Applications of Enterprise GIS for Transportation (AEGIST) can help States move to enterprise data governance and asset management in a way that minimally impacts data users while lowering the cost of managing transportation assets at all points in their life cycle.

**INTRODUCTION**

Today’s transportation infrastructure is becoming a more complicated mix of data providers and users, and State and local transportation agencies have discovered that the well-established data management methods and tools of the past have reached their evolutionary limits. In addition, for those DOTs that have not yet done so, there are now many advantages to adopting an enterprise perspective to the roadway inventory.

This more integrated approach to transportation system management requires business rules that address data quantity, quality, and the need to integrate data across multiple levels of government. This is a massive undertaking, even for DOTs that already have an integrated highway inventory. Many transportation departments are struggling to deploy enterprise linear referencing systems that will relate work processes, transportation system data editing, and publication (data reporting, distribution, and sharing).

The Federal Highway Administration’s Applications of Enterprise GIS for Transportation (AEGIST) Guidebook presents an integrated governance structure for efficiently managing geospatial data—including business rules that support better collection and sharing among different DOT workgroups—that will enable a single roadway dataset that meets the needs of multiple State and local business units.

The AEGIST Guidebook proposes transformative changes, developed through a comprehensive vetting process, which will be tested by the States through Pooled Fund Program No. TPF-645: Applications of Enterprise GIS for Transportation, Guidance for a National Transportation Framework (AEGIST).

The pooled fund study will assist State DOTs, metropolitan planning organizations, and local governments in creating enterprise GIS data management systems based on data governance best practices that support the principle of measure once, use many times.

**COLLECT IT ONCE, USE IT A BUNCH**

AEGIST is meant to help States discover how to cut windows into the functional silos that have individually deployed GIS, BIM, and similar tools, so that the whole enterprise may reap the benefits of these achievements. Doing so will allow the entire organization to evolve to the next level of operation: civil infrastructure management (CIM). CIM is an asset-centric framework for data governance and management. It builds on the existing, task-focused, organizational structures and the concepts of BIM for Infrastructure to show how to migrate data assets from one workgroup to the next as a transportation asset moves through its life cycle.

As an asset moves along its life cycle, the data about that asset should move through the functional workgroups of the agency. The vision of AEGIST is seamless integration of descriptive and performance transportation asset data across all user groups, using the CIM structure to lower operational costs within the agency.

**DATA GOVERNANCE**

Data governance is a joint exercise of senior-level managers (agency directors, workgroup managers, and the chief information officer), the many business unit’s subject matter experts (the practitioners), and the information technology (IT) experts supporting the enterprise and the business units (see Figure 1). Enterprise data management is possible once enterprise data governance has been established.

**NATIONAL TRANSPORTATION DATA STRUCTURE**

AEGIST presents a national transportation data structure, starting with roadways. The intent is to continue to provide the data products expected by the many task workgroups within an agency, while simultaneously reducing the cost of data maintenance.

In the proposed data model shown in Figure 2, the linear referencing method (LRM) position information is acquired from the LRM object that is present at the location of a calibration point. This means the calibration point knows both its LRM location and the type of LRM object. Potential every intersection bridge pier and railroad grade crossing could be used as a calibration point. Since centerline editing will involve the addition, removal, or modification of a whole segment centerline, converting all intersection points to serve as calibration points is recommended.

Element types (see Figure 3) include pavement markings, signs, bridges, guardrail, ROW parcels, drainage ditches, retention ponds, toll plaza, traffic signals, and fencing. Each type probably has a State DOT workgroup devoted to its design, installation, and maintenance. There is also likely to be a specialized database with information about the elements they work with. Many of these workgroups will need geographic location data in addition to business data in order to put them in the proper 2D or 3D location. There are dozens of potential elements that could be included, ranging from sign assemblies to culverts.

The National Roadway Base Map (NRBM) standard mandates the inclusion of only the following roadway elements, each of which has a list of essential and optional attributes:

- Intersections and their component approaches
- Restrictions
- Interchanges, with their component ramp route segments; ramp extensions; and intersections (on limited-access highways only)

Figure 4 shows the two intersection treatments provided by the NRBM. In the upper left is the LRM-based version, where intersections are a single point. To the right is an enlarged view of the middle portion of the LRM map. This scale allows the internal “quantum” components of an intersection to begin to appear. This is not just an enlarged view of the LRM map; it is an entirely different cartographic product.

**GUIDANCE ON DATA COMPIlATION, MAINTENANCE, AND PUBLICATION METHODS**

The AEGIST Guidebook is just the next step in developing a national transportation dataset that can serve the needs of the States, Federal agencies, local governments, Tribes, regional agencies, and other users. Under the Standards and Governance for Enterprise Geospatial Systems in Transportation task order (Program Support for Highway Policy Analysis), many key decisions have been made regarding the structure of the national dataset for roadways and how it can be constructed by the States. Other potential elements of a complete NRBM will be developed during the pooled fund study. The general guidance developed and included in the Guidebook will then be refined accordingly. The pooled fund study will provide financial and technical assistance to the States to establish data governance, produce the NRBM dataset, and utilize portions of the database design and workflow as appropriate.