr. PELLICCI. Yes. Oracle's largest customer in the world is the U.S. Federal Government, and I would like to think that we do have a very strong strategic partnership, a public-private partnership with the Federal Government, and I have been with Oracle 8 years and for 30 years before that, I was a senior leader in DOD, and from both sides, now, I have worked very hard at what is a very difficult thing and that is to make public-private partnerships work. They are like marriage; they are very tough. You have got to work at them continuously, and I would say that one of the largest factors is the overall element of trust, confidence that each element has in one another, a shared interest, the understanding of what is trying to be done, and there needs to be incentives for both sides, and, above all, there has to be metrics placed on these public-private partnerships, so somebody is measuring them and there is feedback as to whether or not they are working.

The most overused words in some of the vocabularies I see are "strategic partnership," and they use it kind of nonchalantly, and it cannot be used nonchalantly, and the forum in which these partnerships occur are direct public-private partnerships like Oracle dealing with the Government or U.S. DOD or with IRS or whoever, but also there are other elements of partnership where we are dealing with NGO's, non-governmental organizations, whether it is Oracle and counties and States working through NAACO or Oracle and Intergraph and other companies working through OGC, the Open GIS Consortium. So, in achieving the goals and objectives that we are trying to do here with the GIS and geospatial data, public-private partnerships are absolutely essential.

Mr. HORN. In their testimony, the representative of the National Academy of Public Administration recommended a series of studies to be conducted to identify the best practices for effective data sharing, licensing, pricing relationships among public and private data producers. Now, do you agree that such an effort would be worthwhile? Or would—Mr. Pellicci, that be in line with what Oracle would be interested in?

Mr. PELLICCI. Yes, sir. I think best practices are certainly things that we are very familiar with. On a global basis, we try to find the best practices, whether it is in the GIS arena, geospatial arena, or any other data management arena and then share those best

practices within the company to the benefit of our customers around the world. But I think best practices allow us to deliver better, faster, and cheaper and do it in a way that makes a lot of sense.

Mr. HORN. In addition, the National Academy of Public Administration recommended that reconciling different laws, policies, and regulations might impede effective data sharing. Do you see this as necessary or is there a worry there in any way?

Mr. CAHAN. If I could respond, Mr. Chairman?

Mr. HORN. Sure, Mr. Cahan.

Mr. CAHAN. Yes, in a study that we are finishing, that the FGDC was good enough to fund, we list some of those inconsistencies in the law, and there are different derivations of Federal activity, some of which are very good.

Mr. HORN. Is this data sharing between Federal agencies?

Mr. CAHAN. You have got the Paperwork Reduction Act; you have the Unfunded Mandate Reform Act; you have Government Performance Review Act; you have Clinger-Cohen; you have all these acts. When you look at the ubiquity of GIS, you have a special challenge to channel all of that efficiency activity in the right way so that it can reinforce the building of data at the local level and the Federal agencies' ability to partner as real meaningful partners in that local activity. So, yes, it would help.

Mr. HORN. Yes. I brought up the privacy question in another panel, and in going over to vote, two of our most senior statesmen around here—one Republican, one Democrat; their names will go nameless to protect the innocent or the guilty as the case may be—and they got on privacy, on another subject. Maybe this is privacy day on the Hill, I don't know, but they got onto that, and they were sort of outraged that data would be available to someone beyond, say, your house, and I mentioned what my colleague from Pennsylvania had mentioned on the sale of unemployment compensation data. So, I just wonder if you have any thoughts on the privacy thing?

We have a bill up in the Senate today in markup which started out really in hospital privacy. This subcommittee has jurisdiction on the Government reform side, and we held extensive hearings, oh, 6 years ago—Mr. Condit's bill—and then we haven't really done much since, although we had Mr. Leahy before us, and he has a bill over there, and you have the Bennett bill and you a whole series of the Jeffords bill.

So, privacy is something that, obviously, politicians get very exercised over, because the clientele gets very exercised over it, and we have had some horrible cases of people's files being gone into, mayors' files, Congress Members' files, Senators' files; it ends up in the newspaper. There is no privacy, apparently, for public officials, but you have got a disgruntled employee you fire in a doctor's office and they just—there is a xerox machine over the lunch hour, and you just get your file xeroxed and next you see it in the, sort of, Fat City Press or something or the Skinny City Press. But do you have any concerns as to where the line needs to be drawn on what types of data that goes beyond a point? Any thoughts on that?

Mr. CAHAN. I participated in the Governor's Task Force on GIS in New York, and this has come up in our legal subgroup.

Mr. HORN. I am sorry, I missed that part. Speak into the microphone a little.

Mr. CAHAN. This issue of privacy has come up before the Legal Working Group in New York. There are some data stewardship principles, and I have heard them most eloquently announced by the Department of Health for the State of New York where they say, first, "You don't know, but when your twin boys were born 6½ years ago, there was data captured you are not even aware of for epidemiological and other studies. We feel we are the stewards of that data." Well, that stewardship ethic and ethical practice is something that GIS, which was dealing with environmental and dealing with AM/FM—which is automated mapping to fix the sewers—there was no person down there that you really cared about. Now, we are talking about people's rights, and we are talking about massive abilities to blend data bases.

Some of us attending the forum before this hearing were cautioned by the GIS Intertribal Council of Indians. They said the Tribes make no big decision without thinking about the decision's effect for seven generations. So, when you think about privacy, at least that is the hat I am going to wear from now on, and it is a good metaphor.

Mr. HORN. I think there is some bureaucracy tribes in this town that unconsciously have had a seven generation bit of input versus output. [Laughter.]

Mr. Miller.

Mr. CAHAN. The other thing I would add—I apologize—

Mr. HORN. No, go ahead.

Mr. CAHAN [continuing]. Is sometimes privacy is a ruse. Sometimes privacy is an excuse for not sharing data, and that is why I say there has got to be some principles that can guide the decision.

Mr. HORN. Yes. Mr. Miller.

Mr. MILLER. This issue of privacy has come up a number of times within Sears. Sears has been around for 113 years, and, as such, we have collected an awful lot of information in those years. And now that we are in the information age and many of our transactions are handled by credit cards, obviously, we have a good deal of information. We think we probably have one of the largest customer data bases in the world. One of the true assets that the company has is the trust of the American people. People trust Sears. They let us into their homes. We go into about 15 million American homes a year, and the fact that we have this information, we guard it religiously. We do not let anyone have access to it. In fact, as the CIO of the company, one of my main jobs is to protect that data, and I have to report to the board of directors on a regular basis about what we are doing to secure that data, so it is a very important issue, I think, obviously, to Sears and also to corporate America.

Mr. HORN. Well said. Mr Dangermond.

Mr. DANGERMOND. The only thought that comes up for me is this notion of blending. If you look at data in abstract, there are certain privacy issues. When we deal with GIS data, there is a unique ability to blend, what we call an overlay, different data sets from different sources. Take, for example, the census data which is pur-

posedly disguised from being in individual reporting to census tracts or census blocks. But when we overlay that data or blend it with other customer information which is freely available in the open market, you can begin to subdivide or intersect by map overlay and define further clusters of information about an individual such that you can target people and find out about their behavior or about their demographics or about their characteristics or their behavior, basically.

This is something that the GIS community, frankly, is uncomfortable with and is not addressing effectively. I see no major research initiatives in our academic world that have taken this on as a subsection, and, again, it goes back to something that I would like to—I recognize this is not an Appropriation Committee but recognize as someone who oversees governing—highlight this, because it is not just privacy in abstract. We are talking about privacy uniquely with geographic information and Geographic Information Systems which can sort of untangle and further define and invade—if we want to use that bad word.

Mr. HORN. In the case that was mentioned, one example where you had children that were adopted, you had some very difficult competing values there. Friends of mine have been in that situation where the parents were not told what the real medical health condition was of these children. They could have been much more helpful to them if they knew that, but the welfare bureaucracy, which I guess knows no bounds in terms of sometimes just sitting on things, didn't use common sense. So, the result was they didn't know what was happening when certain behavior appeared. Was it environmental? Or whatever was it? And those are the tough questions. I think, in this day and age, the parents die and the adoptive family dies, and the children want to know, "Well, who was our real mother and father?" And those get to be very tough questions, and I know there is a lot of State law that you probably have to deal with in one way or the other. Mr. Cahan, do you have any thoughts on that question in particular?

Mr. CAHAN. Only having friends in the same situation on both sides of that and internationally on both sides of that. I think it comes down to—I analogize it to negligence and prudent man and those kinds of principles. Mr. Chairman, we don't have a body of law, as Mr. Dangermond said, that tells us what we need to know for GIS. It tells us for other kinds of data but not for GIS. It is this recombinant, this ability to recombine data sets that have been purposely for the privacy purposes excised of their identifying characteristics that we responsibly say to you, "Yes, we are concerned that the recombining and the automated recombining can undo whatever privacy locks you thought you had built in to the system, and we need some principles."

Mr. HORN. Yes, that is a good point.

The gentleman from Pennsylvania is free to begin and end the questioning.

Mr. KANJORSKI. I will start off with Mr. Dangermond, because you have been in this area probably as long as anyone else. If we do nothing from the standpoint of the Federal Government and the Congress, what is your projection 10 or 20 years from now where this technology will be? Then, on the other hand, if we have an

ideal partnership and respond to this technology every way we can to facilitate, what would the difference be in a 10 or 20-year period?

Mr. DANGERMOND. Well, if you ask me to look 20 years out, I have a particular vision, and, for me, the vision is inevitable, whether there is close cooperation or not, in our minds at this point. The vision is basically one of a society that is based on more geographic and spatial literacy; one that is able to look into these vast data bases which will become basically the automation of all movement and all reality, and those applications that dip into that will serve kids in school to learn about and discover their world. It will serve us in improving the way we govern; it will improve coordinated workflow, allow us to do more productive agriculture, more efficient business; the list is countless. It will also be a data base which people look into for consumer applications at the individual level that make their lives better—finding places to work; finding safe places to live; avoiding environmental problems in their own life, because they will have the knowledge and the information to guide them, and, obviously, privacy must be acknowledged as an issue.

