October 2003

# National GIS Survey Results

## 2003 Survey on the use of GIS Technology in Local Governments

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# 2003 Survey on the Use of GIS Technology in Local Governments

*The 2003 Survey on the Use of GIS Technology in Local Governments was developed and executed by Public Technology, Inc.(PTI) in collaboration with the International City/County Management Association (ICMA), the National League of Cities (NLC), and the National Association of Counties (NACo).*

*This survey is part of a collaborative effort, sponsored by the US Department of Interior, to work with local governments to develop a national Geospatial One Stop (GOS) system. Geospatial One Stop is an Office of Management and Budget (OMB) sponsored E-Gov initiative that would more effectively organize, broaden and accelerate Federal Government plans to develop and provide improved access to Geospatial data.*

## Why GIS is Important to Local Governments

Local governments around the world are leveraging their information technology (IT) investments by integrating mapping and geographic information system (GIS) technology.

GIS provides essential information tools for many essential government services including:

Public Safety

Public Works

Planning

Economic Development

Community Planning

GIS allows us to view, understand, question, interpret, and visualize data in ways simply not possible in the rows and columns of a spreadsheet. Beautiful and interesting maps provide better decision making tools and analysis and make a difference in our world.

## Managing Organizations

The following organizations played a key role in this survey effort that included the creation of policy and technical focus groups of local officials, development and execution of the survey, and analyzing and publishing the final report:

### Public Technology, Inc.
http://www.pti.org

PTI is a national non-profit technology research and development organization based in Washington, DC with the mission to bring the benefits of technology to local governments. Through research, focus groups, online discussions, publications, conferences, pilot tests and demonstration projects. PTI's local government and industry members work together to develop and apply technology to the challenges facing communities of all sizes.

### International City/County Management Association
http://icma.org

ICMA is the professional and educational organization for chief appointed managers, administrators, and assistants in cities, towns, counties, and regional entities throughout the world. Since 1914, ICMA has provided technical and management assistance, training, and information resources to its members and the local government community. The management decisions made by ICMA's nearly 8,000 members affect more than 100 million individuals in thousands of communities--from small towns with populations of a few hundred to metropolitan areas serving several million.

### National Association of Counties
http://www.naco.org

NACo, the only national organization that represents county governments in the United States, is a full-service organization that provides an extensive line of services including legislative, research, technical, and public affairs assistance, as well as enterprise services to its members. The association acts as a liaison with other levels of government, works to improve public understanding of counties, serves as a national advocate for counties and provides them with resources to help them find innovative methods to meet the challenges they face.

### National League of Cities
http://www.nlc.org

NLC is the oldest and largest national organization representing municipal governments throughout the United States. Its mission is to strengthen and promote cities as centers of opportunity, leadership, and governance. Working in partnership with 49 state municipal leagues, NLC serves as a national resource to and an advocate for the more than 18,000 cities, villages, and towns it represents.

### Geospatial One-Stop Initiative
http://www.geo-one-stop.gov

Geospatial One-Stop makes it easier, faster, and less expensive for all levels of government and the public to access geospatial information. The Geospatial One-stop is one of 24 e-government initiatives sponsored by the Federal Office of Management and Budget to enhance government efficiency and improve citizen services.

### Federal Geographic Data Committee
http://www.fgdc.gov

FGDC is a 19 member interagency committee composed of representatives from the Executive Office of the President, Cabinet-level and independent agencies. The FGDC is developing the National Spatial Data Infrastructure (NSDI) in cooperation with organizations from state, local and tribal governments, the academic community, and the private sector. The NSDI encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data.

## Summary of Survey Results

Over 10,000 local governments (counties, cities, towns, townships, villages, and boroughs) were invited to respond to a national local government survey that included contact information, usage, application, data distribution, data standards, and policy questions. The survey was conducted in the summer of 2003.

More than 10% (1,156) of the local governments contacted responded to the survey.

The survey results show that GIS technology is recognized as an essential tool by many local governments but there are a significant number of local governments that do not recognize the benefits of GIS. There are a small number of local governments that effectively use GIS as an enterprise solution with a significant return on their investment.

The benefits of using GIS technology to support homeland security, public works, public safety, and economic development efforts are clearly defined. Federal, state, and local government leaders must take action to provide awareness, education, resources, and funding for more local governments to achieve these benefits.

