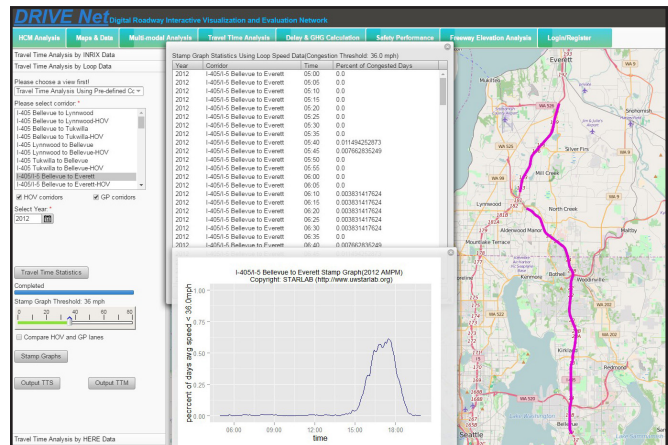# PacTrans (Region 10 UTC) Develops a Practical Data Analytics Tool for Network Performance Measures
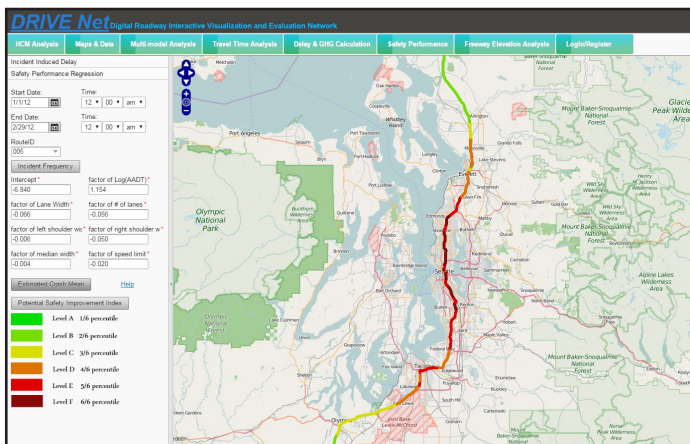
In recent years vast quantities of data have become available through increasingly affordable and accessible data acquisition and communications technologies, including sensors, cameras, mobile location services, and others. This increase in the quantity and variety of data presents a wealth of opportunities in transportation as well as a number of new challenges in both the public and private sectors.

With the recent rise in congestion across the country's transportation system, a significant opportunity resides in the ability to utilize these new data to make smarter decisions. As urban areas continue to densify while suburbs expand further from job centers, past methods for funding transportation infrastructure are proving ineffective. There is a need for data driven investigation that focuses limited dollars where they will make the biggest impact on moving goods and services safely, equitably, and efficiently. The Moving Ahead for Progress in the 21st Century (MAP-21) Act, signed by President Obama in July 2012, recognized this need and established a streamlined and performance-based surface transportation program.



**Safety Performance Analysis**

What are the most urgent challenges to using these new data driven opportunities to inform proactive management and decision making? A few readily identifiable challenges include: entities do not have knowledge of or access to crucial data (this includes silos within individual institutions), data gets collected and stored in different

formats, most analysts continue to use primitive analytical tools such as Microsoft Excel, and many of these analyses take significant amounts of time and tax dollars to execute. Thus the PacTrans STAR Lab at the University of Washington has been working with the Washington State Department of Transportation (WSDOT) on an innovative platform called The Digital Roadway Interactive Visualization and Evaluation Network (DRIVE Net).



