2009 State Summary Report

This is the 14th 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 *Roll Call of States*, and administered using a web-based survey instrument. The result was a surprising eighty (80) percent response, with forty (40) states and the Commonwealth of Puerto Rico submitting. The responses were down from ninety-six (96) percent in 2008.

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

GIS Organizations Structure and Development Stage

A majority of the States (46%) 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 (39%) 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 (38%) 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.

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 (68%) also reported having staff with an information technology or computer science background. Thirty-four (34) percent of the States reported having a certified GIS professional on staff. However, only twelve (12) percent of respondents claimed certification was an important hiring consideration.

The allocation of GIS staff time across core functions shows a fairly even distribution of 14 - 16 percent for LRS maintenance, data warehousing, technical support, end user and web applications development, with slightly more time spent on base map maintenance (20%). These results represent the same distributions as 2008. However, the distribution of staff activities varies considerably across agencies, and even within an agency from one year to the next.

On average, respondents outsource just over forty (40) percent of their GIS application development work. The median outsourcing expenditure is approximately $100,000.

GIS Software

Respondents were asked to identify what software products were used for GIS analysis and web mapping by core and user staffs. Twelve separate products from 6 different vendors were identified.

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-three (73) percent of the States, either alone or in combination with other database software. Other commercial database software used by the States includes SQL Server® (46%), and Microsoft Access® (34%).

ArcSDE® (60%) and Oracle Spatial® (36%) are the principal software packages used to manage the geo-spatial attributes in enterprise data warehouses.

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

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. Seventy (70) 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, while thirty-one (31) percent include only state and county routes.

The majority of states (62%) distribute their road centerline database free of charge to whoever wants it. Most other States (32%) 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. Nearly sixty (60) percent reported having formal data sharing agreements with public or private entities.

States were asked if they maintain any other statewide geo-spatial data layers, beyond the road centerline database. Ninety-eight (98) percent of those 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%), ortho-

imagery (46%), and geodetic control points (46%). State DOTs are less likely to maintain other framework layers such as elevation (26%) or water features (36%).

The primary sources of geo-spatial data used by State DOTs are other state and local agencies (identified by 83% of those responding), followed by statewide geo-spatial clearinghouses (66%), and geo-spatial data maintained by federal agencies (49%). Less common sources include data purchased from commercial data vendors (25%) or data acquired through the Geo-Spatial One-Stop (17%).

Over sixty (60) percent of responding states reported including some local source data as a component of their roadway transportation data set. However, seventy-five (75) percent do not include commercial data as part of their transportation network.

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 (70%) and the most difficult and costly to implement. Last year, Asset management's percentage was similar to Enterprise data integration as costly to implement, but this year, Asset management was twenty-five (25%) less than Enterprise data Integration. However, Asset management was selected as having the expected greatest future benefit (68%); twenty-five (25%) greater than Enterprise data integration.

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 2009 are 5-1-1 / Emergency operations, Video log integration, Mapping / base maps, Roadside features / activities, and Traffic counting. Falling off the list from 2008 were Truck routing / permitting, GPS collection / integration, Strategic Planning, Right-of-Way, and Data Warehouse Activities.

The DOT's are active participants in respective statewide geospatial coordination efforts. Ninety-five (95) percent of respondents indicated having involvement; nearly seventy (70) percent are fully engaged in coordination efforts. However, only one-half of the states indicated providing centerline data to the US Census Bureau or E911 efforts. Only seventeen percent of states noted having cross border coordination with their neighboring states.

GIS Activity (Categories with at least 5 citations)	# of Citations
Enterprise Applications	21
Development of web-based GIS applications	11
Location referencing system	9
5-1-1/ Emergency Operations	9
Road Inventory management	8
Migration to new GIS software / Hardware /Architecture	8
Project/Construction Management	7
Road Centerline database development/enhancement	7
Safety/ Crash analysis	6
Ortho-imagery data collection / integration	6
Video log integration	6
Environmental / Cultural Analysis	5
Mapping / Base Maps	5
Roadside features / activities	5
Traffic Counting	5

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

The list reflects a few surprises, particularly, items that did not make the cut this year. Notable absences from the list are GPS collection / integration from 2008, and recent hot-topics, the Highway Performance Monitoring System (HPMS), and the American Reinvestment and Recovery Act (ARRA). The latter two topics may have emerged too late to make the survey in significant numbers. The HPMS submittal is especially interesting because over ninety (90) percent of respondents will use GIS-T data layers for their submittal and seventy (70) percent will use the DOT's GIS road network. Great intrigue awaits next year's results. Will new topics like data visualization move to the forefront, or will DOT's still be in analysis/wait and see mode?

Overall, whether the score refers to Enterprise applications, web based applications, or video log integration, they can all be considered enterprise application efforts. The citations signify GIS activity is truly mainstream, enterprise wide.