TN TDOT Department of Transportation

Research Summary

Enhanced GIS Legacy Database for TDOT Legacy Data Phase III: Power BI Applications

Project Number:
RES2016-23

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WHAT WAS THE RESEARCH NEED?

TDOT has embarked on an initiative to develop data analytics and visualization capabilities using the Microsoft Power BI platform to serve the agency's needs. Critical to the success of this initiative is the ability to identify, develop and serve a range of applications across TDOT's various divisions, covering a variety of operating modes within the state. However, to date only a few Power BI applications have been developed by agency staff, largely due to the lack of opportunity to design, develop and implement Power BI in ways that leverage information that TDOT obtains and manages. As a result, there are missed opportunities associated with performing both basic and comprehensive data analytics that become possible once TDOT staff become more aware and proficient in the use of Power BI.

WHAT WERE THE RESEARCH OBJECTIVES?

The objective of this project was to create Microsoft Power BI applications that enable more informed decision-making by TDOT in providing safe, secure, efficient, and environmentally friendly passenger and freight transport. An added goal of this research was to help mainstream the use of Power BI across the organization by providing the necessary knowledge, skills, and experience to TDOT staff in support of workforce development.

WHAT WAS THE RESEARCH APPROACH?

At the outset of the endeavor, the research team met with TDOT staff to identify Power BI applications; the following were selected for immediate development: Crash Safety Analysis and Pavement Management. segments. For each

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of these applications, the following multi-step process was performed in a sequential manner: 1) meet with TDOT staff to learn about available data and understand data analysis needs that could potentially be met by developing a Power BI analysis tool, 2) develop a storyboard that included a description of desired capabilities, functions and performance metrics, 3) invite storyboard feedback from TDOT following which the Power BI design specification was developed, 4) produce the application for beta testing, and lastly 5) finalizing the application and delivering the tool to TDOT to serve and maintain.

WHAT WERE THE FINDINGS?

The activities associated with this project have demonstrated the high value of developing Power BI applications in supporting TDOT's mission. The agency is blessed with a large amount of data characterizing physical and operational characteristics of transportation assets in the state. Yet, at the same time, this amount of data can be overwhelming, making it difficult to support informed decision-making. Power BI offers a platform for organizing large amounts of disparate data into a cohesive and practical environment for performing analyses in support of a variety of TDOT's roles and responsibilities. It has the added value of being able to display results in several formats, including maps, graphs, tables, and other visual means that are best suited for understanding and communicating key observations.

IMPLEMENTATION AT TDOT

In addition to recommending the continued and expanded use of Tennessee Crash and Safety Analytics Tool (TCAST) and Tennessee Pavement Analytics Tool (TPAT) within the agency, it is suggested that TDOT move forward with the development of other Power BI-based tools, as there are several areas where such activity would prove meaningful. Examples include identifying locations of extreme weather hot spots, assessing transportation access for socially disadvantaged populations, studying truck parking, and public engagement, among others. Concurrently, it is recommended that TDOT invest in Power BI training for its workforce in order to expand this resource capability.

MORE INFORMATION

Find the final report here: https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2016-final-reports/RES2016-23_Phase3_Final_Report_Approved.pdf.

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