2010 State Summary Report

This is the fifteenth (15th) year that the GIS-T Symposium has conducted a survey of GIS activities at State DOT's. The survey was administered using a web-based survey instrument. The survey's purpose is to inventory the current state of practice, identify potential needs, and discover wide ranging topics for discussion. The result was a surprising ninety-eight percent (98%) response, with forty-nine (49) states and the Commonwealth of Puerto Rico submitting. The responses were up from eighty percent (80%) in 2009.

Five new questions were added this year to address the emerging issues facing State DOT's:
1. Does your agency plan to submit your GIS road network for use in HPMS? If so, which roads will be submitted?
2. Is your GIS road network routable?
3. If your GIS road network is routable, do you plan on submitting the routable network as part of HPMS?
4. Does your agency work with neighboring states/agencies to connect GIS road networks at the borders?
5. Does your agency share a GIS road network with State's E911 system? If not, do you plan to do so in the future?

GIS Organizations Structure and Development Stage

A majority of the States (41%) 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 equally prevalent structure (41%) is an "enterprise" GIS organization with agency-wide data integration.

The organizational location of GIS core units are evenly distributed between Planning (42%) and Information Services (37%) with 21% 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. Seventy-two percent (72%) report a core GIS staff size between one (1) and ten (10).

Eighty percent (80%) of the States responded that at least one staff member have a geography or a cartography background, sixty-two percent (62%) of States reported having staff with an information technology or computer science background. Thirty-five percent (35%) of the States reported having a certified GIS professional on staff. However, only six (6%) of respondents claimed certification was an important hiring consideration. Certification importance in hiring is down from twelve percent (12%) last year. However, those not sure of its hiring relevance was thirty-five percent (35%).

The allocation of GIS staff time across core functions shows an emphasis on road base map development and enhancement (22%). LRS maintenance and GIS technical support and training were second at seventeen percent (17%) each. The latter is

evidence of the Roll Call of States indicating many were working on enterprise issues and support. These results are similar to 2009.

On average, respondents outsource less than thirty percent (30%) of their GIS application development work. The majority spend less than $500,000.

GIS Software
web mapping by core and user staffs. Twelve (12) separate products from six (6) different vendors were identified. The most widely used products are from ESRI® in both core and distributed user groups; Bentley Microstation® was also prevalent. To a lesser degree states cited Intergraph® and Caliper® products and finally, AutoCAD® and MapInfo®.

Most States use commercial relational database management software (RDBMS) in combination with GIS software to manage their geo-spatial data. Oracle® is used by fifty percent (50%) of the States, either alone or in combination with other database software. Other commercial database software used by the States includes SQL Server® (34%), and Microsoft Access® (10%). The use of both Microsoft® products is down significantly from 2009.

ArcSDE® at sixty-two percent (62%) and Oracle Spatial® at thirty-five (35%) are the principal software packages used to manage the geo-spatial attributes in enterprise data warehouses. These numbers are relatively unchanged since 2009.

The reader should note that software questions permitted multiple answers from the same responder.

Web Applications
Questions were asked pertaining to web application development and costs. States' expenditures in this arena are wide ranging in the areas of hardware, software, services, data, and other needs.

Like the GIS desktop tools, the ESRI products represent a large percentage of deployments.

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. Fifty-eight percent (58%) of the States report that their road centerline databases have a spatial resolution of 1:5,000 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, seventy percent (70%) of the states report that their road centerline database includes all public roads; this is up from sixty percent (60%) in 2009. Twenty-one percent (21%) include only state and county routes; this is a drop of ten percent (10%) since 2009.

The majority of states (88%) distribute their transportation feature databases. Sixty percent (60%) distribute free of charge to whoever wants it. Most other States (30%) 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. Sixty-two percent (62%) reported having formal data sharing agreements with public or private entities. Ninety-six percent (96%) of states are fully or partially involved in state GIS coordination programs.

States were asked if they maintain any other statewide geo-spatial data layers, beyond the road centerline database. Many states responding reported that they also maintain some other geo-spatial database, generally other transportation networks or features, such as rail lines or airports. Other "framework" geo-spatial data maintained by State DOTs include political and administrative boundaries (51%), geodetic control points (42%), and ortho-imagery (25%). State DOTs are less likely to maintain other framework layers such as water features (21%) or elevation (20%).

Over half the respondents (51%) claimed they were not working with their neighboring states on geospatial matters.

Sixty-six (66%) percent of responding states reported including some local source data as a component of their roadway transportation data set, up slightly from 2009. Meanwhile, sixty nine percent (69%) do not include commercial data as part of their transportation network, down slightly from 2009.

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 benefit (62%), but unlike last year, not quite the most difficult and costly to implement. The honor goes to Asset Management in 2010. Last year, Asset Management was cited twenty-five percent (25%) less than Enterprise data integration. However, Asset Management was selected as the business where geospatial technology adds the most value.

Current Activities
Respondents were asked to list up to four of their current GIS activities for the *Roll Call of States*. 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. New to the table for 2010 are HPMS, GPS/Field/Mobile, and Asset Management. Falling off the list from 2009 were Project/Construction Management, Safety/Crash Analysis, Ortho Imagery, Video Log Integration, and Traffic Counting.

GIS Activity (Categories with at least 5 citations)	# of Citations
Enterprise Applications	16
Development of web-based GIS applications / Portals	15
Migration to new GIS software / Hardware /Architecture	11

Road Centerline database development/enhancement	10
Location referencing system	10
HPMS 2010	9
Asset/Pavement Management	8
Road Inventory management	8
Road features/activites	8
GPS / Field Collection / Mobile	6
5-1-1/ Emergency Operations	6
Environmental / Cultural Analysis	6
Mapping / Base Maps	7

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

The top three items on the list are all enterprise related. They imply GIS involvement in many areas of the business enterprise wide. The development of web based applications and portals, both Intranet and Internet, reflect the use of GIS for transparency, and data access and integration. Migrations to increased computing power and the latest technology are indicative of increased use and positions GIS for enterprise implementations.

HPMS appeared in smaller than anticipated numbers, could mean timing is involved. Last year was too early to appear on the list; this year the survey was too late. DOT's are finishing 2010 HPMS submittal preparations.