AN EVALUATION PLAN FOR THE CONCEPTUAL DESIGN OF THE FLORIDA TRANSPORTATION DATA WAREHOUSE

PROBLEM STATEMENT

Traffic information plays a substantial role in the decision-making process of road users with respect to departure time, mode selection, and route choice. Widespread traffic information is expected to reduce traffic congestion and pollution, lower fuel consumption, enhance traffic safety, and improve traffic management. Thus, one of the chief goals of a traffic management center is to deliver up-to-date information on traffic conditions to both *current* and *prospective* travelers. The rapidly growing deployment of ITS technology statewide, combined with the need to integrate and employ ITS data applications, calls for a means of collecting, storing, and manipulating huge amounts of transportation data.

The following are challenges to implementation of the central data warehouse (CDW):

- Available transportation data are collected by several agencies but with no common standards.
- Data organization ranges from data logged in plain files, such as some road maintenance data, to data managed by commercial databases, such as transit and toll transactions data.
- Many data types collected by the same system are not integrated. Moreover, no database model is utilized to describe the relationships between data types. For example, loop detectors data and incident data collected by the same agency might have totally separate database schemata.
- Data currently available to support needed short-term applications are insufficient. Therefore, a strategy should be developed to make use of existing data in developing multi-phase applications that have the ability to expand when more data become available.
- Administrative and cross-jurisdiction problems occur when data maintained by different agencies must be collected. Agencies hesitate to share the data due to cost, liability, and lack of sufficient manpower.

OBJECTIVES

There are three main objectives in this study:

1. Establish a multi-year and multi-phase implementation plan for the Central Data Warehouse project.
2. Provide a budget for the data warehouse implementation that includes the costs of equipment, hardware and software, and human resources.
3. Suggest database design elements and application requirements for the data warehouse.

FINDINGS

Researchers developed a three-year implementation strategy for the data warehouse, which would constitute Phases 2, 3, and 4 of this project. Phase 2 would cover interstates under surveillance and toll roads; Phase 3 would cover parts of the arterial systems in highly populated areas; and Phase 4 would cover transit systems, emergency management centers, and seaports across the state. The start-up cost would include the costs of software, hardware, and personnel (to run the data warehouse), in addition to costs associated with meeting fiber network communication requirements. The start-up cost is estimated to be $750,000. The yearly cost would cover labor, on-campus hardware maintenance, and dedicated T-1 connections, and would be an estimated $430,000/year starting the second year (or Phase 3).

Most of the traffic management software deployed by FDOT uses proprietary definitions which are not compatible. These data definitions need to be mapped to ITS standard definitions, such as the Traffic Management Data Dictionary (TMDD) and the ITS Data Registry (ITS-DR).

Researchers suggested two different database replication techniques to copy the data (collected and logged by remote sites) into the Florida CDW database: a multi-tier approach for application development is suggested for the CDW. This approach identifies at least three separate application development layers or tiers, namely, (1) the display or presentation tier, (2) the logical tier, and (3) the data tier. Researchers also recommended dynamic query applications such as On Line Analytical Processing (OLAP). They proposed the multi-dimensional database model to implement the data warehouse. In this model, data are organized in fact and dimension tables. Common dimensions, such as TIME and LOCATION, are proposed to provide the integration between different data types employed by the data warehouse. GIS is to provide the LOCATION dimension, in addition to part of the data warehouse functionality.

CONCLUSIONS

This study presents the guidelines for achieving a fully functional Florida data warehouse by the year 2005. The three-phase implementation strategy developed in this study is considered the most appropriate method for development of the Florida data warehouse. This strategy will allow Florida citizens to access the developed applications while the CDW project continues to expand. The total estimated budget for the Florida CDW is very close to similar programs presently run by universities and public agencies nationwide.

BENEFITS

This research provided the Department with a plan, including estimated cost, for implementing a data warehouse in central Florida. Such a data warehouse is needed to integrate traffic data from various agencies (i.e., FDOT, expressway authority, local government) into one source, which will allow seamless, real-time information to be provided to Florida citizens. The desired net effect would provide both social and economic benefits by reducing traffic congestion and pollution, lowering fuel consumption, enhancing traffic safety, and improving traffic management.

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