**Travel Time Analysis**

DRIVE Net is a region-wide, web-based transportation decision support platform designed to both automate many of WSDOT's existing performance metrics analyses as well as support a variety of new and emerging data sources and analytical methods. DRIVE Net provides a central point of access to DOT data resources and a variety of other public and private sector data, including loop detectors, crash records, commercial probe vehicle data, public transportation data, weather, and ferry traffic.
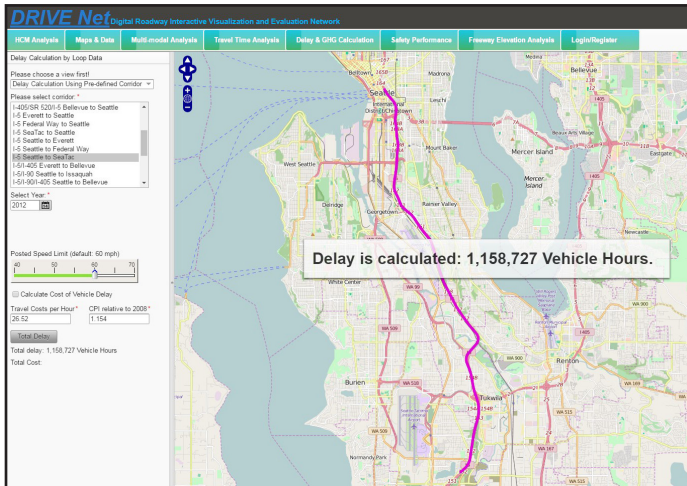
PacTrans STAR Lab developers have worked hard to create automated processes that convert different data set types into formats where they can interact with each other in the uniform spatial and temporal confines of the platform, and then perform quality control. These developers have then created a variety of analysis modules, embedded within the platform, providing users the ability to analyze and visualize a multitude of queries in a single interactive online environment. DRIVE Net is supported by open source spatial and statistical analysis tools. The entire system is hosted and maintained at the PacTrans STAR Lab.

Below are several examples of built in modules.



**Delay and GHG Emissions**

The DRIVE Net traffic safety analysis module includes predictive modeling, hotspot identification, and various visualization tools for assessing the safety performance of the highway system. Further, users can view specific incidents, calculate the associated traffic delay, and visualize and compare different locations and time periods. Though the methodologies are well known in the transportation field, DRIVE Net streamlines the process by automating the data processing and preparation tasks and providing a user-friendly analysis and visualization interface. Further, all of the computation and data management details are handled by the DRIVE Net servers, requiring only a web browser on the client computer.

Working closely with the Washington State Transportation Center, the DRIVE Net team has automated much of the highway performance analysis supporting WSDOT's quarterly Gray Notebook performance report. DRIVE Net users can generate travel time statistics for predefined or custom travel corridors, assess throughput productivity, and visualize travel time reliability in Washington State, all with a few mouse clicks, which is about a 90 percent time savings compared to previous methods of analysis. In addition, DRIVE Net supports delay and greenhouse gas emissions estimation using traffic sensor data and standard EPA emissions factors. The sensor data supporting these calculations is automatically preprocessed, checked for

errors, and imputed as needed to insure the resulting statistics are reliable and reproducible.

DRIVE Net also provides a useful platform for data sharing, with access to a variety of public and private sector data APIs, including transit arrival times, Car2Go car share service, and WSDOT real-time ferry and freeway alert data. Users can also view and interact with high-resolution highway elevation data and download a variety of WSDOT data resources based on user-defined time and location. In addition to the data sharing and analysis modules, DRIVE Net also provides an exciting channel for research dissemination. For example, the STAR Lab has developed modules to allow users to visualize and analyze wireless mac address-based pedestrian sensing data.
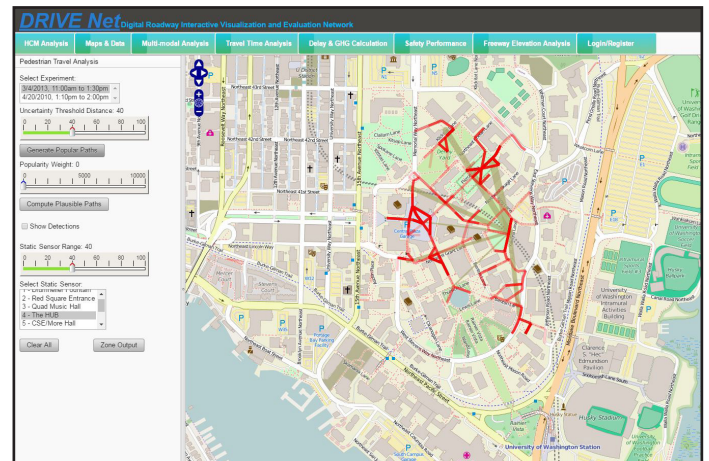
With a modular structure and mature data integration and management framework, DRIVE Net can be expanded in the future to include a variety of additional data resources and analytical capabilities. Soon the platform will be able to assist planners and engineers to visualize what a specific infrastructure investments impact will be on the system, as well as having increased flexibility in the system so that new and emerging models for generating current performance metrics can be tested quickly and efficiently. In the future, STAR Lab developers believe this platform could also be used as a testing grounds for new metrics methodologies. Ultimately this platform may prove to be a key piece in our journey toward a connected vehicle transportation system.



**Pedestrian Travel Analysis**