## Survey Highlights

*Note that many questions allow multiple responses and therefore the cumulative percentage may be greater that 100%.*

### Barriers to Using GIS More Effectively

There are many barriers to the effective use of GIS technology in local government. The biggest barrier is funding. The cost of developing and maintaining GIS systems and accurate data layers can be expensive. Leading organizations have developed regional cooperative programs that share information, data, and costs associated with maintaining effective GIS infrastructures. The problem is that these organizations are ‘far and few between’. It is the inherent nature of governments to operate independently. Because essential data comes from various sources, GIS technology promotes necessity of sharing data and working cooperatively.

- Over 64% of respondents are interested in GIS systems, but do not have the funding to move forward.
- Over 42% are interested in GIS systems, but do not have the technical expertise to move forward.

- Over 35% would like to know more about GIS systems to determine whether it makes sense to acquire them.

### Who is Using GIS

Early adopters of GIS principally used GIS technology for geographic planning functions. With this use the technology was a priority for larger government jurisdictions. GIS technology is becoming a priority for all governments now that solutions are being effectively used in public safety, health, public works, revenue collection, and economic development. The challenge is to provide awareness, education, and funding to late adopters of GIS technology.

- Over 97% of respondents with populations of over 100,000 use GIS technology.

| Population | Using GIS | Not Using GIS |
|---|---|---|
| 100,000 or greater | 97% | 3% |
| 50 - 100,000 | 88% | 12% |
| Less than 50,000 | 56% | 44% |

- 56% of respondents with populations of less than 50,000 use GIS technology.

- County use of GIS (72%) is slightly higher than city use of GIS (64%).

- States with the largest percentage of communities that <u>use GIS</u> technology include Colorado, Hawaii, Arizona, Maryland, California, Nevada, Vermont, Washington, Wisconsin, and North Carolina.

- States with the largest percentage of communities <u>not using GIS</u> include Arkansas, Alabama, Mississippi, Oklahoma, South Dakota, New Jersey, Nebraska, Louisiana, North Dakota, and West Virginia.

### Cost vs. Benefit Assessment of GIS

Though an effective GIS technology infrastructure can be expensive to implement, the benefits of enterprise GIS applications produce a clear and measurable return on investment (ROI)..

- 86% of respondents have achieved benefits from their use of GIS technology that justify the associated cost for software, hardware, and labor.

| Population | Proven ROI | No ROI |
|---|---|---|
| 100,000 or greater | 90% | 10% |
| 50 - 100,000 | 89% | 11% |
| Less than 50,000 | 84% | 16% |

### Implemented GIS Applications

GIS applications have become integral resources for public works, financial, public safety, and economic development. GIS applications have moved from the desktop (analysis) to significant components of essential technology systems (i.e., CAD, Emergency Management, Land Use, Tax Assessment, etc.). On the horizon, GIS technology will become a key component of every government applications system. In addition to the visual analysis of data, a key driver for enterprise GIS applications is that location is the connection point for the interoperability of desperate systems.

- 77% of respondents use GIS technology to view aerial photography.
- 70% use GIS technology to support property record management and taxation services.

| Population | Aerial Photography | Public Access |
|---|---|---|
| 100,000 or greater | 90% | 67% |
| 50 - 100,000 | 88% | 64% |
| Less than 50,000 | 71% | 52% |

- 57% of respondents use GIS technology to provide public access information.
- 41% use GIS technology to support capital planning, design, and construction.
- 38% use GIS technology to support permitting services.
- 38% use GIS to support emergency preparedness and response activities.
- 33% use GIS to support computer aided response activities.

- 28% use GIS activities to support crime tracking and investigative activities.

### Cooperative Development and Cost Sharing Programs

Leading governments recognize the economic value of cooperative GIS organizations. In addition to sharing the cost for developing and maintaining GIS technology, these organizations provide education for professional development; networking opportunities; leadership, coordination, and representation. These organizations are often sponsored by local governments, states, GIS practitioners or independent non-profit organizations.

- 73% of respondents participate in intergovernmental cooperative GIS programs.

| Population | County | Cost Sharing | State |
|---|---|---|---|
| 100,000 or greater | 68% | 57% | 34% |
| 50 - 100,000 | 68% | 39% | 19% |
| Less than 50,000 | 79% | 39% | 14% |

- 75% participate in county sponsored intergovernmental cooperative programs.
- 44% participate in cooperative programs that share the costs of creating base maps and layer building.
- 20% participate in state sponsored cooperative programs.

