2008 State Summary Report

This is the 13th year that the GIS-T Symposium has conducted a survey of GIS activities at State DOT's. The survey was combined with an information request for the State Roll Call, and administered using a web-based survey instrument, and resulted in a ninety-six (96) percent response, with 48 States plus the District of Columbia and the Commonwealth of Puerto Rico completing the survey. These responses were tabulated and are presented in a separate summary table.

Nine new questions were added this year to address the new issues facing State DOT's:

1. Where do you see geo-spatial technology adding the most value to your agency in the future?
2. To what degree is your State transportation agency involved in your state GIS coordination Program?
3. Does the roadway transportation data include source data from local government?
4. Does your data include commercial data? Indicate which vendor.
5. Does your DOT use your roadway transportation data for federal reporting of the Highway Monitoring System (HPMS) data to the Federal Highway Administration?
6. Has your state provided centerline data to the U.S. Census Bureau for the upcoming Enhanced TIGER release?
7. Is your agency using or considering the use of any of the following tools? Google Earth, Google Maps, Microsoft Virtual Earth, Yahoo Maps, Other
8. Does your agency's road inventory file account for the z-value (other than odometer readings) when calculating roadway length?
9. What research is needed in GIS for transportation? (Write description)

GIS Organizations Structure and Development Stage

A majority of the States (53%) report having an organizational structure consisting of a GIS core unit, providing technical support to a much larger group of end-users throughout the agency. The second most prevalent structure (40%) is an "enterprise" GIS organization with agency-wide data integration. However, the number of States reporting this type of organization actually declined from last year's survey. Only one State (HI) reports that, although they have "pockets" of GIS applications, there is no agency-wide coordination of geo-spatial data or services.

The organizational location of GIS core units seems to be split between Planning (44%) and Information Services (36%) with 20% reporting other locations. Even in those States that have instituted an enterprise GIS, there is no significant difference in where the GIS core unit is located.

The average staff size of the GIS core unit is 6.8 persons. Over eight-seven (87) percent of the States responded that at least one staff member has a geography or cartography background, and a majority of States (77%) also reported having staff with

an information technology or computer science background. GIS professional certification still remains a relatively minor factor in current staff hiring. Only twenty-eight (28) percent of the States reported having a certified GIS professional on staff. The allocation of GIS staff time across core functions shows a fairly even distribution of 16 - 17 percent for LRS maintenance, data warehousing, technical support, and web application, with slightly more time spent on base map maintenance (21%). However, the distribution of staff activities varies considerably across agencies, and even within an agency from one year to the next.

On average, States outsource about forty (40) percent of their GIS application development work, with an average annual expenditure of about $406,000 per agency.

GIS Software
Respondents were asked to identify what software products were used by GIS core staff for web applications. Seventy-two (72) percent of those responding use ArcIMS products, twenty-seven (27) percent use Geomedia Webmap, while forty-eight (48) percent use other products for web applications.

Most States use commercial relational database management software (RDBMS) in combination with GIS software to manage their geo-spatial data. Oracle® is used by seventy (70) percent of the States, either alone or in combination with other database software. Other commercial database software used by the States includes SQL Server® (44%), and Microsoft Access® (19%). Louisiana and California also use ESRI File-Base Geodatabase and PostgreSQL respectfully.

ArcSDE® (80%) and Oracle Spatial® (48%) are the principal software packages used to manage the geo-spatial attributes in enterprise data warehouses.

Road Centerline Networks and Other Geo-Spatial Databases
A key component of most transportation GIS activities is the road centerline network database. All States reported that they maintain a digital road centerline database. Both the spatial accuracy and coverage of these databases continue to improve. Sixty-three (63) percent of the States report that their road centerline databases have a spatial resolution of 1:12,000 scale or better. Much of the improved accuracy has been achieved through the use of high-resolution orthoimagery and/or kinematic GPS. With respect to coverage, sixty (60) percent of the States report that their road centerline database includes all public roads, and another twenty-two (22) percent include all State and county routes.

The majority of States (63%) distribute their road centerline database free of charge to whoever wants it. Most other States (33%) have policies that allow the data to be shared with other public agencies, but place restrictions on its use for commercial purposes and/or redistribution.

States were asked if they maintain any other statewide geo-spatial data layers, beyond the road centerline database. Seventy-seven (77) percent of those responding reported

that they also maintain some other geo-spatial database, generally other transportation networks or features, such as rail lines, airports, etc. Other "framework" geo-spatial data maintained by State DOTs include political and administrative boundaries (60%), orthoimagery (51%), and geodetic control points (49%). State DOTs are less likely to maintain other framework layers such as elevation (23%) or water features (34%).

The primary sources of geo-spatial data used by State DOTs are other state and local agencies (identified by 85% of those responding), followed by statewide geo-spatial clearinghouses (77%), and geo-spatial data maintained by federal agencies (52%). Less common sources include data purchased from commercial data vendors (25%), data acquired through the Geo-Spatial One-Stop (23%).

Benefits and Costs of GIS Applications

Several questions introduced in 2006 regarding the perceived benefits and costs of geo-spatial technology were asked again in this year's survey. Enterprise data integration continues to be cited by most States as yielding the greatest current benefits (60%), but also tied with Asset management as being the most difficult and costly to implement (48%). CAD/GIS was also cited as being the next most difficult to implement (28%), followed by Enterprise data integration were also seen as having the greatest expected future benefits (67%).

Current Activities

Respondents were asked to list up to four of their current GIS activities for the State roll call. Listed activities were grouped into similar categories and then ranked based on the number of times that they were cited by the respondents. Table 1 lists those GIS activities cited five or more times by the State DOTs.

GIS Activity (Categories with at least 5 citations)	# of Citations
Development of web-based GIS applications	33
Road Centerline database development/enhancement	22
Road Inventory management	19
Migration to new GIS software / Hardware	11
Safety/ Crash analysis	11
Location referencing system	8
Project Management	8
Orthoimagery data collection / integration	7
Enterprise Applications	7
Environmental / Cultural Analysis	7
Truck routing and permitting	6
GPS data collection / integration	5
Strategic Planning	5
Right-of-Way	5
Data Warehouse Activities	5

Table 1 - High priority GIS activities at State DOT's

GIS has finally become an important tool for data management and integration, analysis, and visualization in every State DOT. The key question is no longer <u>whether</u> the agency should invest in GIS, but rather how much of the agency's program data should be integrated using geo-spatial technology. Many State DOTs are currently investigating or are actively developing an enterprise GIS data warehouse. Enterprise data integration is seen as yielding the greatest agency benefits from geo-spatial technology, but it is also cited as one of the most difficult applications to implement.

Web-based GIS applications continue to grow, facilitating information exchange both to the traveling public and to DOT field staff. GIS also seems to be used more frequently in specific analysis and planning applications, particularly environmental studies, safety/crash analysis, and project management.

GIS core staffs continue to function effectively in either planning or information management organizational divisions. Important GIS core staff activities continue to include the maintenance and enhancement of the road centerline database, linear referencing, and migration of legacy applications to new and upgraded commercial software. Increasingly, however, application-specific geo-spatial analyses and map products are being carried out by end-users throughout the agency, both with and without assistance from GIS core staff. citations signify GIS activity is truly mainstream, enterprise wide.