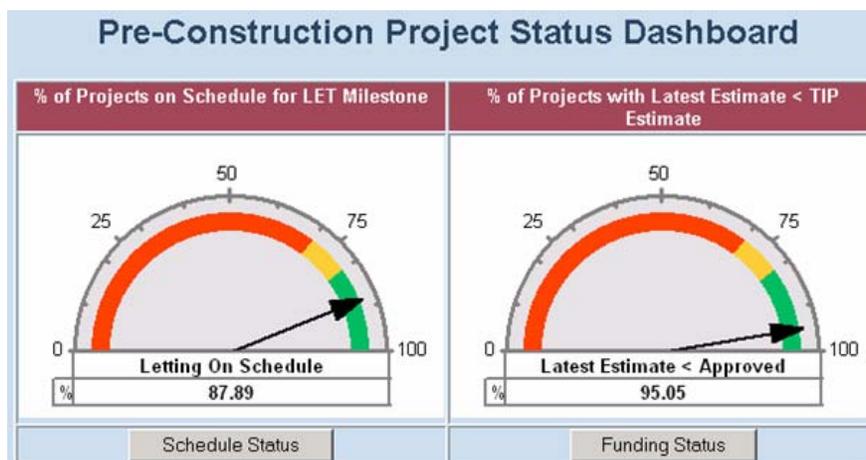**NASCIO Nomination Category: Data, Information and Knowledge Management**

Project Title: NC Department of Transportation Pre-Construction Project Status Dashboard

Executive Summary

The North Carolina Department of Transportation (NCDOT) serves as a caretaker of a sizeable transportation system, including 78,000 miles of roadway, 74 public airports, public transportation in all 100 counties, two major passenger train routes, statewide bicycle routes and ferry service along eight coastal routes. Major construction, maintenance and enhancement projects are planned using a six year Transportation Improvement Program (TIP). The Pre-Construction Project Status Dashboard is a web-based application for senior executives of NCDOT to manage the schedule and funding of Transportation Improvement Program (TIP) Projects for Highway Construction and Maintenance. NCDOT is actively working on over 1000 TIP projects at any given time. These projects are geographically diverse, span multiple phases such as Right of Way(ROW) acquisition, Environmental Study and Let (award construction contract to private vendor), and support a wide range of tasks such as new road construction, bridge replacement and road improvement. The Executive Reporting dashboard is designed to visualize the overall health of projects in the Pre-Construction phase using Key Performance Indicators (KPI) for Schedule Status and Funding Status. The KPIs are presented in a tachometer gauge and allow management to view the percentage of projects that are on schedule and on budget.

The application allows the user to drilldown and view performance measures and supporting details. The schedule and funding performance measures view can be restricted to view the information by the fourteen geographical divisions, 100 counties, project types or by Fiscal year. The dashboard application is an analytical application using SAP Business Intelligence (SAP BI) software package. SAP BI is automatically updated every night from the SAP R/3 transactional system as well other legacy systems at NCDOT. As a result, the dashboard application always displays current data and is a reliable source of information for the senior management. The Pre-Construction Project Status dashboard is the first in a series of Executive Reporting dashboards to be developed at NCDOT. The project provides the Information Technology (IT) infrastructure and methodology for similar application in other business areas, such as Fiscal, Construction and Environmental Compliance. The Secretary of Transportation has initiated a project to develop a comprehensive dashboard for senior management to monitor the key business areas at NCDOT as well as provide information to the public regarding performance of NCDOT.

The Pre-Construction Project Status Dashboard will help senior management at NCDOT to manage a large number of complex TIP construction projects and deliver new roads and bridges for the citizens of North Carolina on time and on budget. NCDOT has the responsibility of providing an adequate transportation infrastructure for the growing North Carolina economy. The dashboard provides a tool for effectively utilizing the available transportation dollars and completing transportation improvement projects on time.