### Most Beneficial Assistance

Many governments that developed GIS applications through grant funds have difficulty funding the required ongoing maintenance costs. There are thousands of dormant GIS applications that had grant funded development and local government funded maintenance. Local governments would like federal or state financial support to hire the experienced staff required to maintain the applications. They would also like financial support for training first responders who use GIS as a primary tool during their response and recovery efforts.

| Population | Subsidy | Training | Volunteer |
|---|---|---|---|
| 100,000 or greater | 77% | 69% | 35% |
| 50 – 100,000 | 71% | 68% | 28% |

| | | | |
|---|---|---|---|
| Less than 50,000 | 71% | 67% | 31% |

- 72% of respondents would like a subsidy for hiring/contracting GIS support.
- 68% would like to receive GIS training for first responders.
- 31% would like to receive volunteer GIS support as needed.

### Homeland Security Support

Local government leaders see a clear application of GIS technology for homeland security efforts. The concern that homeland security technology funding would not be applied as intended is diminished when applied to GIS. GIS applications and solutions clearly resonate with emergency management and public safety executives as an essential tool to provide the most effective support of their efforts. When you combine ground-truthing imagery, GPS, and digital maps, the possibilities are limited only to your imagination.

> *"After the courage and efforts of our first responders, GIS technology was the most demanded resource by local, state, and federal responders during the 9-11 response and recovery activities at the NYC world trade center". – Alan Leidner, Director of Enterprise GIS for the City of New York NY.*

- 95% of respondents think that GIS technology usage can be improved with federal Homeland Security funding.
- 80% would build additional GIS data layers with Homeland Security funding.
- 76% would build new GIS applications that support Homeland Security initiatives.
- 66% would improve their maintenance of GIS data.
- 65% would provide GIS staff training.
- 54% would improve the accuracy of their GIS data.
- 43% would hire skilled GIS staff.
- 32% would design enterprise GIS architecture.
- 29% would hire GIS consultants.

### Policy for Sharing GIS Data

Local government policies for sharing GIS data are evolving. Though many policies are to share data with federal agencies, local governments often put limits on how and whom the data is shared with. There is a clear desire to share the cost for developing and maintaining GIS technology with organizations that use the technology. There is also a desire to maintain control of that data as it is being shared as opposed to providing organizations with data extracts.

Emerging web service technology allows governments to share their data through the Internet (as opposed to data extracts) therefore maintaining control of the security and interpretation of the data.

- 97% of respondents would allow the federal government to use their GIS data for floodplain mapping.
- 96% would allow federal government agencies to use their GIS data in land use and land cover programs.
- 98% would allow federal government agencies to use their GIS data for Homeland Security purposes.
- 97% would allow federal agencies to use their data for emergency preparedness and response.

## Call to Action for Government Officials

As demonstrated through examples provided in Exhibit B, GIS is an essential technology for all local governments. The survey results show significant shortfalls in the effective use of GIS technology across the nation.

The common barriers to the effective use of GIS technology in local government include funding, awareness, and education.

Overcoming these barriers will require strong leadership at the federal, state, and local levels.

Leading organizations have overcome many of these barriers through cooperative information and cost sharing programs. Several examples of regional, state, and federal programs exist.

Regional best practice examples of cooperative GIS programs include Cincinnati's Cooperative Agents in a Global Information Space

(CAGIS) project and the San Francisco Bay Area Automated Mapping Association (BAAMA).

State best practice examples include the Maryland State Geographic Information Committee (MSGIC) and the state of Pennsylvania's GIS Consortium (PAGIS).

Federal best practice examples include the Geospatial One Stop project that sponsors geodata.gov (a national GIS data sharing portal).

### Actions for Federal Government Officials

1. Sponsor outreach programs that provide awareness for local government officials and training for local GIS practitioners.

2. Sponsor volunteer programs that allow experienced GIS practitioners to assist local governments with essential project work.

3. Provide GIS tools and resources that can be accessed via the Internet.

### Actions for State Government Officials

1. Conduct periodic state surveys on the availability and use of GIS data.

2. Support GIS information and cost sharing organizations and programs.

3. Support information sharing Internet portals that provide awareness and education resources.

### Actions for Local Government Officials

1. Lead and participate in regional cost and information sharing organizations and initiatives.

2. Promote the development of Enterprise GIS (shared infrastructure) across government organizations.

3. Promote the awareness and education on GIS technology and applications.

4. Promote ROI models that promote the effective use of GIS technology.

# Exhibits

## Exhibit A: Detailed Survey Results

Survey responses have been recorded into an online relational database that can be accessed through the PTI website at www.pti.org. This database is very large and it would be impractical to print the detailed result permutations in this report.