Whether we do this now or whether we do this later is simply an economic issue from my perspective. We can start to coordinate more effectively now, and FGDC has made amazing contributions in that area. I would have not guessed that they could have accomplished as much as they have in this decade a decade ago, but they have done it, and it is a process, not an event. So, for this, I would like to acknowledge all of those people that have worked hard in this but also point out that there is a huge gap of work yet to be done in two fields. The first is, our national mapping efforts as well as State and local map and silos. Soil people map soils independent of the geologists' topic who map geology independent in some respects of the water people who map water independent of people who map roads. Actually, roads are mapped at—roads in this country are mapped maybe four or five times—the feds, the States, the local governments, the counties, and the cities—and, actually, they are all the same road. So, when we overlay these and combine them in various ways, which GIS is a beautiful tool to do, we get this whole mess, and it is not the interoperable, technical standards that aren't working; it is our content standards and organizational issues that sort out, "Let us map the road once and here is the common standard for it, and, by the way, it is not a feature in isolation. It is also a feature which is related to other features." Congressman Horn, soils have something to do with geology, morphed out of it. It has something to do with vegetation which grows out of it, and this country, one of the concerns that I have is at the Federal level we map all these phenomena separately, because we administrate budgets separately, so some people map vegetation independent of soils yet we know that they are co-related and similarly with geology and similarly with all of it.

So, with the good work of the framework studies that our mapping committees and so forth have come forth with, we have got better clarity on what the features are that we should have, and those are good standard efforts. But what still troubles me is that

we will then all go out and map independently rather than map in an integrated way.

Our colleagues in China don't map independently; they map holistically. They have a different integrated mapping approach the way they map at the Federal level and similarly in Australia and Holland and a number of Latin American countries. They map using integrated techniques, and this is something I think your committee should probably look at. The idea that the NAPA study came out with is the bringing together, as the Secretary mentioned, of the geodetic mapping, but that is only the base and the beginning.

I think we need to really rethink the way American maps map its reality and does it holistically at the Federal level so that we look at the systems that we are mapping, not the parts, and we do that in a different organizational framework, and, similarly, the relationship between mapping at the Federal level and the State level, we have parametrized this rather than approaching it as an integrated approach. And, as a result, our approach to land management and open space and integrated thinking and planning and land management suffers. In fact, one of the reasons why GIS even came out was to try to bring these data sets together rather than approaching it holistically.

We see this sort of in the popular press and in the popular politics with people saying we should have water management. We should approach things on a place-based basis, which brings it all together instead of the bits and governing and so on. So, I think I am on to something with this notion of rethinking the way that we actually begin to measure all of it as an integrated whole.

Mr. HORN. Yes. I would like you to, if I might, just ask a 10-second question here, but I would like to hear more with a few examples as to the Australians and the Chinese versus us, and I completely understand what you are saying on the different bureaucracies having used the map as a way to meet their goals—

Mr. DANGERMOND. Sectorial goals.

Mr. HORN. Yes, and that budget—I am thinking of soil conservation; I grew up on a ranch, and you go into Hollister, CA, the County Seat, and there are the files and out come the photographs, and they can sort of make decisions, as they sit around the table, do they give you a loan or don't they? So, that is one use of photography.

Mr. DANGERMOND. Well, the photo is one of the bases for the compilation of the soil map, and the investment of soil mapping in this country was largely done to help the farmer, the Farm Service, and so on, and then we discovered that we could actually predict other things from it especially if we automated the maps. And in something like doing suitability mapping for a new town or for urban development, the concept is we really want to take soils as a factor and all of its predictive capabilities and overlay it with geology and slope. Say, "these areas we shouldn't build on, and these areas, we should." It is a multi-factor analysis, and, unfortunately, when we do that overlay—if you overlaid plastic maps, you might just imagine it in your mind—the lines which define a geological separation between two geologic type should actually be the same lines that are associated with the definitions of soils, which exhibit

the characteristics of their original material, but they are not, because these different phenomena are mapped at different scales, very different scales, and they are mapped with, in one case, crayolas; in the other case, high precision pencils, and they are mapped with different standards of resolution and accuracy. So, the problem for land managers in the Forest Service or in BLM or other local and State agencies who use this data is to sort of homogenize all of these data sets that have been stovepipe collected at different times, at different scales, with different standards, and it is a mess.

From a science standpoint, it is even a bigger mess as we have homogenized our reality in these little polygon areas function that if you overlay them all together and you add their characteristics, you can actually derive predictable results. Some of the science suggests that that isn't so; that you are making a mess out of this parametric approach for mapping, and if mapping is the foundation for creating the future, which I believe it is—mapped information and geographic information—and if we assume that its homogenization and coming together provides us a foundation for decision-making, which I think we have heard plenty of testimony that it is, then we had better get the fundamental measurement methodologies integrated in the first place, not just automate the stovepipes. We need to really rethink that. Sorry, Congressman.

Mr. KANJORSKI. Well, do you see an effect on the future as you look out 10 or 20 years?

Mr. DANGERMOND. What I guess I wanted to say—excuse me, I didn't conclude this—is, ultimately, this is going to be figured out and figured out in a variety of ways. We could do this more deliberately if we just realized it and got real with respect to the data and its quality now rather than sort of mushing around about it; addressed it with the right Science Committee that would really bring it together and demonstrate what I am talking about.

What is happening, actually, in the GIS community is it is really fantastic. This technology is fantastic. I have lived it for 35 years. I love it. I love this technology. What is happening, however, is that the popularity of it and its demonstrated effectiveness and results are outstripping some of the science understanding of the fundamental information underneath it. I called before for more funding in the academic area to understand GI and how it ought to be integrated and work with it. As I mentioned before, we are throwing a pittance of \$1 million a year, \$1.5 million a year, maybe \$2 million or \$3 million, if I really stretch it with NEMA and the other—into the academic funding.

I am not an academic, so I feel comfortable I can speak on this matter that we throw hundreds of millions to more fundamental work in various areas. This is an area that, if it is indeed the foundation for decision support for creating the future, we really believe that, and I do, then what the hell are we doing not investing like crazy in this technology and the information sets that are associated with it?

Mr. KANJORSKI. You are indicating there an academic investment?

Mr. DANGERMOND. I am asking that one of the pieces that is troubling me, at least, is that we are not funding academic re-

search into the GI and GIS foundations. We are doing it at a pittance level.

So, back to your question about the future: How is the future going to turn out? We can either pay now to do that fundamental work and then look at remodernizing and integrating some of our mapping programs now or we will do it later, and then we will pay by redoing all of our mapping so that it works in an integrated mode. So, should we do it now or should we do it later? If we do it later, we are going to have to redo it. We are going to have to rebuild these data sets, and it will be troublesome. I think that is—

Mr. KANJORSKI. So, potentially, we are looking at a problem that left alone and not addressed could be expensive.

Mr. DANGERMOND. Yes, right now, we are spending billions—you are spending billions at the Federal level in automating data, in parametrically defined data sets that don't actually work very well together, and we are talking about how you make them interoperable at the technical level as if that would really create some impact on the integration of science and geography. It is a scary thought, and we sort of breeze over that as a community—my colleagues and I; I am guilty of it, as well—but this is actually the thing that troubles me most.

Mr. KANJORSKI. So, we have a Y2K problem that—

Mr. DANGERMOND. We have a Y2K problem that is not as serious in terms of dramatic an event at 2000. It is more of a process of further commitment into these stovepipe systems without the integrated thinking and the mapping area. This is not about technology; it is about the way we organize to collect our measurements of reality.

Mr. HORN. If the gentleman would yield a minute, I am curious, are there any experiments going on in the Federal Government that brings people from different bureaucracies that have been doing things different ways together? Has any of that occurred on a pilot project basis without asking us for money?

Mr. DANGERMOND. There is lots of experimentation. Actually, the Forest Service is a good example.

Mr. HORN. What have we learned from that?

Mr. DANGERMOND. We have learned that in order to build integrated mapping to do range management in the Forest Service, what we do is take all the parametric maps from different agencies, and then we actually spend a lot of time reworking the data, so we can actually use it for decisionmaking in a real world. And, so there is lots of evidence to suggest that this chaos that we are sort of cruising over is actually there, and the evidence suggests that you spend a lot of money rebuilding your data sets when you actually do something real with respect to decisionmaking on geography. And that is also happening in the local governments. They will often get Federal data sets and then spend a whole bunch of time trying to standardize it to make it work. I am getting down to the dirt and technical aspects of this, but I think it is actually important that you understand this and that we acknowledge it as a problem so we can actually work on it. To be able to solve that problem, it starts with fundamental research and prototyping, but

we do have lots of evidence that the problem recurs in most people who are trying to bring the data sets together.

Do you understand what I am talking about?

Mr. KANJORSKI. Yes, I understand. You are saying rather than starting with a diseased plant, cure the disease and start with a good plant.

Mr. DANGERMOND. Right. It will take a little time and some major pain and some downhyping of it all working out.

Mr. KANJORSKI. Are you suggesting that we need sort of a Federal convention on mapping or we just do not have the academic backgrounds to begin to determine what maps should be used, and we should go back to the fundamental academic world and ask them to catch up to speed, so then we could have a convention?

Mr. DANGERMOND. If you ask the vegetation people about their mapping, they will think it is pretty damn good, and we are making better investments and evolving that methodology very well; same with the geologists and the soil people. What I guess I am pointing out is that we have a flawed way in the way that the Federal Government approaches mapping, which is, I would call it, parametric mapping versus integrated mapping.

There is some controversy in this in the scientific community, and there is certainly a lot of controversy in the agencies about "Well, I know how to map soils. I have my mission, which is agriculture. I know how to make soils and never mind the fact that soils are best conceived in a holistic way." So, there is some controversy about that.

