UTC PROJECT DESCRIPTION

PROJECT NUMBER:
02114

PROJECT TITLE:
GIS Maintenance & Resource Allocation Visualization

CO-PRINCIPAL INVESTIGATORS:
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PROJECT OBJECTIVE:
This initiative focuses on how ALDOT’s maintenance forecasting and new construction planning processes can be facilitated and enhanced through GIS visualization. The initiative evaluates the plausibility and effectiveness of using multi-criteria decision models and sensitivity analysis based on economic, safety, engineering and political concerns.

The ultimate goal of this initiative is to create visualization systems that facilitate ALDOT’s mission to continue to build and maintain the state’s transportation system effectively.

The initiative also provides needed data to comply with GASB 34’s requirement to grade, maintain, and disclose the overall quality of the state’s roadway system. In this regard, this initiative is integrated with current UTCA Project: 01459, GASB 34 and Asset Management.

PROJECT ABSTRACT:
Highway systems throughout the United States are showing their age. Consequently, transportation agencies across the country are increasingly faced with the dilemma of allocating resources to new construction to increase capacity or allocating resources to maintain existing roadways. The allocation process includes economic, safety, engineering and political concerns. Therefore, it is vital for planners and policymakers to view and understand multi-criteria decision models. Moreover they must be able to effectively depict their decisions to stakeholders and constituents.
This initiative prototypes multi-criteria decision models using geographic information systems (GIS) based on statistical analysis and data mining techniques. Although these techniques are effectively used in the private sector, their use by transportation agencies to allocate resources is rare.

The researchers will work with Alabama Department of Transportation staff to specify, design, build, test, and evaluate a multi-criteria GIS visualization resource allocation support system. Based on preliminary work, the system will integrate data from the Alabama Bridge Information Management System (ABIMS), ALBRIDGE, Comprehensive Project Management System (CPMS), ALDOT’s Intergraph GIS, and Pavement Management System (PMS).

The initiative has support from ALDOT’s bureaus of planning, maintenance, and finance.

PROJECT TASK DESCRIPTIONS:
1. Analyze Existing Materials
2. Benchmarking
3. Requirement Discovery Prototyping
4. System Integration Technology Prototyping
5. Develop Applications
6. Sensitivity Analysis
7. Prepare Report
8. Training Workshops for ALDOT Staff

MILESTONES AND DATES:
1. Detailed Study Report 3/29/02
2. Systems Requirements 5/31/02
3. Integration Requirements 6/28/02
4. Prototype 9/6/02
5. Enhanced Prototype and Training 12/31/02

TOTAL BUDGET:
One-year project: UTCA funds $49,994; total budget $105,059.

STUDENT INVOLVEMENT:
This initiative will engage: Two part-time (10 hours per week) graduate students for one year. It is anticipated that the students will become fully versed in the effective use of visualization tools in forecasting and planning. One graduate student will use this initiative as the basis for his dissertation. A team of 4-5 undergraduates will participate in this initiative as a part of their senior systems development class.

RELATIONSHIP TO OTHER RESEARCH PROJECTS:
This project is the next step in the Asset Management initiative of ALDOT. Current work is underway through UTCA Project Number: 01459 – GASB 34 and Asset Management. It will utilize the models and tools created in that project.

TECHNOLOGY TRANSFER ACTIVITIES:
Based on the proposed methodology and the expected deliverables, the Principal Investigators hope to publish articles and/or present the results to appropriate transportation journals and conferences. Targeted publications include: the Transportation Journal.

POTENTIAL BENEFITS OF THE PROJECT:
This project seeks to improve the management of ALDOT’s roadway maintenance efforts and supports UTCA’s theme of Management and Safety of Transportation Systems, GASB 34 Compliance and effective use of Human Resources. The project extends basic research, then applying research to Alabama’s DOT situation, and finally providing knowledge and technology transfer to ALDOT. The project will involve faculty and students from MIS, professional staff from the Enterprise Integration Lab, the Center for Business and Economic Development and graduates students from College of Business Administration and College of Engineering. GIS, as a part of the maintenance forecasting tool, will enable ALDOT to more effectively evaluate and communicate (through visualization) the tradeoffs between alternative investment options during planning. It will also allow ALDOT to demonstrate the impact of higher or lower budget levels on system condition and performance.

TRB KEYWORDS: