

Development of an Inter-Agency Transportation Data Platform to Mitigate Congestion in a Bi-National Region



By Niagara International Transportation Technology Coalition

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Benefits Statement

The NITTEC project improves transportation in the Buffalo-Niagara region by enhancing safety, efficiency, and cost savings. It saves lives through faster emergency response, automated incident detection, and safer commercial vehicle operations. Time is saved with real-time traffic updates, improved border crossing management, and predictive traffic strategies that reduce delays. It saves money by optimizing freight operations, reducing fuel costs, and streamlining traffic management. The unified platform integrates multiple data sources, allowing better coordination, resource allocation, and preventive maintenance, leading to a more reliable and cost-effective transportation system.

In this case study you will learn:

1. How NITTEC improves regional transportation by integrating real-time traffic data, enhancing emergency responses, and optimizing cross-border and freight operations.
2. How NITTEC is unifying diverse data sources, utilizing AI for predictive traffic management, and facilitating better collaboration between agencies.
3. How the project utilized stakeholder involvement, systems engineering, and Agile development for successful implementation.

BACKGROUND

Niagara International Transportation Technology Coalition (NITTEC) is a coalition of agencies developed to help get you where you are going more safely and efficiently. NITTEC provides real-time traffic and roadway information to improve traffic flows, and enhance emergency assistance for motorists using the transportation system.

NITTEC's mission is to improve mobility, reliability, and safety on the regional bi-national multimodal transportation network through information sharing and coordinated management of operations. NITTEC operates a Traffic Operations Center (TOC) 24 hours a day, 7 days a week that monitors traffic and informs the public, as well as the member agencies, stakeholders, and first responders, about traffic situations.

As part of a FHWA Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) grant, NITTEC and its partners have developed a tool to bring together transportation data from a wide variety of sources to allow for better situational awareness and response to regional traffic events. This tool allows NITTEC's member agencies to collaborate during major incidents, such as extreme weather events and impacts on international border crossing. The project also included the deployment and integration of several ITS field equipment pilots.

The project focuses on the following three goals:

1. Balance multi-modal demand at international border crossings through active demand management.
2. Extend integrated corridor management functionality & advance the regional traffic model.
3. Improving commercial vehicle operations through targeted traveler information.

To meet these goals, project outcomes were grouped into the following focus areas:

- Improve Border Crossing Performance and Travel Time
- Improve Commercial Vehicle Operations and Safety
- Expand Regional Smart Mobility
- Improve Incident Management
- Provide for Operational Integration with Member Agencies regarding Regional Smart Mobility
- Using Real-time and Forecasted Weather Information for Active Traffic Management Strategies
- Provide Travelers with Enhanced Real Time Information
- Enhance Data Collection, Fusion, Distribution and Archiving

TSMO PLANNING, STRATEGIES AND DEPLOYMENT

AllRoads, the system developed for this project which includes a data platform, addresses some of the long standing challenges experienced in the Buffalo Niagara Region. While ITS projects have been successfully deployed in the past, integrating them into traffic management operations, especially across agency jurisdictions, has proven difficult. NITTEC used this project as an opportunity to leverage the strong inter-agency collaboration it has built to create a new system which addresses the needs of its stakeholder agencies, bringing together the previously siloed sources of traffic data into a common platform. The overall objectives of this project include balancing multi-modal demand across the Niagara Frontier border crossings, improving freight operations by providing targeted information to drivers, using improved weather information in traffic management, improving regional mobility by expanding integrated corridor management activities, and providing

the benefits of multi-agency cooperation by creating real-time inter-agency information sharing and collaboration.

AllRoads was developed by Parsons based on their Intelligent NETworks® Smart Mobility (iNET™) platform, along with an accompanying data hub and data mart to store and disseminate the data to external agencies for information sharing with the traveling public. The data is used by Parsons' award-winning artificial intelligence (AI) and micro-simulation based integrated decision support system (DSS) to generate predicative traffic management strategies that will improve regional traffic performance. The data collected and strategies generated by this cloud-based centralized solution also powers key performance indicators at the regional level via advanced analytics and dashboards, providing insight into the performance of the road network, commercial vehicle operations, and border crossing activities.

In addition to integrating with existing ITS elements and data feeds, NITTEC used this project to deploy new sources of transportation data which were then made available to its member agencies through AllRoads. These included: Traffic Signal Connectivity and Coordination, Development of Decision Support to enact Emergency Signal Timing Plans, Enrichment of International Border Crossing Vehicle Detection Data, Automated Incident Detection through Video Analytics, and Truck Parking Management.

COMMUNICATIONS PLANNING AND EXECUTION

The user needs and system requirements for this project were created by working closely with NITTEC's member agencies through a series of stakeholder workshops and interviews. These included over 60 representatives across over 20 agencies.

The goal of these interviews was to obtain a

comprehensive understanding of the region's existing and desired ITS architecture, and gaps in the existing infrastructure. This feedback was used to create a conceptual design document and develop system requirements for the project.

Development of the system interfaces and integration of stakeholder data occurred gradually over the course of the project and required continuous participation by key members. NITTEC was able to leverage its collaborative structure and pre-existing relationships to maintain this participation over the project lifecycle.

This engagement was largely driven by NITTEC's Strategic Planning Committee, which is comprised of NITTEC personnel and representatives from key member agencies. The committee was able to steer project development, communicate with NITTEC's Board of Director, and coordinate with other stakeholders and member agencies as needed.

OUTCOME, BENEFITS AND LEARNINGS

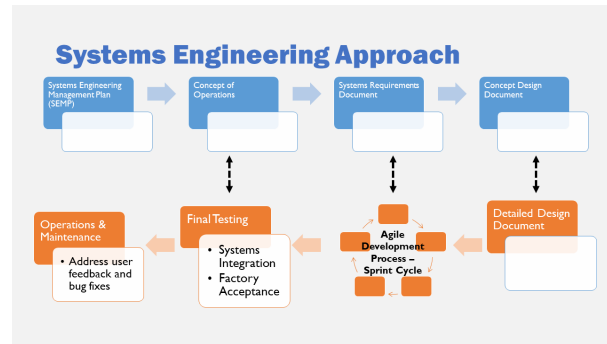
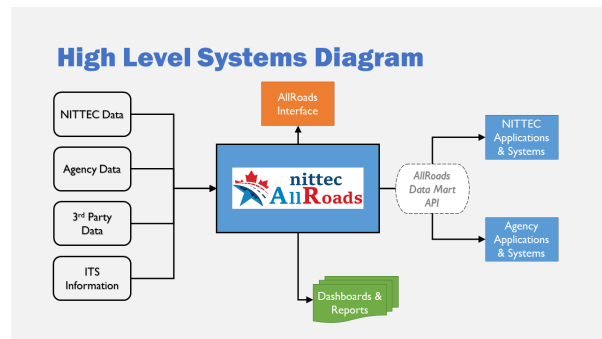
The AllRoads system serves as the central data dissemination and exchange system for the greater Buffalo and Niagara region traveling public. It utilizes advanced AI based Decision Support System (DSS) with real-time prediction data to simulate the traffic conditions every 15 minutes and consolidates data from 16 different data sources and devices and fuses the data and updates the Data Mart end points for other agencies/users to use.

The region benefits from the presentation and sharing of this data in a unified platform, as well as the additional sources of data introduced as a part of this project.

To manage a project of this magnitude NITTEC chose to split the project into two phases. First, a request for proposals (RFP) was issued for Phase 1, which included only the initial project planning tasks, such as the project Concept

of Operations, Stakeholder Interviews, Project Management Plan, Systems Engineering Plan, Systems Requirements Document, and Conceptual Design Document. This was awarded to WSP, who then assisted in the development of an RFP for Phase 2 - The Implementation Phase, which included the Detailed Design Document, System Development, Testing, and Training.

One of the most significant lessons learned by NITTEC was the inclusion of a secondary consultant to accomplish project management activities. NITTEC is a small organization with limited personnel, while managing this project would have been a full-time job for someone. This led NITTEC to retain WSP during Phase 2 of the project to help manage the project with NITTEC, while Parsons developed the system and had a project team of their own, made this project possible and ensured all of the requirements were met as intended. WSP also conducted an impartial evaluation of results following the project's conclusion.



This project greatly benefited from the use of the Systems Engineering and Agile Development processes. Following FHWA's guidance for systems engineering, a specific set of requirements were created based on real end-user needs and these requirements served as the basis for tasks completed by the developer.

The systems Engineering Process begins with a Project Scope and Project Plan, which define the goals and objectives being addressed. This is then used to create a Concept of Operations which includes a high-level description of user needs and key performance measures. The Concept of Operations is used to help stakeholders create a list of system requirements.

These requirements allow the system developer to create a Detailed Design Document, Implementation Plan, Project Schedule, and plans for testing, validation, training, and operations & maintenance.

Following the Agile development process, the system requirements were assigned to short Sprint Cycles and presented in the final functional state every few weeks. This allowed NITTEC to begin testing and using the product very early on, as active development continued.