You are asking me what to do? The first thing that we need to do is actually hold a convening session which reveals this problem that is underpinning a lot of the hype of GIS and its application that drill into it. There have been national committees on mapping that have gone on for years, but it is all about getting clear on the features that go on maps and then separately mapping these and not doing as much coordination as I would like.

I am absolutely sure that I am exaggerating the point to make a point. I will bet there are many fine efforts in the map homogenization and coordination going on. Nevertheless, this is a little problem that is there that is going to be an obstacle for us to create this future I was suggesting is going to happen in 20 years. So, it might as well come out now; I have done it. Excuse me. My colleagues—some of them agree and don't agree.

Mr. KANJORSKI. Mr. Miller, it is interesting that you testified about your contribution to Sears & Roebuck and the amount of moneys you were able to save reducing delivery windows to 2-hours and mapping warehouse worker movement. I see that incentive there for the private sector, because there is a response back to the shareholder—it flows out to management and then to the shareholder.

A problem in Government, I look at this tool as probably our greatest opportunity for increasing productivity in the public sector, and, actually, I want to put in the record and call the chairman's interest, because it raises the question of winners and losers. As this technology gets applied in the private sector, you are using less gasoline, less tires, et cetera, but you are paying for those tires, and you are making the decision you want to do those things.

In the governmental side, I often find that there are interest groups that even when confronted with logic and efficiency, look at it as a threat to their own well-being. An example would be the control at one time of the airlines. The Postal Service helped subsidize the activity of airplanes, private airlines.

Not too long ago—about 6 years ago—a very bright colonel, full colonel from the Pentagon, called me up and came over and met with me, and he wanted to indicate to me that he could save anywhere from \$200 million to \$400 million a year immediately for the U.S. Government, and so he came by with his computer, and it wasn't too dissimilar to what I see in GIS sometimes in that he had structured the military airlines, the American Military Airline Club—it is the largest airline in the world—that we could probably transport 75 to 80 percent of Government civil employees if we just coordinated their schedule with the military airline schedule on drop-off points. There is something like 1,400 planes a day in the sky that were federally owned, paid for, and were going there regardless. Rather than putting someone on a commercial flight from Washington to L.A., you could put them on a military flight and get them there and save all of the money. But it was interesting. The pressure that was brought on him and that whole program was from the private sector. They said, "No, that is our passenger; you have to pay for him."

So, at that time, there wasn't the drive, but now, as I look around and I see the failure of having passengers stopped at some of our major airports on the east coast and the west coast, maybe we will go back and reinvestigate the possibility of bringing this type of efficiency to Government. But that is an example, I think, of—your example in private industry, the example that colonel brought to me, and so many areas, whether on a local governmental level, State, or Federal, that for the first time in our economy we have a tool available for efficiency and increase in productivity; not probably as gigantic as it will be in some private matters, but certainly far more than we have ever experienced in recent times in Government, and I would think that is why we probably should have bipartisanship on this, because, to my knowledge, there is no one, whether they are on one side of the aisle or the other, who is against efficiency and effectiveness, saving money, and getting the job done more effectively, and, clearly, we all represent the same constituents out there, and that is why I was so pleased about having this hearing.

I am sure my friend, the chairman, is very much aware of the changes to GIS, but I think he will agree with me that not many of our colleagues are, and I hope that the hearing we have had today will be able to draw this out, and I know we have had the experts, this panel of senior executives, Mr. Chairman. So, the fact that they sat here all afternoon and gave of their time to this and listening to the broad perspective, I think it has been certainly enlightening to me. I hope it has been for you.

Mr. HORN. Absolutely.

Mr. KANJORSKI. This transcript may enlighten our other colleagues and maybe we can move the Congress to get something done in a bipartisan way.

Mr. HORN. Well, this is a small building block, but I think it has been a long step, and I particularly want to visit that Reston facility that was mentioned by some of you. So, if you could give me that information, I would like to go out there with any members that Mr. Kanjorski and I can find within the building and maybe go out on a Friday afternoon or a Friday morning when we are not doing much. But I would like to see what is happening there.

So, do you have any more questions?

Mr. KANJORSKI. No.

Mr. HORN. Well, I think you ended this hearing on a good note, and we do respect and thank you for the talent that you bring to this problem, and I know there is a lot of interested people out there. Usually, when the cabinet officer is here, the place is full. As soon as the cabinet officer leaves, everybody else leaves, and there is 10 faithful souls or something. Well, you have had about 50 to 150 souls today.

So, I know there is a lot of talent out there, and all I can say if there are things you would have liked to say, just write me, care of this subcommittee: chairman of the Government Management, Information, and Technology Subcommittee, room 2331, Rayburn House Office Building. We will turn it over to staff to integrate it in the report, and we welcome any ideas, and I thank you again for all of you that have participated and those of you that have sat nicely and we are sorry that our colleagues are in the Defense authorization floor today. That is what we are missing on both sides of the aisle.

So, thank you again, and, with that, this hearing is adjourned. Oh, I do have the staff list here somewhere, so let me just say Russell George, staff director, chief counsel—don't know if he is here—Matthew Ebert, to my left, your right, is the policy advisor on this hearing; Bonnie Heald is seated back there, director of communications; Grant Newman, staff assistant; Paul Wicker, intern; Justin Schlueter, intern, and for the minority, Faith Weiss, minority counsel; Earley Green, minority staff assistant, and we had more than one court reporter, I believe, didn't we? Oh, just Ron Claxton. Well, you are a brave soul, and you ought to get hazard pay for something like that.

But, with that, we are adjourned.

[Whereupon, at 4:36 p.m., the subcommittee was adjourned.]

[Additional information submitted for the hearing record follows:]

“Geographic Information for the 21st Century:
Building a Strategy for the Nation.”

Testimony of National States Geographic Information Council

Before the

Subcommittee on Government Management, Information and Technology

Committee on Government Reform and Oversight

US House of Representatives

June 21, 1999



Washington Offices
1225 New York Ave. N.W.
Suite 350
Washington, D.C.
20005-6156
t: 202.628.9724
f: 202.628.9744
e: NSGIC1@AOL.COM

June 21, 1999

Chairman Stephen Horn
House of Representatives
State of California
Committee on Government Reform
2157 Rayburn House Office Building

Dear Chairman Horn:

As Chairman of the Subcommittee on Government Management, Information, and Technology, The National States Geographic Information Council (NSGIC) would like to thank you for holding the hearing, June 9, 1999 on "Oversight of Geographic Information Systems (GIS) and Programs." Your leadership on educating and focusing Congress toward addressing issues regarding the National Spatial Data Infrastructure (NSDI) is commendable.

The attached documents provided by NSGIC are illustrative of the goals, objectives, and direction of our organization of states, and highlight the essential role states play as stakeholders in building and sustaining the NSDI.

NSGIC is looking forward to the continuation of Subcommittee efforts, and offer our assistance in providing to you any information, or perspectives that will help all of us in advancing this critical infrastructure.

Sincerely,

A handwritten signature in cursive script that reads 'Sheryl Oliver'.

Sheryl G. Oliver
President-elect, NSGIC

NSGIC



National States Geographic
Information Council

Washington Offices
1225 New York Ave. N.W.
Suite 350
Washington, D.C.
20005-6156
t: 202.628.9724
f: 202.628.9744
e: NSGIC1@AOL.COM

**RESOLUTION OF THE MEMBERSHIP OF THE NATIONAL
STATES GEOGRAPHIC INFORMATION COUNCIL**

In Council Assembly this 14th Day of March, 1999

WHEREAS: The President has proposed a Community/Federal Information Partnership (CFIP) Federal budget initiative for fiscal year 2000 to assist the implementation of the National Spatial Data Infrastructure (NSDI) and

WHEREAS: The Initiative has two components

- 1) Provide funding for grants, partnerships and cooperative agreements among federal agencies and communities for projects that implement components of the NSDI
- 2) Provide funding to federal agencies to improve their ability to provide information that meets community needs or to fully participate in the NSDI and

WHEREAS: The purpose of the National States Geographic Information Council (NSGIC) is to "encourage effective and efficient government through the coordinated development of geographic information and technologies to ensure that information may be integrated at all levels of government and

WHEREAS: NSGIC believes that the CFIP initiative is consistent with the goals of NSGIC and the development of NSDI in support of communities.

THEREFORE, be it resolved by the NSGIC board:

- 1) NSGIC supports the Community/Federal Information Partnership initiative and its efforts to implement the components of the NSDI at the community level.
- 2) NSGIC encourages FGDC member agencies to consider state needs and their leadership role in partnership building to the regional/county/and local levels of government in states in the development of products and services.
- 3) NSGIC encourages the Office of Management and Budget to continue to provide oversight and support of the FGDC and the CFIP initiative.
- 4) NSGIC recommends that the U.S. Congress fully fund the CFIP initiative being put forth by the President in the fiscal year 2000 budget.

**National States Geographic Information Council
Comments On a NAPA Report
"GEOGRAPHIC INFORMATION FOR THE 21ST CENTURY:
BUILDING A STRATEGY FOR THE NATION"**

The issues that surround geographic information; its development, integration, and access are of everyday concern to the membership of the National States Geographic Information Council (NSGIC). For the past eight years, the Council has invested in its mission to "truly impact the delivery of effective and efficient government services in individual states and their constituent local governments, and at the national and global levels..... for the coordinated development of geographic information and technologies.....".

Many on the panel of the National Academy of Public Administration (NAPA), and sponsors of this study are familiar with the goals and objectives of NSGIC and the partnerships and activities that have been forged over the years. Therefore, NSGIC welcomes this important and timely document and would like to take this opportunity to advance a position on the NAPA report "Geographic Information for the 21st Century: Building a Strategy for the Nation".