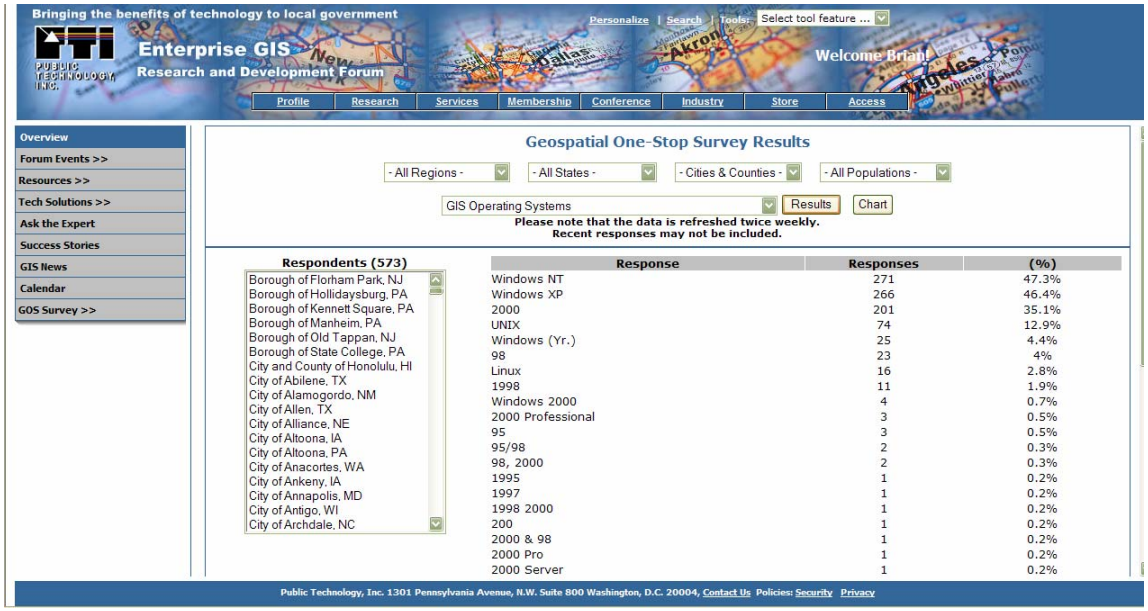
Detailed survey results are available to be accessed in two ways:

- Web-based interactive reporting tool;
- Downloading OLAP Database and Microsoft Excel Pivot table.

### Web-based Interactive Reporting Tool

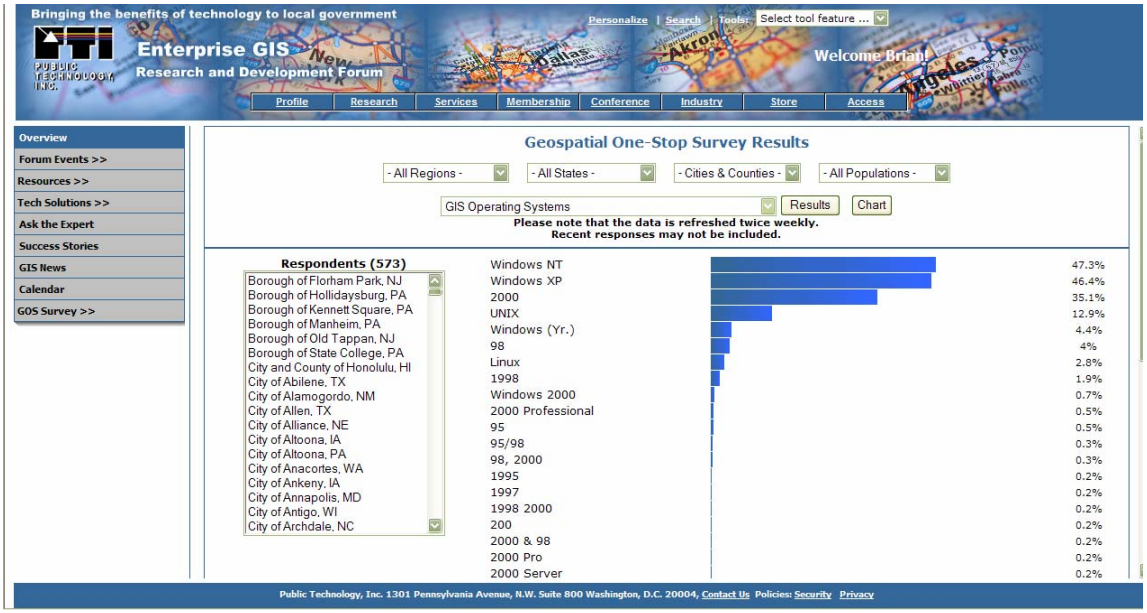
The web-based interactive reporting tool is a custom tool developed by PTI that provides users with quick and easy features for benchmarking survey responses by permutations of geographic region, state, city/county type, and population.

