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A NEW DATABASE FRAMEWORK FOR FLORIDA'S TRANSPORTATION PLANNING: INTEGRATING WORK PROGRAM, MULTIMODAL TRANSPORTATION NETWORKS, PLANNING AND ENVIRONMENTAL DATABASES

PROBLEM STATEMENT

At present, the transportation planning databases, transportation networks and applications associated with the Florida Department of Transportation (FDOT) Work Program (WPA), Roads Characteristics Inventory (RCI), Florida Intrastate Highway System – Decision Support System (FIHS-DSS), Florida Standard Urban Transportation Model Structure (FSUTMS), Florida Geographic Data Library (FGDL), Efficient Transportation Decision Making (ETDM), and Strategic Intermodal System (SIS) are not fully integrated in a connected Geographic Information Systems (GIS) environment. The lack of integration impedes the efficient flow of information and exchange of variables among the databases and related applications, thus limiting the full potential for integrated transportation modeling and environmental analysis. In addition, the heterogenic nature of such information may contribute to the lack of awareness about its availability. Thus, when the identified information resources are available, there is a need for methods on how to make use of them for given applications.

OBJECTIVES

The overall goal of this research project is to develop a database framework that establishes connections among the databases used in transportation planning in order to facilitate data sharing and exchange. The specific objectives of this research project include the following:

1. Develop a methodology for the integration of existing transportation databases into a connected database framework.
2. Test the methodology by connecting selected databases into the database framework.
3. Develop user-friendly tools to facilitate the integration of Florida's transportation data to the database framework.

FINDINGS AND CONCLUSIONS

By analyzing the current transportation planning process and the related databases, the researchers identified four main data connectivity problems:

1. There is a discrepancy among street reference data used at different levels of transportation planning, from the Metropolitan Planning Organizations (MPO) mobility planning to FDOT WPA. Local GIS street data used by MPOs are different from the FDOT RCI-based linear-referenced department basemap. Additionally, transportation modeling stick network data lack accurate geographic reference and do not match either local data or the department basemap, which creates another layer of discrepancy among the transportation planning reference data. Such discrepancies hinder efficient exchange of information among related transportation planning applications.

2. There is no database tracking mechanism for transportation project reference and attribute data as they move from Long Range Transportation Plan (LRTP) to ETDM to WPA. A database mechanism is necessary to facilitate the information sharing during the different phases of the transportation planning lifecycle, from MPOs to FDOT.

3. There is no data structure to handle multimodal transportation data. The need to manage multimodal transportation planning data has increased with the development of the SIS. Further, a database organization is needed to integrate non-FDOT multimodal datasets, e.g., from federal or local sources.

4. Several socio-economic databases are used in transportation planning, such as landuse, demographics, and employment; but there is no documented method for connecting them in a larger transportation database framework.

To address these issues, the research team developed a concept for a connected database framework that would link the main databases used at different levels of the transportation planning process; examples of data that should be included are local reference, department reference basemap, socio-economic, and multimodal transportation planning data. Specific recommendations include the following:

1. Use a state-wide GIS street reference system to mediate the exchange of information between the local MPO street network and FDOT's RCI basemap. The ideal solution would be for FDOT and MPOs to use a single street reference system with a linear referencing system. This reference could be used to facilitate the exchange between the FSUTMS stick network and the department basemap. Dynamap/Transportation (D/T) streets, a commercial product purchased recently by FDOT, could serve this purpose. D/T includes local streets and is consistently updated from one source with a reasonable time sequence of six months. The research team developed a GIS data association tool that would help transfer attributes between different reference data. This solution extends the street network to include local streets, offers more accurate geometry and provides access to the RCI linear referencing system, all in the same street network. However, it does not solve current problems with inaccurate mapping of the RCI events.

2. To allow local transportation projects to be tracked from an MPO's LRTP to ETDM and to the WPA in the FDOT system, use a database structure with linkages that would allow access to project information from inception at the planning level to construction and, eventually, to RCI.

3. Adopt Environmental Systems Research Institute's (ESRI) network dataset for integrating multimodal transportation planning data. The network dataset would be appropriate as a data structure for managing SIS multimodal data as well as for related networking applications.

4. To integrate socio-economic data in the transportation planning database framework, most of the socio-economic polygon data should be related by a combination of common attributes and geographic boundaries. Specifically, for point employment data, such as InfoUSA data, aggregation to the TAZ level should be performed by geocoding using property parcel data and the D/T street network.

BENEFITS

This research contributes to streamlining data sharing and exchange among databases used in transportation planning by providing documentation of data and data connectivity, methods for establishing missing links, and tools for facilitating the implementation. The proposed database relationships among LRTP, ETDM, and WPA could be used to track and exchange project data from inception at the MPO level to the FDOT work program and RCI. The use of D/T streets, enhanced by the

RCI linear referencing system, can be applied to planning applications that require more accurate GIS streets and need to include local streets in the same layer. Applications that could benefit from this solution include SIS Prioritization, Transportation Modeling, ETDM, Traffic and Criminal Software (TraCS), and Intelligent Tranportation System (ITS) traffic operation and planning. The network dataset model proposed for the SIS can support the overall database organization and management of SIS data as well as networking applications (e.g., determination of optimal routes, transportation modeling, and tracking of goods from origin to destination).

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