NSGIC has followed the NAPA study from its inception. Many states were interviewed or contributed in other ways to the research and development of the study. The NSGIC President and three board members were participants at the U.S. Geographic Information Resources Conference, sponsored by the NAPA panel. The NSGIC membership analyzed the NAPA report and found strong alignment between its recommendations and NSGIC's mission, and complete consistency with several elements of NSGIC's strategic plan. After thoughtful consideration and debate, we offer the following commentary on specific NAPA study recommendations:

"State and local governments should establish GI coordinating groups or focal points responsible for serving as the points of contact responsible for NSDI coordination and cooperation."

We agree that the NSDI should be immediately and fully implemented and that states will play a critical role in making that a reality. With shrinking state and federal budgets, resource sharing is the only way to accomplish our ends. States have a better ability to garner advocate support from within their boundaries because states understand more of the issues important to their legislatures and local governments. The states are well-positioned to then negotiate data sharing and joint funding agreements with federal agencies and the private sector and act in a liaison capacity from the federal level to the state and local level. We agree that the private sector should be incorporated into the process whenever practical. We contend that the federal policy of open access should be maintained and that state and local governments should also make those decisions based on legislative actions in each individual state, as many of them already have.

"Create a private, nonprofit NSDC modeled on the current FGDC and NSDI charters, with appropriate representation by all levels of government and the private sector"

The Council heartily supports the concept of an NSDC and feel strongly that NSGIC should be part of the charter of such an organization. However, attention should be paid to the structure and function of such a

group. A permanent, full-time entity is needed and thought should be given to changing the proposed name to reflect this, such as "center", "association", or "institute".

"In order to aid in reconciling conflicts and to monitor agency implementation, designate the OMB program associate director for natural resources, energy, and science to be a full member of the FGDC.

To maintain a broader technology perspective to the FGDC, a senior staff member of the Office of Science and Technology Policy should also be a member of the Committee."

It is reasonable to designate an Office of Management and Budget(OMB) program associate director for natural resources, energy, and science to be a full member of FGDC. It is critical that OMB become involved as a player as well as, a representative from the Office of Science and Technology Policy (OSTP).

"Further increase state, local, and tribal government participation in the FGDC and encourage stronger involvement by the private sector.

Encourage active participation in FGDC by all agencies having major GI-related programs, including NASA and DOD."

State and local participation in the FGDC needs to expand. The future of geographic information related issues depends on the ability of the entire GI community to work together, and the states now play - and will increasingly play - a vital role. We support the call for increased participation in the NSDI by sub-state jurisdictions, and their active representation in NSDI discussions by the National Association of Counties (NACo), The National League of Cities (NLC), and other representative organizations. We strongly support active participation in the NSDI by major GI-related programs by such as the U.S. Department of Defense (DOD) and National Aeronautics and Space Administration (NASA). Our work will continue to cross-over both agencies at an increasing rate as high resolution DOD satellite data become unclassified and commercial satellites make remotely sensed data more accessible and affordable to states.

"NIMA and NASA should ensure that FGDC members are made fully cognizant of technological developments applicable to civil government needs.

To further civil government applications, the technology development programs of NIMA, the National Reconnaissance Office, and NASA should be coordinated and undertaken jointly, whenever possible, with civil agencies."

A policy level committee that includes the leadership of the Department of the Interior, National Imagery Mapping Agency (NIMA), the National Reconnaissance Office, the Central Intelligence Agency (CIA) and other members who will help in the declassification of high-resolution imagery and share it with state and local governments would save governments immeasurable funds. NSGIC is very much in favor of such activity and is willing to participate by serving on a designated committee.

"Consolidate base geographic information functions into a New Geographic Data Service "

Federal reorganization efforts to incorporate GI functions currently housed in the Departments of Commerce, Interior, and Transportation into a Geographic Data Service (GDS) is a recommendation we expected to see included in this study. We concur with the panel that the objectives behind this recommendation are sound and must be achieved in order to better align federal GI programs and

activities toward effective realization of an NSDI. However, NSGIC proposes that alternative strategies toward achieving the same set of objectives be pursued before a reorganization is considered to be the best solution.

"Use the Results Act as a tool for coordination "

The concept that federal agencies and their field offices should move forward with coordinated NSDI goals, strategies and performance measures is one with which NSGIC agrees. Further, the GI portion of their budgets should be coordinated through the Government Performance and Results Act (GPRA) – this would go a long way in helping coordinate the building of GI and NSDI in the United States. NSGIC recommends that federal agencies document measurable goals and progress toward the creation of NSDI in the context of their annual GPRA plans.

In summary, NSGIC applauds the NAPA panel for undertaking a difficult and pertinent set of questions regarding geographic information in the United States. The recommendations will most certainly move the NSDI, and, in fact, all of the GI community forward. We strongly support more involvement of the states in this process.

If NSGIC were to select one recommendation from the NAPA study to emphasize the concept that states are critical players in the creation of the NSDI, it would be:

"Interagency, intergovernmental, and private-sector GIS users and producer groups, whose cooperation is essential to implementing NSDI should continue to meet to encourage and accelerate the development, cooperation, sharing, and maintenance of NSDI framework data files. These groups should be relied on to negotiate additional data sharing and joint funding agreements".

The membership of NSGIC could not agree more and stands by ready to participate in the development of the NSDI in any and all relevant ways.

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National States Geographic Information Council Strategic Plan

The **National States Geographic Information Council** (NSGIC) first convened at an informal meeting of thirty-nine states in Atlanta, Georgia in the fall of 1991, and was formalized as an organization of states by the adoption of bylaws the following year in Santa Fe, New Mexico. NSGIC was created as a forum for exchange of information and the development of consensus to advance the interests of states. The council enjoys the support and active participation of federal agencies, the private sector, academia, and professional organizations representing a variety of interests.

The purpose of NSGIC is *"to encourage effective and efficient government through the coordinated development of geographic information and technologies to ensure that information may be integrated at all levels of government."*

NSGIC Activities

- **Policy** -- NSGIC provides a unified State voice on geographic information and technology issues, advocates State interests, and supports the membership in their individual initiatives.
- **Liaison and networking** -- NSGIC promotes interaction and cooperation among Council members, federal, tribal, local and regional governments, professional associations, and public and private sector groups.
- **Research** -- The Council studies and provides a forum for examining geographic information issues.
- **Education and public relations** -- NSGIC develops and helps others develop, a variety of educational programs and materials through a variety of media to enhance and promote discussion of ideas regarding geographic information management and integration.

The following vision statement for NSGIC underpins this strategic plan:

"The National States Geographic Information Council, through its membership, will truly impact the delivery of effective and efficient government services in individual states and their constituent local governments, and at the national and global levels. By providing to its members and partners information, tools, opportunities and innovative ideas for the coordinated development of geographic information and technologies, NSGIC will empower these entities to positively influence public decision-making."

STRATEGIC GOALS

- I. **Establish effective channels of communication between the NSGIC membership, Board of Directors, and others who share our interests.**
 - A. Improve and maintain Internet communication methods to ensure timely dissemination of information and encourage improved use by the membership.
 - B. Maintain, continuously improve and provide contact list information as required for official NSGIC business and to disseminate information to the membership.
 - C. Provide a method to schedule cost-effective on-demand conference calls for official NSGIC business.
 - D. Produce a cost-effective newsletter three times per year in order to provide outreach to those individuals without electronic forms of communications.
 - E. Develop and maintain electronic and physical archives to preserve the "institutional" knowledge of NSGIC and its electronic and physical documents.
 - F. Provide meeting and training opportunities for the membership as directed by the Board.

- II. **Make efforts to assure that GIS programs and geospatial infrastructure of individual states are strong and diverse.**
 - A. Advocate the creation of state geographic information coordination councils where they do not exist; and champion the cause of existing councils.
 - B. Guide and counsel Governors, Legislatures, Chief Information Officers, and other state officials on geographic information policy and technology.
 - C. Recruit participation from all public, private, and professional sectors within the state.
 - D. Adopt and implement national, state and local standards for computerized mapping and geographic information technology.
 - E. Promote the development of GIS curricula and educational programs in schools and universities.
 - F. Identify and investigate funding opportunities for state GIS activities including general revenue sources, grants, cooperative partnerships, corporate donations, cost recovery, etc.

- III. **Provide opportunities and mechanisms for states to partner with Federal agencies to build the NSDI.**
 - A. Continue interaction with the Federal Geographic Data Committee (FGDC) to address national issues.
 - B. Stay involved with national activities that affect state activities such as National Academy of Public Administration (NAPA), National Satellite Imagery Archive Advisory Group, National Academy of Sciences (Mapping Sciences Committee), etc.

- C. Maintain participation in the FGDC coordination structure by formal representation on the Steering Committee, Coordination Group, and appropriate Working Groups.
 - D. Continue to improve working relationships with Federal representatives.
 - E. Determine mechanisms for NSGIC to more effectively work with individual agencies at a national level in support of NSDI and individual state efforts.
- IV. **Provide opportunities and mechanisms for states to partner with other states -- as well as with local, tribal and other jurisdictions -- to build the NSDI.**
- A. Increase interaction among neighboring states through joint projects, cooperative partnerships, mentoring exercises, educational exchange programs, conference sponsorship, and other means.
 - B. Work more closely and establish strategic alliances with other governmental advocacy groups and NSDI stakeholder organizations.
 - C. Encourage states to work with their state associations of sub-state government to identify contacts to coordinate activities and document successful alliances to build a nested NSDI.
 - D. Help states provide assistance to sub-state governments and organizations.
 - E. Participate in defining the National Spatial Data Council.
- V. **Collaborate with national, state, tribal and local non-governmental organizations to build the NSDI.**
- A. Participate in NSDI initiatives.
 - B. Provide assistance to states.
 - C. Establish and maintain strategic alliances with other NSDI stakeholder organizations (e.g. FGDC, NACo, NLC, UCGIS, IAAO, URISA, ACSM, ASPRS, and others) (ongoing).
 - D. Promote NSDI concepts and support participation among the NSGIC membership and spatial data community at large (ongoing).
- VI. **Advance research in geographic information sciences and spatial data infrastructure.**
- A. Establish and maintain list of priority policy and technical research topics for NSGIC.
 - B. Pursue research funding
 - C. Build and strengthen relationships with research-oriented organizations

- VII. **Identify international opportunities related to GIS and spatial data infrastructures which may be of relevance to states.**
 - A. Develop organizational and peer exchanges.
 - B. Arrange publication of information from the NSGIC newsletter in professional magazines and journals of GIS associations and organizations in other countries and regions of the world.
 - C. Monitor and participate in relevant work of the International Standards Organization, particularly ISO/TC 211.