The results include a list of governments that responded to each question as well as the response, response totals, and response questions for many of the questions in the survey.

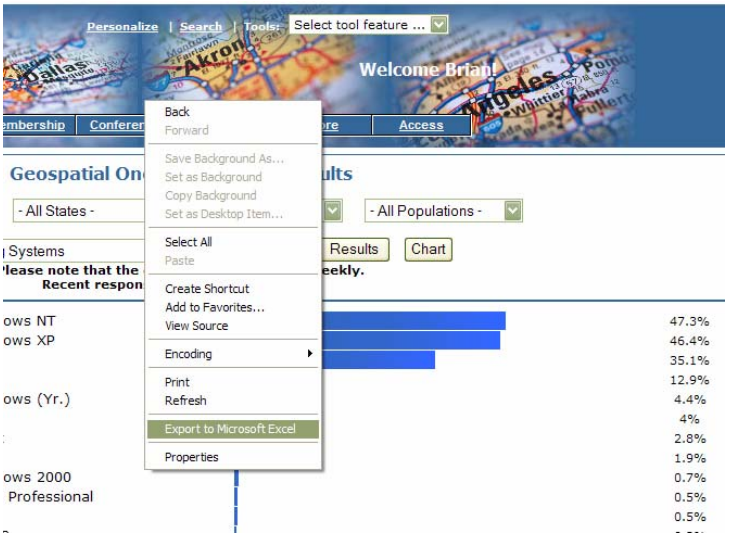



| Response | Responses | (%) |
|---|---|---|
| Windows NT | 271 | 47.3% |
| Windows XP | 266 | 46.4% |
| 2000 | 201 | 35.1% |
| UNIX | 74 | 12.9% |
| Windows (Yr.) | 25 | 4.4% |
| 98 | 23 | 4% |
| Linux | 16 | 2.8% |
| 1998 | 11 | 1.9% |
| Windows 2000 | 4 | 0.7% |
| 2000 Professional | 3 | 0.5% |
| 95 | 3 | 0.5% |
| 95/98 | 2 | 0.3% |
| 98, 2000 | 2 | 0.3% |
| 1995 | 1 | 0.2% |
| 1997 | 1 | 0.2% |
| 1998 2000 | 1 | 0.2% |
| 200 | 1 | 0.2% |
| 2000 & 98 | 1 | 0.2% |
| 2000 Pro | 1 | 0.2% |
| 2000 Server | 1 | 0.2% |

The survey results can also be viewed as a chart by clicking the chart button on the selection screen.




Microsoft Explorer (5.0 or higher) users can export the survey results to Microsoft Excel by placing the mouse in the results area and clicking the right mouse button. In the menu select Export to Microsoft Excel to access use the survey results for further analysis, presentations, or reports.



## On-Line Analytical Processing Database (OLAP) and Excel Pivot Table

For more in depth analysis, users can download and use the OLAP database and Microsoft Excel Pivot Table report tool. This tool can be accessed by following simple instructions for downloading and installing the tool on your desktop. The OLAP database includes the entire survey database and the Pivot Table report provides access to the complete set of detailed survey questions and responses.

OLAP is a way to organize large business databases. OLAP databases are organized to fit the way you retrieve and analyze data so that it's easier to create the reports you need.

OLAP databases are designed to speed up the retrieval of data. Because the OLAP server, rather than Microsoft Excel, computes the summarized values, less data needs to be sent to Microsoft Excel when you create or change a report. This approach lets you work with much larger amounts of source data than you could if the data were organized in a traditional database, where Microsoft Excel must retrieve all the individual records and then calculate the summarized values.

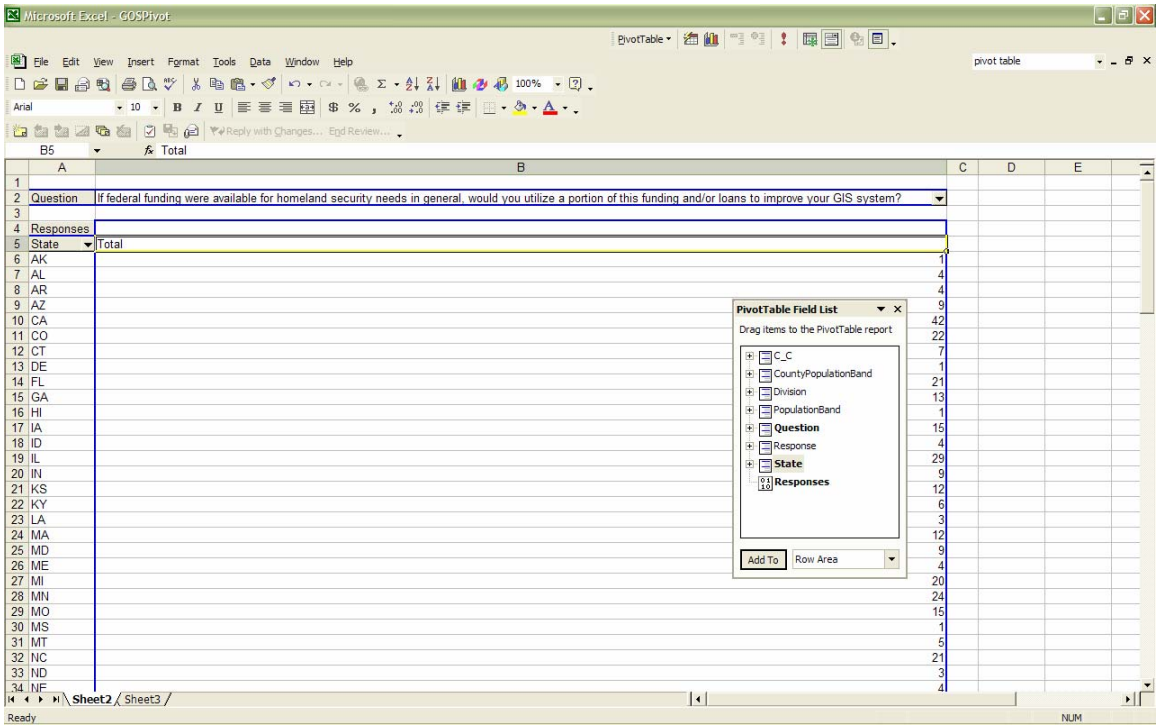
A Pivot Table report is an interactive table that quickly combines and compares large amounts of data. You can rotate its rows and columns to see different summaries of the source data, and you can display the details for areas of interest.

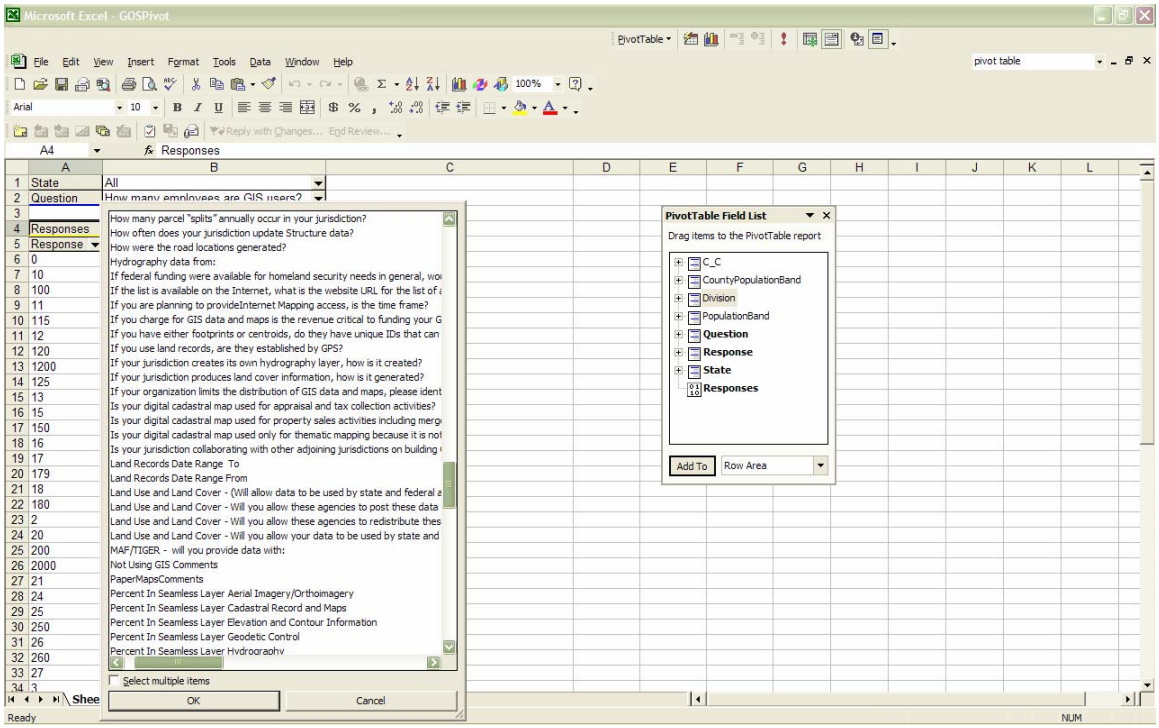
From the PTI website, you will click the option to download a zip file that will extract four files into a designated file directory.