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Project Description

NCDOT Division of Highways is actively managing over 1000 complex projects at any time. The projects are distributed across 14 divisions and have a mix of different project types, such as new Construction, Bridge Replacement, and Enhancement. DOT senior management needed the ability to determine the overall status of the projects in the Pre-Construction stage and identify projects that are doing well and projects that are having problems. An application was needed that would be easy to use, display department KPIs and performance measures, and show the overall status of each project, based on data that was always current and automatically updated from the SAP R/3 Project Management information.

The solution was to develop a web based executive dashboard to provide the required information and analytical capabilities. The overall information flow is displayed in Figure 1. The initial screen of the application displays two KPIs: On Schedule and On Budget. The KPIs display the overall status of all the active TIP projects. Table 1 describes the KPIs. The KPIs are supported by 10 performance measures, 4 for the Schedule status KPI and 6 for the Budget Status KPI. The performance measure view can be restricted by geographical region, project type or time dimension. The application further provides the ability to drill into details for each of the performance measure with the lowest level detail being the information about a single project.
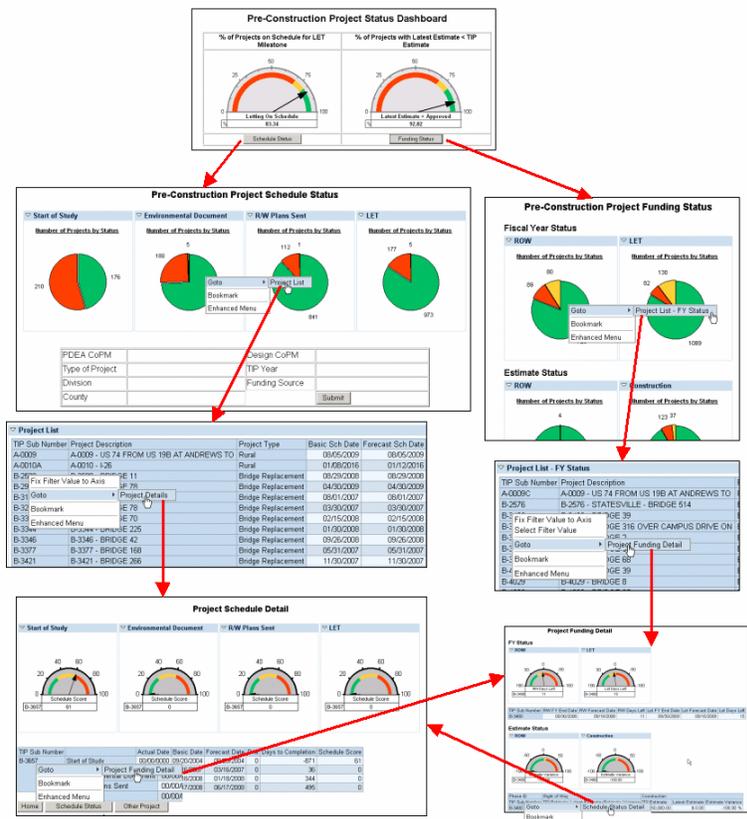

Figure 1: Information Flow for Pre-Construction Project Status Dashboard

KPI	Description
% of Projects on Schedule for LET Milestone 50 25 75 0 100 Letting On Schedule % 75.02 Schedule Status	This Gauge shows the % of projects where the Let Milestone is not complete and on Schedule. The Let Milestone for a project indicates that the Pre-Construction work on a Project is complete and the Contract has been awarded to a Private Vendor for Construction.
% of Projects with Latest Estimate < TIP Estimate 50 25 75 0 100 Latest Estimate < Approved % 93.16 Funding Status	This Gauge displays the % of total projects where the Latest Estimate is less than the TIP Estimate. TIP Estimates are approved by Board of Transportation every year and the latest estimate relects the current expected cost of the project.