- VIII. **Provide quality administrative and technical support to the Board, committees, and members.**
 - A. Periodically review and contract for the services of professional/technical/administrative staff.
 - B. Ensure that NSGIC has a stable base of funding that is derived from multiple sources.
 - C. Provide NSGIC administrative office with sufficient guidance and technical assistance to help ensure excellence of support services and quality technical support.

- IX. **Enhance the viability and credibility of NSGIC.**
 - A. Educate governors and congressional leadership about NSGIC.
 - B. Promote public understanding of NSGIC and geographic information and technology issues through a variety of media.
 - C. Seek acknowledgment of the role states play in national GIS initiatives from federal and regional (e.g. Western Governor's Association) entities.
 - D. Attempt to recruit all 50 states as NSGIC members.

Community/Federal Information Partnership



Community Solutions Through The National Spatial Data Infrastructure

An Interagency Proposal To Advance the National Spatial Data Infrastructure

**Coordinated by the
Federal Geographic Data Committee**

June 1999

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Community/Federal Information Partnership:**Community Solutions Through The
National Spatial Data Infrastructure**

**An Interagency Proposal To Advance the National Spatial Data Infrastructure
Coordinated by the
Federal Geographic Data Committee
May 1999**

INTRODUCTION:

Our nation's communities are addressing a wide range of complex economic, social and environmental issues. Geospatial data plays a key role in helping communities synthesize information relevant to these issues, unfortunately data are often difficult to locate, obtain, and integrate. Geography creates the unifying element that brings people together to identify key issues, develop a vision, set goals and determine the actions necessary to improve their community. The Glen Canyon Restorative Flood project shows the value of a geographic information system (GIS) in this collaborative process. The Department of the Interior received 33,000 written comments that identified 2,300 separate concerns about this flooding that was designed to restore spawning areas downstream of the Glen Canyon Dam. GIS played an important role by enabling stakeholders to keep abreast of their concerns, but more importantly to see the totality of the situation--to place their concerns in context with those of other stakeholders and reach consensus. Geographic information is the key because with it citizens and communities can better address the challenging issues they face. Coordinated geospatial data from all levels and sectors that is produced, integrated, and made readily available to all citizens can empower communities to move toward consensus rather than conflict.

The nation's communities are re-discovering that geography is important. In 1998, for example, New York State set aside \$1 million for state-wide cancer mapping in response to citizens concerns about the environmental risks that can cause cancer. This mapping effort, the first such program in the nation, was sought by cancer survivors to help identify environmental risks in their communities. Communities need geospatial data to address issues of concern like cancer. As a nation we need to respond to the importance of developing and using geographic information to help our communities deal with these complex issues.

The National Spatial Data Infrastructure (NSDI) offers a mechanism to link technologies, policies, standards, and resources necessary to improve the way geospatial data is acquired, stored, processed, disseminated, and used. The *Strategy for the National Spatial Data Infrastructure* published in April 1997, creates a vision of the NSDI that "Current and accurate geospatial data will be readily available to contribute locally, nationally, and globally to

economic growth, environmental quality and stability and social progress.” This vision will be realized only when federal, state, local and tribal governments and the private sector and academia are working collaboratively to develop integrated geospatial data and promote better access to this data to improve the decisions affecting the nation’s communities.

The initial development of the NSDI responded to a recommendation contained in the Vice Presidents’s National Performance Review of 1993 and has involved activities by federal agencies and many organizations outside the federal government, including the National Research Council (NRC). These have resulted in considerable progress but much work remains. The 1998 report from the National Academy of Public Administration *Geographic Information for the 21st Century* follows a 1993 study by the NRC, *Toward a Coordinated Spatial Data Infrastructure for the Nation*, both of which endorse vigorous development of the NSDI. The need for geographic information is booming, some have called it a geospatial revolution. Now is the time to ensure progress among all sectors by investing in our NSDI, because with it our nation can improve the opportunity for all citizens to participate in community-driven solutions while better meeting crucial Federal responsibilities. This progress in implementation of the NSDI will also serve to continue to keep the United States in the forefront of global spatial data initiatives and will support an emerging global spatial data infrastructure.

PROPOSAL

The Community/Federal Information Partnership is designed to make geospatial data available for use by governments, businesses, academic organizations and citizens to use in addressing everyday and long-term issues. A component of the Administration's Livability Agenda, the Community/Federal Information Partnership seeks to promote collaborative decision making at the community and regional level by providing the resources, tools, and information for community members to make well informed community and regional planning choices.

The proposed four year initiative, beginning in FY2000 with \$39.5 million, has two integrated components. The first is a grant, cooperative agreement and partnership program to advance the capacity of communities to create and use geospatial data for sound decision-making. The second component is a series of actions to improve federal agencies’ capabilities to meet community information needs by further implementing the NSDI. Working together, these two efforts will result in a comprehensive, integrated, nationwide NSDI that is kept up-to-date and is accessible to all Americans and will serve to help keep the United States in a leadership position in global spatial data management and use.

GOALS AND OBJECTIVES

The long term goals of the *Community/Federal Information Partnership* are to help promote:

- informed decision-making at the community level

- improve land and resource use
- a more informed public
- greater opportunities for public participation in decision-making
- ready transfer of data between the Federal government and communities
- contributions of communities to data sets of national and global interest

In support of these goals, the initiative has three major objectives:

- 1) stimulate local and regional and national entities to engage in community-based geospatial data collection, sharing, and use;
- 2) build federal agencies capabilities to meet their responsibilities for NSDI implementation, particularly the transfer of geospatial information to communities; and
- 3) ensure that every local government jurisdiction in the nation has the technical infrastructure, data access and training to meet their basic needs to use geospatial data to make informed place based decisions.

The two components of the *Community/Federal Information Partnership* are:

I. Advancing the Capacity of the Nation's Communities to Create and Use Geospatial Data

This component would provide a multi-agency grant, cooperative agreement and partnership program to support community-based efforts to build the NSDI. All projects would require a contribution from the participating non-federal partners sufficient to demonstrate commitment. Multi-jurisdictional proposals (i.e. multi-county, city/county, local/state, private/public etc.) and proposals that compliment the relevant objectives of the Livability Agenda for grant, cooperative agreement and partnership projects are particularly encouraged. These types of projects support the goals of the NSDI for building networks of organizations and can lead to efficient cost-effective data collection sharing and use. Activities supported through this component will include:

- Building the capacity to access data and to use Geographic Information Systems technology. This would include software and hardware, metadata development and collection, clearinghouse activities, and local standards development. This also would include participation in standards development activities at the federal or state levels, the coordination of data collection activities of organizations to provide for a more consistent approach to building the NSDI, and the implementation of Federal Geographic Data committee (FGDC) Data standards where available or other commonly agreed to standards for data content when FGDC or national standards are not available for use. Included are activities to organize and improve the use of existing data or enhance the data collection activities of ongoing programs to provide data that is appropriate to community needs and can be integrated with other data. Data sets included are:

- NSDI Framework Themes - Framework themes are geographic data themes used by most organizations such as geodetic control, orthoimagery, elevation, transportation, hydrography, governmental units, and cadastral information.
- Other Priority Themes - Among the numerous other geographic data themes watershed boundaries, flood plains, earth cover, soils, natural hazards, wetlands and shoreline have been identified for priority attention by this initiative.

- Research, developmental or implementation activities to support architectures and technologies that enable data sharing or that address institutional, policy or economic issues that will support implementation of the NSDI.
- Use of integrated decision support tools to aid decision-makers in analyzing, visualizing or determining probable effects of decision.

This component will be funded pursuant to a consolidated announcement developed by FGDC member agencies and appropriated to individual agency accounts. The program will be announced by a joint Request for Proposals (RFP) that will be issued through the auspices of the FGDC. The RFP will describe the overall objectives and parameters of the initiative. Each of the participating agencies will have a program element that is part of the RFP which supports the initiative through the mission of the agency. Agencies are encouraged to join together to identify and support crosscutting program elements that are relevant to more than one agency. Each of these program elements will further describe the specific funding agency, project criteria, submittal requirements, and other information needed by prospective applicants.

The grants, cooperative agreements and partnerships will be selected through a criteria and performance based award process and will be administered through the funding agency. Recipients may be tribal, local, or state government agencies, government corporations, from the private sector, non-profit organizations or academic institutions. Awards will only be made for activities that support the implementation of the NSDI in a manner that builds networks of organizations linked through commitments to solving problems of common interest to the community. Projects that partner with federal agencies, particularly those of the FGDC are encouraged in order to leverage existing program activities. The project funds will be distributed and administered by the individual agencies of the FGDC and coordinated by the FGDC Steering Committee.

II. Improving Federal Agency Capabilities to meet community information needs

This second component provides funding for FGDC member agencies to use specifically for critical agency tasks to enhance their ability to support the advancement of NSDI goals pertaining to communities. This component includes: the use of metadata standards to document all new geospatial data sets as well as high priority existing data sets and the use of the NSDI

Clearinghouse to provide access to agency geospatial data. Agencies also will use these funds to develop and implement data standards that are important to improve the transfer and use of data by communities, to organize and integrate data and make it available to communities. Equally important, this component includes outreach and education programs to increase the awareness and understanding of the NSDI by agency employees, and activities to understand community and stakeholders needs for geospatial data.