To use the file, simply open the Microsoft Excel Worksheet (GOSPivot).

If you are not familiar with Pivot Table reports, it is simple to use. Take five minutes to review the help instructions.

The Pivot Table report allows you to specify any permutation of reporting criteria including the selection of multiple questions (e.g., Enterprise GIS architectures that use IBM DB2)


Microsoft Excel - GOSPivot
File Edit View Insert Format Tools Data Window Help
B5 Total
Question If federal funding were available for homeland security needs in general, would you utilize a portion of this funding and/or loans to improve your GIS system?
Responses
State Total
AK 1
AL 4
AR 4
AZ 9
CA 42
CO 22
CT 7
DE 1
FL 21
GA 13
HI 1
IA 15
ID 4
IL 29
IN 9
KS 12
KY 6
LA 3
MA 12
MD 9
ME 4
MI 20
MN 24
MO 15
MS 1
MT 5
NC 21
ND 3
PivotTable Field List
Drag items to the PivotTable report
C_C
CountyPopulationBand
Division
PopulationBand
Question
Response
State
Responses
Add To
Row Area
Sheet2
Sheet3
Ready
NUM


Microsoft Excel - GOSPivot
File Edit View Insert Format Tools Data Window Help
A4 Responses
State All
Question How many employees are GIS users?
Responses
Response
0
10
100
11
115
12
120
1200
125
13
15
150
16
17
179
18
180
2
20
200
2000
21
24
25
250
26
260
27
How many parcel "splits" annually occur in your jurisdiction?
How often does your jurisdiction update Structure data?
How were the road locations generated?
Hydrography data from:
If federal funding were available for homeland security needs in general, wo
If the list is available on the Internet, what is the website URL for the list of
If you are planning to provideInternet Mapping access, is the time frame?
If you charge for GIS data and maps is the revenue critical to funding your G
If you have either footprints or centroids, do they have unique IDs that can
If you use land records, are they established by GPS?
If your jurisdiction creates its own hydrography layer, how is it created?
If your jurisdiction produces land cover information, how is it generated?
If your organization limits the distribution of GIS data and maps, please ident
Is your digital cadastral map used for appraisal and tax collection activities?
Is your digital cadastral map used for property sales activities including merg
Is your digital cadastral map used only for thematic mapping because it is not
Is your jurisdiction collaborating with other adjoining jurisdictions on building
Land Records Date Range To
Land Records Date Range From
Land Use and Land Cover - (Will allow data to be used by state and federal
Land Use and Land Cover - Will you allow these agencies to post these data
Land Use and Land Cover - Will you allow these agencies to redistribute thes
Land Use and Land Cover - Will you allow your data to be used by state and
MAF/TIGER - will you provide data with:
Not Using GIS Comments
PaperMapsComments
Percent In Seamless Layer Aerial Imagery/Orthoimagery
Percent In Seamless Layer Cadastral Record and Maps
Percent In Seamless Layer Elevation and Contour Information
Percent In Seamless Layer Geodetic Control
Percent In Seamless Layer Hydrography
Select multiple items
OK
Cancel
PivotTable Field List
Drag items to the PivotTable report
C_C
CountyPopulationBand
Division
PopulationBand
Question
Response
State
Responses
Add To
Row Area
Ready
NUM

## Exhibit B: Examples of GIS in Local Government

### Cincinnati and Hamilton County, Ohio
http://www.cagis.hamilton-co.org

The mission of the Cincinnati Area Geographic Information System (CAGIS) is to create a revolutionary computerized information sharing system that enables the fundamental transformation of government and utility service management and delivery. CAGIS is to offer government, utility companies, groups, or citizens a new, intelligent, and cost effective tool to make informed decisions based on shared data within a standard framework. CAGIS is a consortium of the land and infrastructure agencies in the City of Cincinnati, Hamilton County, Cincinnati Bell Telephone and Cincinnati Gas & Electric.