Table 1: Key Performance Indicators

The schedule performance measures show the count of projects in a red, yellow or green status in the four main project phases: Start of Study, Right of Way (ROW) acquisition, Environmental Analysis and Letting (award the project for construction to a vendor). The performance measures are displayed as pie charts. The green status indicates that the phase is likely to be completed as scheduled, yellow means that the milestone is not likely to be completed on time but can be reached with additional efforts, and red indicates that the project as currently scheduled will not be able to achieve the milestone. The funding performance measures show the count of projects in a red yellow or green status for planned funding year, planned amount and actual expenditures in ROW and LET project phases. The ROW funding and Construction funding for projects should be allocated in a timely manner and the planned funding year performance measures displays the count of projects where the funding is aligned with the project progress. The estimate status performance measure tracks that the correct amount of funds are allocated for the project. The actual expenditures against the allocated funding is captured by the expenditure status performance measure.

The application allows the user to view project lists for each pie of the 10 performance measures. The project lists can be downloaded to excel for easy distribution and further action. The projects lists have links to detailed information about each project. The dashboard is setup to display real time data as of the previous day.

The current version of Pre-Construction Project Status Dashboard has been in operation since Feb 2007. The initial version with just the schedule status has been available since October 2006.

Improvement of Government Operations

NCDOT established the goal of "Implement new Procedures to improve Oversight and Delivery of Highway Projects" in its 2007 Agenda. The Pre-Construction Project Status Dashboard is a significant milestone towards that goal. It provides senior management the tools to effectively monitor and manage a large number of complex active projects. The application is simple to use, with graphical displays and is automatically updated using well tested IT processes. The dashboard allows management to quickly identify projects behind schedule or over budget. From the summary view the user can get to the root cause of the problem with a few clicks. The Pre-Construction Project Status dashboard is the first in a series of Executive Reporting dashboards to be developed at NCDOT. The project provides the Information Technology (IT) infrastructure and methodology for similar application in other business areas, such as Fiscal, Construction projects and Environmental Compliance. The Secretary of Transportation initiated a project to develop a comprehensive dashboard for senior management to monitor the key business areas at NCDOT as well as provide information to the public regarding performance of NCDOT. At this time, it is not possible to quantify any monetary savings as a result of this project.

Using a standard methodology and IT infrastructure means that the cost of developing other modules will be lower. Since the dashboard is created from data extracted nightly it is always current. The data driving the dashboard is the same that is used to provide reports to project managers for their reporting needs. The IT infrastructure ensures that all users are working with one integrated data repository, reducing the chances for data errors as result of manual processes

Public Value of the Project

The public value of the project will be realized from an improvement in the schedule and budget performance of complex highway projects. The Pre-Construction project status dashboard will enable NCDOT to efficiently use the available funds for maintenance of highway infrastructure. In the long run, this project will help the citizens with better roads.

Marketing / Education

The dashboard's user community consists of DOT senior management and the Project Managers for TIP projects. Training materials were developed and workshops conducted to roll out the functionality. As a result of the workshops, the "On schedule" KPI has improved from 77% in Oct 2006 to 87% in May 2007.

Hardware and Software Environment

The Pre-Construction Project Status Dashboard is implemented on NCDOT's SAP Business Warehouse(BW) system. SAP Business Warehouse is a Enterprise Data Warehouse product designed for reporting and analysis. NCDOT is using SAP BW for its reporting and analysis requirements in most of the business units. It provides consistent data with state of the art reporting and analysis tools. The system is designed to scale to a large number of users all over the state. BW was the ideal platform to develop and deploy the dashboard application, because it leverages existing IT investments and provides the tools needed for dashboard applications. SAP BW is setup to extract data from the SAP R/3 ERP system on a nightly basis. NCDOT is using the Project System (PS) module for maintaining the TIP project schedules. The funding and expenditure information is maintained in the SAP R/3 system as well. The automatic nightly extracts to BW ensure that there is no manual intervention for populating the data that drives the dashboard. The dashboard always reflects the status of projects as of yesterday and can be trusted to accurately reflect the project status.. Sap R/3 and BW systems are designed for thousands of users and do not show performance degradation with a large number of users.