This component supports the Goals of the NSDI Strategy with emphasis on federal agency responsibilities and their internal capabilities to support improved documentation, access, and delivery of geospatial data. It will be funded through individual agency appropriations. Activities to be funded must be consistent with the NSDI and also be included in the agency's Government Performance and Results Act plans. While these activities will be part of individual agency plans, they will be integrated into consistent federal agency actions that will be coordinated through the FGDC Coordination Group and the FGDC Executive Secretariat.

EXISTING PROGRAMS

There are many Federal programs that rely upon non-Federal contributions to advance the use of geospatial data. Examples of these programs include: The Soil Survey Program, The One Stop Reporting Program, and the State Advisor Program, Community 2020, and the National Mapping Program.

The Department of Agriculture's Soil Survey Program involves partnership with Federal, state, and local units of government that provide soil survey information necessary for managing, conserving and sustaining the nation's soil resources. These surveys provide a scientific inventory of soil resources which includes detailed maps. These soil surveys, with their maps, provide basic information to manage soils and are important to planners, engineers, and homeowners, as well as agricultural producers. As digital soil information is developed, it must be part of a uniform system for geospatial soil resources.

The One Stop Program, EMPACT, and other EPA grant programs partner with states and communities to improve reporting and management of environmental data. Despite efforts to improve data systems and incorporate geographic information systems (GIS) capabilities, often these systems lack the integrated data needed to detect and prevent pollution. Communities, States and the Environmental Protection Agency (EPA) are expanding their use of GIS capabilities to integrate geospatial data with other data. A number of governmental entities have begun major efforts to reform environmental reporting processes and data management systems. The One Stop Program and other programs provide grants to leverage state and local resources into developing a long-term plans for effective environmental reporting and management. This includes enhancing public access to this environmental data.

The State Advisor Program provides regional outreach and technology transfer enhancing access

to the Geodetic Control Network. The purpose of the program is to provide liaison between National Oceanic and Atmospheric Administration's National Ocean Service (NOS) and a host state, with a jointly-funded NOS employee residing in the state to guide and assist the state's charting, geodetic, and surveying programs. The program is designed to fill a need for more accurate geodetic surveys, and is in response to states desiring to improve their surveying techniques to meet Federal Geodetic Control Subcommittee (FGCS) standards and specifications. The advisor also trains and assists state personnel in the preparation of survey data in a format compatible with FGCS standards and specifications.

Community 2020 is a GIS product that was developed through a partnership between the Department of Housing and Urban Development and the private sector to describe the location, type, and performance of HUD-funded activities throughout the United States at scales ranging from neighborhoods to regions. In 1996, HUD's Consolidated Plan and the software systems that support it were a recipient of the Ford Foundation's Kennedy School of Government's Innovations in American Government Award. HUD's goal for Community 2020 is to expand community participation in the development of HUD's 5-year Consolidated Plan covering nearly \$7 billion in annual expenditures in nearly 1,000 cities and counties.

In the U.S. Geological Survey, the National Mapping Program leverages federal, state, and local government agencies' investments in accurate map and remotely sensed information. The result is a common, consistent base map needed for community-based decision making. This base map also provides a framework through which additional information can be registered, integrated, and reused. Examples of these data include orthoimage data of the earth, on which many organizations collect data and register observations; and hydrography data, to which organizations spatially register and model information about water quality and quantity, along with biotic, and other characteristics of streams and lakes.

These programs recognize the value of geospatial data and along with many others are moving to improve their collection, dissemination, sharing and use of geospatial data. However there are critical shortfalls in the capability of agencies and communities to obtain and use the data needed to address the challenges they face. For example, the FHWA has a massive highway infrastructure program, yet building a coordinated national transportation geospatial framework is a new program area not specifically identified under the Transportation Equity Act for the 21st Century (TEA-21). In another program critical nationally and locally, millions of dollars are spent on studies and assessments of Superfund sites but little funding is available for ensuring long term usefulness of geospatial data. Environmental assessments are conducted by all sectors and range from site specific to regional level analyses. However little of the geographic data developed for environmental assessment or impact statements is available for more than a one time use. This initiative will help these and other existing programs implement the NSDI as well as provide an Information Infrastructure that will support future programs at the federal, state, local or tribal levels.

JUSTIFICATION

Economic Benefits

The heart of the proposed initiative is a multi-agency grant, cooperative agreement, and partnership program to support community-based efforts to build the NSDI. The benefits that can be expected from this program can be estimated based upon the actual benefits obtained from similar programs conducted in the past. The projects that would be funded by the proposed initiative are similar to those involved in the NSDI Competitive Cooperative Agreements Program (CCAP) a relatively small program of approximately \$2 million per year initiated in 1994. CCAP activities are consistent with action items contained in the NPR Report on the Department of Interior that accompanied the Report of the National Performance Review and with recommendations contained in the National Research Council 1994 report, *Promoting the National Spatial Data Infrastructure Through Partnerships*. Through 1996, CCAP had provided funding for 62 projects. The FGDC examined the benefits obtained from these projects and issued a report, "Impacts of the NSDI CCAP", September, 1997. This report reflects:

- Most participants (74%) stated that their projects had made geospatial data more accessible
- "Has inspired several of our clients to open up their data to the GIS user community"
- In almost all (98%) of the projects, partnerships started in the project are expected to continue beyond the agreement period
- Benefits grow over time: for projects started in 1996, 24% reported benefits greater than expected, while for projects started in earlier years, 41% and 57% reported benefits greater than expected
- More than half (60%) are aware of other organizations that have instituted similar efforts as a result of their project work
- CCAP funding was a significant factor in the success of the projects.

CCAP provided seed funds which resulted in significant and growing benefits in terms of improved accessibility and increased use of geospatial data. Illustrative of the benefits that can be achieved is the experience of the North Carolina Center for Geographic Information and Analysis.

- In 1994 a clearinghouse with compliant metadata was established. The clearinghouse was accessed 299 times that first month.
- The number of times accessed grew to an average of 2267 times per month in 1996 and 13,745 times per month through the first four months of 1998.
- This is a six-fold increase in use of the clearinghouse in less than three years.

Projects aimed at improving Federal agency capabilities to meet community information needs are expected to generate significant benefits that will support community-based efforts to build the NSDI. This is because of the great volume, extensive geographic coverage, and wide applicability of Federal geospatial data sets. Illustrative of the benefits that can be achieved is the

experience of the Fish and Wildlife Service's National Wetlands Inventory Project.

- Wetlands data from the NSDI was first made available on the Internet in 1995
- In the 13 years prior to this, the FWS sold an average of 2,920 wetland map files per year
- In the 3 years on the Internet, an average of almost 135,000 data files per year have been downloaded
- This is more than an order of magnitude increase in the public's use of the wetlands data

Investments are needed to support needs of Federal agencies. For example, in 1998 Interior agencies stated needs for \$154 million in data production. Currently, there are \$11 million available to satisfy this demand. These resources are currently extended through partnerships with other organizations, but the resources available for partnerships fall far short of the total required to meet the need. Additional resources to expand capacity for partnerships would provide data to meet federal agencies' needs as well as data required by state and local programs.

An important sector that could benefit is the strong commercial Geographic Information (GI) industry that has developed in the U.S. and that is globally competitive. The U.S. is estimated to export about \$1 billion in GI hardware and software. The U.S. efforts to build NSDI have served as a model for initiatives in the European Community and Japan. Further, the U.S. industry is believed to dominate the global GI market. In general, the GI industry benefits from Federal efforts to make geospatial data more accessible and shareable. This initiative would stimulate competitiveness in the U.S. GI industry since stimulating NSDI also leads to benefits in the commercial sector.

A study conducted by the USGS focusing on the GIS in Government found that the use of GIS is growing. The number of government organizations that are starting to use GIS is increasing, and the rate of growth is increasing. Further, the use of GIS within an organization continues to increase after the initial start-up. Most benefits accruing to GIS in the startup phase are usually attributed to efficiency benefits, while more complex applications of GIS, including new uses of geospatial data--uses that were previously impossible, take some time to evolve but can lead to large effectiveness benefits. The benefits from GIS are likely to grow as the organizations and people gain new insights into using geospatial data to address community issues. An important finding of the USGS study was that 60 percent of GIS users indicated the GIS outputs resulted in better decision making. Thus, this initiative could stimulate benefits from the growing use of GIS and, over the long term, lead to compounded benefits as the diffusion of GI influences community decision making.

Geospatial data is involved in much of our economic activity, the 1998 NAPA report estimates that \$3.5 trillion is spent in major sectors of our nation's economy which are impacted by Geographic Information (GI). This is about half of the total economic activity of our nation. Further, the NAPA report estimated the total commercial data and information market for North America in GI to be \$4.2 billion. In addition, an FGDC study estimated Federal agencies spend

about \$4 billion on GI. While these numbers do not indicate the benefits derived from GI, they do suggest that the nation is using and benefitting from geospatial data. To fully realize the benefits of GI we must avoid the creation of disjoint geospatial data, and thus the goal of this initiative is to leverage, through cost sharing incentives, these existing resources to make geospatial data compatible and shareable for the benefit our nation's communities.

Programmatic Relationships

The experiences described above lead the Federal Geographic Data Committee to conclude that the Competitive Cooperative Agreements Program (CCAP) has been an effective pilot project for the C/FIP program that is now being proposed to support a wide range of Federal programs. The initiative would comply with the mandates contained in the National Spatial Data Infrastructure Executive Order (12906) of April 11, 1994, including:

- Development and use of The National Geospatial Data Clearinghouse - The Clearinghouse is the distributed network of data producers and users, that is being used for discovery and access to standardized metadata and geospatial data. It uses the Internet, internationally accepted protocols and standard methods that enable spatial data discovery and access in ways not currently available through standard Web search engines.
- A national distributed framework of common base themes of data for use in registering and referencing other themes of geospatial data. Framework data themes are transportation, hydrography (rivers and lakes), geodetic control, digital imagery, government boundaries, elevation and bathymetry, and land ownership, and will become available through the Clearinghouse to all users at Federal, state and local levels, as well as to the private sector, academia, and the general public.
- FGDC endorsed standards for data content, classification and management that would apply to Federal agencies and would be available for use by the entire community of geospatial data producers and users.