In 1995 CAGIS established the foundation for automating the functions of government and utilities whose activities create the inventories of sewers, land records, water, drainage, electrical systems, streets, right of way, etc. supporting the community. Having a real-time availability of the graphic and alpha - numeric inventories has been demonstrated as the strategy upon which major cost improvements in line department operations are based. In 1995 CAGIS began the design for the automation of the Permits System for the City of Cincinnati, Hamilton County and Cincinnati Gas and Electric Company as the first stage of embedding maintenance of inventory data into the on-going work of employees. The Permits project concentrates on the additions and deletions made to all of the public and utility managed inventories by the activities of the private sector. The goals of the project are to improve the efficiency and effectiveness of the permitting services offered the private sector while enabling the real time parallel maintenance of the graphic and alpha numeric inventory databases.

### Montgomery County, Maryland
http://gis.montgomerycountymd.gov

The Montgomery County, Maryland Department of Technology Services - Geographic Information Systems (DTS-GIS) team, in cooperation with the Department of Fire & Rescue Service (DFRS), developed an ArcView GIS based Emergency Operations Center (EOC) application. The application provides the County Emergency Management (EM) team assembled at the EOC during emergencies with useful geographical and tabular data. It improves EM staff efficiency for displaying/printing Montgomery County (MC) geographic and associated attribute data. The EOC application functionality includes geographical data display, attribute data for over 40 MC

databases, including Washington Gas Lines, WSSC water lines/hydrants, MC road networks, and Maryland-National Capital Park and Planning Commission (M-NCPPC) property data listings. This enables the EM staff to only call up the application in the event of an EOC emergency activation or emergency exercise and access the information. The MC geographic data presented in the EOC application reflects information downloaded daily, weekly, or quarterly by DTS-GIS.

**Philadelphia, Pennsylvania**
http://citymaps.phila.gov

CityMaps (citymaps.phila.gov), is an address-based mapping service web site that uses GIS technology to help citizens, businesses, and visitors view geographic features (e.g., houses, streets, etc.), determine service areas (e.g., zoning districts, police districts, etc.) and locate facilities (e.g., recreation centers, libraries, or hospitals) within the City of Philadelphia. The City's Mayor's Office of Information Services, GIS Services Group, created this web site using inter-agency collaboration in support of the Mayor's Vision for a Better Philadelphia to provide individuals with on-line access to City information.

By entering a valid address within the Philadelphia city limits, users can:

- get a bird's-eye view of a neighborhood using digital orthophotography (aerial photography);
- examine zoning districts, get zoning code information and overlay other land use controls and restriction information;
- determine the geo-political or service area (such as council district, ward or zip code) for a given address or location;
- find the nearest recreation center, library, or hospital.

Users of CityMaps can easily use this address-based mapping service web site to obtain various types of information related to a particular address that would ordinarily be extremely difficult to obtain. Also because the application was built using GIS technology, end-users can not only quickly and easily view address related information, but also print cartographic results as well as hotlink to related web sites for additional information.

## Acknowledgements

### Geospatial One Stop Board

An Intergovernmental Board of Directors composed of state, local, tribal and federal representatives governs the Geospatial One Stop initiative. This Intergovernmental Board helps provide guidance on the direction of the project and ensures dialogue among the levels of government making major investments in geospatial information. Based on the substantial investment of state and local governments in the collection and management of geospatial data, formation of an intergovernmental board is intended to facilitate the ability of governments to leverage their individual resources to be more efficient, more cost effective and better serve their citizens.

The Board of Directors includes representatives from the following organizations:

- International City/County Management Association
- Intertribal GIS Council
- National Association of State Chief Information Officers
- National States Geographic Information Council
- National Association of Counties
- National League of Cities
- Western Governors Association
- Department of the Interior
- Department of Commerce
- Department of Transportation
- National Aeronautics and Space Administration

## Geospatial Survey Management Team

The following individuals were instrumental in the development of the survey:

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*Carlton Moore*
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*Deputy Mayor Pro Tem, Plano, TX*

*Scott Wilson*
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