Recent initiatives to implement the NSDI have produced many instances where Federal agencies have partnered to produce common collections of geospatial data and have shared geographic data in a mutually beneficial manner with substantial cost savings and enhancements of analytical and management capabilities. Additionally, a growing number of state, local and private organizations are likewise sharing data, using the FGDC Metadata Standard to document their data and are implementing clearinghouse nodes to make data accessible. These NSDI "proofs of concept" provide further justification for proceeding with an accelerated and more broadly based program, as is being proposed.

The activities conducted under C/FIP would support a variety of high priority Federal programs

and initiatives, including:

- The Administration is launching a comprehensive Livability Agenda to help communities across America grow in ways that ensure a high quality of life and strong, sustainable economic growth. The Livability Agenda aims to help citizens and communities: (1) preserve green spaces that promote clean air and clean water, sustain wildlife, and provide families with places to walk, play and relax; (2) ease traffic congestion by improving road planning, strengthening existing transportation systems, and expanding use of alternative transportation; (3) restore a sense of community by fostering citizen and private sector involvement in local planning, including the placement of schools and other public facilities; (4) promote collaboration among and within neighboring communities to develop regional growth strategies and address common issues; and (5) enhance economic competitiveness by nurturing a high quality of life that attracts well-trained workers and cutting-edge industries. This initiative will allow communities to achieve these goals by leveraging Federal dollars that will provide them with the information and other decision-making tools for land preservation, regional collaboration and planning, and economic development according to the communities own values.
- The Department of Transportation's budget totals over \$50.5 billion. Major programs that will support geospatial data improvements include the Federal Highway Administration (FHWA) and the Federal Railroad Administration FRA. FHWA's FY2000 proposed budget, in particular, contains funding to support development of a coordinated national geospatial data infrastructure not specifically identified in the Transportation Equity Act for the 21st Century (TEA-21). This improved data will enhance Federal, State, and local transportation decision-making.
- The Department of Commerce FY2000 budget of \$7.2 billion includes funds for the Census Bureau and NOAA, two key producers and users of geospatial data. (Census requested an additional \$1.7 billion on 6/1/1999 to comply with the requirements of a Supreme Court ruling earlier this year regarding procedures for Census 2000.) In NOAA, there is a 13 percent increase -- \$282 million over last year's appropriation -- to protect natural resources and better protect people and property from the enormous cost of natural disasters. *This initiative will strengthen the ability of the Department to work with local communities in making data from the above programs more readily available. It also will enable the Department to better utilize state and local data in its programs and to provide current data and more effective services to its customers.*
- EPA's FY2000 budget proposal totals \$7.2 billion, including \$1.6 billion for Clean Water and Drinking Water State Revolving Fund (SRF) programs that provide assistance for the construction of drinking water and wastewater treatment facilities, and \$1.5 billion in Superfund to continue cleanup of toxic waste sites. EPA's mission areas which have significant need for geospatial data include water, air, solid waste, emergency response and pesticides and toxic substances. *Consistent with EPA's Community Right-to-Know*

program, this initiative will expand EPA's activities to provide relevant information to communities to help them understand, plan and manage a variety of issues associated with environmental health and pollution control and abatement.

- In the Department of the Interior, the FY2000 budget requests \$8.7 billion for public land management and related activities. This includes programs for informed and scientifically sound management of public and other lands; conservation and enhancement of rivers, lakes, and wetlands; protection and restoration of ecosystems and watersheds; protection and management of park, historical and archaeological resources; management of land and mineral records; fulfilling trust responsibilities to Native Americans, and implementation of clean water initiatives. The use and availability of geospatial data play an important role in the management of federally-administered public lands. Equally important is providing the private and public sectors with access to this data for use in planning efforts. *Funds under this initiative will be used to work with state, tribal, and local government agencies, the private sector, and others (1) to develop and provide access to data that improve collaborative planning processes for Federal land and water resources, (2) to increase advantages afforded by spatial data by leveraging the department's data investments with those of others, and (3) to improve public access to the department's spatial data holdings, while also protecting the security of sensitive data including any federally or state listed endangered, threatened, or sensitive species (plants or animals) and archaeological sites.*
- The Department of Agriculture FY2000 budget of \$55.2 billion includes programs conducted by the Farm Services Agency, the Natural Resources Conservation Service, and Forest Service that rely on geospatial data. Key business areas of these agencies requiring geospatial data are farm and community programs; farm program conservation planning, assessment and monitoring; the application of conservation practices; and natural resources inventory and assessment. *The activities supported by this initiative will include cooperative work on critical framework data themes and the establishment of partnerships for data access through NSDI clearinghouse nodes in counties where NRCS has offices.*
- In Housing and Urban Development, the FY2000 budget requests \$28 billion, including Community Development Block Grant funding of \$4.775 billion and two new proposals, Regional Connections and Redevelopment of Abandoned Buildings. HUD proposes the \$50 million Regional Connections program to develop and implement smarter growth strategies across jurisdictional lines which will include: 1) compact development rules and incentives for new growth areas in neighboring jurisdictions, and 2) coordinated reinvestment in already built-up and infrastructure-rich areas of participating regions. The Redevelopment of Abandoned Buildings program, proposed funding at \$50 million, will address some of the primary sources of blight in our urban neighborhoods: abandoned apartment houses, single family homes, warehouses, and office buildings. Through a competitive process, HUD will award Redevelopment grants to local

governments to support the demolition and or deconstruction of blighted, abandoned buildings as part of a comprehensive plan to redevelop properties for commercial use.

Accurate and accessible geographic information is key to effective implementation of a wide range of programs. The Community/Federal Information Partnership is designed to ensure that Federal agencies have the capacity to develop, organize and transfer this information.

PROPOSED COMMUNITY/FEDERAL INFORMATION PARTNERSHIP FUNDING

Funding Requested for FY 2000
(\$Million)

AGENCY	FY 1999 BASE	FY 2000 Component I	FY 2000 Component II	FY 2000 TOTAL
Commerce (Census & NOAA)	10.0	2.0	8.0*	10.0 (no new funds)
Interior (USGS & BLM)	2.0	8.0	6.0	14.0 (\$12 million increase)
Transportation (FHWA)	0	5.0	1.0	6.0 (\$6 million increase)
EPA	2.5	1.0	1.5**	2.5 (no new funds)
HUD	2.0	0	2.0	2.0 (no new funds)
Agriculture (NRCS)	0	3.5	1.5	5.0 (\$5 million increase)
TOTAL	16.5	19.5	20.0	39.5 (\$23 million increase)

* The Census Bureau's contribution to this process in FY2000 is limited to support of objective 2, to increase federal agency capabilities regarding the transfer of geospatial information to communities. These contributions include the widely available TIGER/Line files and related LandView software, data from the American Community Survey and the 1997 Economic Census, and implementation of the Internet-based American FactFinder system to support Census 2000, American Community Survey, and other data dissemination activities. The Census Bureau is not a fund-granting agency.

** A portion of EPA agency funds will be used to support community NSDI related projects through regional office efforts.

The figures in this table reflect the proposed agency budgets for FY2000. The distribution of funding between agencies and between the components of the Initiative will change as the needs and priorities of the communities and the Federal government agencies shift over time. Other agencies are actively considering joining the partnership in FY 2001 and beyond.

APPENDICES

Department of Commerce

Appendix 1

Community/Federal Information Partnership Participation

Participating Bureaus:

Bureau of the Census, National Oceanic and Atmospheric Administration

Bureau of the Census

Bureau of the Census FY2000 budget includes ongoing programs that support the goals of the Community/Federal Information Partnership. Census, which maintains the TIGER database and a Master Address File for programmatic use, will benefit from local infrastructure improvement, particularly where local governments can exchange geographic data with the Census Bureau as part of preparations for Census 2000 and the American Community Survey.

The TIGER database is a publicly available geospatial dataset that supports Census Bureau activities and the Nation's statistical program infrastructure. Support from this initiative will facilitate local, state, and tribal agency efforts to contribute locally produced geospatial data to the Census Bureau. This would enhance the value of the TIGER database and the Census Bureau's statistical data. Further, it would improve the ability of local, state, and tribal agencies to utilize geospatially related data obtained from the Bureau.

National Oceanic and Atmospheric Administration

Two of the administrative units within the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service of NOAA focus specifically on working with coastal state agencies in support of resource management initiatives. The mission of the Office of Coastal Resource Management is to make sound decisions, with partners, that ensure diverse, healthy coastal and ocean resources and resolve conflicts among users. The NOAA Coastal Services Center (CSC) mission is to support the environmental, economic, and social well being of the coast by linking people, information, and technology. Both of these programs are participating in the Community Federal Information Partnership (C/FIP) for FY 2000. These offices fully support the goals of the Community Federal Information Partnership and have been focused resources to achieve the mission objectives, consistent with the intent of C/FIP, for several years.

Specific NOAA activities that support the C/FIP initiative in FY2000 will be:

- **Protected Areas Geographic Information System (PAGIS).** GIS implementation within every National Estuarine Research Reserve and National Marine Sanctuary. This project includes installation in 37 separate offices within 22 states and 2 territories.

- **Tijuana River Watershed Demonstration Project.** This project has been designated by the Federal Geographic Data Committee as an example of the National Spatial Data Infrastructure working at the bi-national level.
- **Metadata Training.** NOAA offers metadata training classes to a broad base of coastal constituents. All data sets created using federal funds must be documented using the FGDC metadata standard for data descriptions. The focus of FY 2000 activities will be on delivering training the trainers metadata curriculum.
- **Geographic Information Systems (GIS) Training**
NOAA provides GIS training classes to state and local project partners, other NOAA line offices, and internal staff. These training classes are designed specifically to meet the needs of the coastal resource management community. Courses offered are ESRI certified Introduction to ArcView® and Avenue® training as well as NOAA developed Intermediate ArcView® training.
- **Ocean Planning and Governance Geographic Information System (Ocean GIS).**
The Ocean GIS is a prototype on-line regional marine GIS, covering the ocean area of North Carolina, South Carolina, Georgia, and Florida, out to the exclusive economic zone. The Ocean GIS is being developed to provide coastal and ocean resource managers in the Southeast access to regional geographic data and mapping technologies to improve coordinated decision making and integrated ocean management.
- **Coastal Information Directory.** The Coastal Information Directory (CID) provides single query access via the Internet to a variety of descriptions of coastal data, products, and information from sources throughout the U.S.. All descriptions available through CID are compliant with federal metadata requirements and use the FGDC format for spatial data and the Machine Readable Code (MARC) for library items. As part of CID, CSC maintains an FGDC Clearinghouse node containing descriptions of CSC products and data. Recently, CSC has also become an FGDC Clearinghouse Gateway, providing access to the Clearinghouse for users in the southeastern U.S.

Department of the Interior

Appendix 2

Community/Federal Information Partnership Participation

Participating Bureaus: U.S. Geological Survey, Bureau of Land Management

U.S. Geological Survey

The U.S. Geological Survey (USGS) works with state, local, and tribal governments, the private sector, and others to advance the capacity of communities to create and use geospatial data, and to improve the USGS's ability to provide spatially-referenced earth science information. The President's fiscal year 2000 budget includes an increase of \$10.0 million for the Community/Federal Information Partnership, of which two-thirds will be conducted through matching cooperative agreements and other mechanisms. This increase builds on current activities and base funds in the bureau's budget. The program will expand these activities:

- **Data:** The USGS will increase collaborative efforts with the public and private sectors to develop spatially referenced earth and biological science data. Rapidly expanding interest in these data provides opportunities to leverage Federal data investments, resulting in increased and more current data coverage for both communities and Federal agencies. Cooperative development of common geographic data also aids collaborative decisionmaking for issues of interest to both communities and Federal agencies, and helps to bring Federal scientific data and expertise to bear on issues faced by communities. The Community/Federal Information Partnership provides resources needed to spur these cooperative efforts to develop these data and to improve the compatibility of data. The emphasis will be on geographic orthoimage, elevation, and hydrography data, biological data needed for land management, and surficial geologic data. In addition, USGS will work with others to develop and test standards for spatially referenced geologic and water data. These standards will increase the benefits of future investments by ensuring that data can be combined and reused by many organizations and for many applications.
- **Access:** Spatially referenced data held by the USGS can aid decisions regarding economic, social, and environmental issues facing the Nation. The fiscal year 2000 budget increase will improve access to these data through the use of advanced Internet-based technologies and participation in the National Geospatial Data Clearinghouse. Communities, government, industry, and the public will be able to conduct Internet-based search, retrieval, and display of spatially referenced biologic, geographic, geologic, and remotely sensed data.

Bureau of Land Management

The Bureau of Land Management (BLM) FY 2000 budget includes \$2.0 million for the Community/Federal Information Partnership. Of the \$2 million that is requested, \$1 million is to

match investments by other Federal and nonfederal organizations for spatial data. BLM estimates that over \$2 million can be leveraged from state and local governments with this money. As a result, the BLM will be able to increase data coverage, currentness, and compatibility with less time and money through collaborative data development efforts. The second \$1 million is to integrate BLM information with data from other sources to produce common data solutions. The BLM estimates that it could leverage over \$1 million from other agencies and local governments to develop common coordinates where differences exist.

- Data developed and held by the BLM as well as other organizations contain information that supports better decision making about economic, social, and environmental issues on public and private lands. Unfortunately, this data often differs between organizations resulting in the distribution of conflicting information to our public as well as decision makers. The BLM will benefit from C/FIP funding by participating in NSDI efforts that support common data solutions across organizations. BLM will educate its program professionals on Geographic Information and the NSDI, and thereby move toward data that is integrated with other sources and available in a consistent format for decision making and commerce. The BLM, with other federal agencies and state and local governments, will develop a common foundation of information to support decision making across government agencies, reducing potential conflicts and delays.

Community/Federal Information Partnership Participation

The Federal Highway Administration (FHWA) requests \$6 million in FY 2000 to provide incentives for state and local governments to create geospatial databases depicting their transportation infrastructure and to make those databases available for use by the general public.

- The Bureau of Transportation Statistics (BTS) is the designated lead agency within the Department of Transportation for coordination of geospatial data related to ground transportation infrastructure, including roads, railroads, transit guideways, etc. Ground transportation is one of the seven critical geospatial data themes that comprise the framework layer of the NSDI. Transportation features are also among the most dynamic of the framework themes (e.g., new road construction, realignments, rail abandonments), and therefore require greater input from local sources to remain current. While many local agencies are developing geospatial databases for their own use, additional incentives are needed to encourage them to make their databases available to other organizations using national standards for data formats and documentation. The Bureau of Transportation Statistics (BTS) will carry out the work for this initiative via reimbursement from FHWA.
- The program consists of two integrated components. The first is a competitive matching grant program with state and local agencies for collecting, maintaining, documenting, and disseminating geo-spatial databases of transportation features that meet NSDI standards. The second part expands BTS's current NSDI standards development and spatial data clearinghouse activities to integrate locally collected data into a consistent national transportation framework layer, in coordination with the U.S. Geological Survey and the Bureau of the Census.

Community/Federal Information Partnership Participation

The \$2.5 million in FY2000 for the EPA under the Community/Federal Information Partnership initiative will go toward EPA regions, states, communities and other stakeholders to provide access, improvement and development of geographic information technologies and associated spatial data. These efforts will improve EPA's ability to meet mission needs.

- The EPA will take a step forward in our data integration endeavors through improved spatial data documentation, access, and increased use of spatial analysis tools. This improved data integration will help support environmental justice, community based environmental protection and risk-based targeting for environmental management. These efforts will improve data sharing between stakeholders, states and local communities, and EPA organizations, be they regions, labs, or headquarter program elements.
- The EPA will enhance and support opportunities for information and technology exchange necessary for sound environmental management. Spatial data and technologies will aid environmental planning. Coordination between federal agencies in environmental management will leverage funds used for spatial data discovery, open spatial data access, and foster spatial data production. These data will be documented and produced according to emerging FGDC standards.
- The EPA will improve public access and understanding of environmental information through the use of geographic data. This involves the coordinated development of spatial analysis tools and data for web deployment. These tools will assist environmental groups and citizens to better understand the impact of environmental programs and conditions both in small communities and in larger geographic areas such as cities and states.

Community/Federal Information Partnership Participation

At the Department of Housing and Urban Development (HUD) the \$2 million proposed under the fiscal year 2000 Community/Federal Information Partnership initiative will be used to work with State and local government agencies, the private sector, and others in the development of partnerships to break down the barriers to the effective use of the nation's geospatial data resources to improve the nation's communities.

- Citizens and local governments will be better able to develop Plans and Strategies on a sound and comprehensible information base, a shared understanding of the scope and magnitude of the problems they face, and the resources and opportunities potentially available to them.
- Collaboration will increase the effectiveness of federal data for community use. HUD sees economic development opportunities by promoting the application of geographic information systems and information databases to advance local agendas for economic development. HUD is aware of the opportunity to use geographic information systems and information databases to help those involved in disaster prevention, mitigation and relief. HUD shares environmental justice functions, prevention of environmental disaster, remediation of contaminated buildings and sites with other agencies--another opportunity to use geographic information. The impact of crime and drug abuse permeates all sectors of city and community enterprise; HUD is partnering with other Federal agencies to develop data sets and use geographic information to address crime related issues.
- HUD will extend the Community 2020 GIS software into the administrative framework of additional HUD Programs. This common approach among HUD's programs will help enable HUD's clients to benefit from improvements to the Community 2020. The use of the Community 2020 software is basic to the way the participating communities prepare and submit their applications to HUD.

Community/Federal Information Partnership Participation

Participating Bureaus: Natural Resources Conservation Service (NRCS)

NRCS conservationists spend most of their time on agricultural land- cropland, pasture, and rangeland - the predominant use of private lands in this country. They work in close cooperation with conservation districts through field offices that serve nearly every county in the nation. The agency emphasizes voluntary, science-based assistance, partnerships, and cooperative problem solving at the community level. The \$5 million proposed by NRCS under the fiscal year 2000 Community/Federal Information Partnership initiative will be used to:

- Improve collaborative efforts to work with local governments to develop geospatial data that aid and facilitate the development of conservation plans, resource inventories, and soil surveys. NRCS will use cooperative agreements with state and county governments to foster the development of geospatial data layers such as hydrography, roads, soils, watershed boundaries, county boundaries, incorporated cities, minor civil divisions, and public land survey, at the digital orthophoto quad level of resolution or better.
- Improve collaborative efforts to disseminate local geospatial data using FGDC developed procedures of metadata and clearinghouse. NRCS will assist states and counties in establishing an Internet web-server in compliance with FGDC clearinghouse and metadata standards. This will provide locally produced geospatial data to the USDA Service Centers and to the public on a public access server.
- Improve capability to administer local cooperative agreements for geospatial data as well as develop metadata for internal geospatial data development for such data as soils, plants, climates and watersheds. NRCS has offices in over 2500 counties in the country with authority to enter in to and administer cooperative agreements at the state and county level. To administer these new geospatial data agreements, relevant NRCS offices will have a GIS specialist to coordinate with other federal agencies, state, and local partners, develop the cooperative agreements, and monitor progress.

