INDIANA DOT CASE STUDY

How applied research is guiding a new generation of transportation management solutions

INRIX believes in the power of applied research for developing the next generation of tools and services to make transportation faster, safer, and more cost effective. Each year, a handful of universities and researchers approaches us with intriguing ideas on how to use INRIX data in new ways. If a proposal looks promising—either for the public good or as new line of business—INRIX supports the research with free or discounted pricing on data.

The longest and most productive applied research collaboration INRIX has signed onto is known as the Joint Transportation Research Program (JTRP) between Purdue University and Indiana Department of Transportation (INDOT). Recognized nationally as a model for collaboration between government, academia and industry, JTRP was the first in the country to integrate INRIX data from vehicle navigation systems in 2011 to help mitigate real-world traffic challenges. In this article, we'll spotlight the groundbreaking projects of JTRP and the role of INRIX data in their work.

> "We have relationships with all the data providers out there and our products are built to work with any of them, but there are two things we like about INRIX: The quantity and the density of the probes, and honestly, the willingness of their marketing and technical staff to collaborate with both Purdue and INDOT."

Edward D. Cox
ITS engineering director at INDOT Traffic Management.

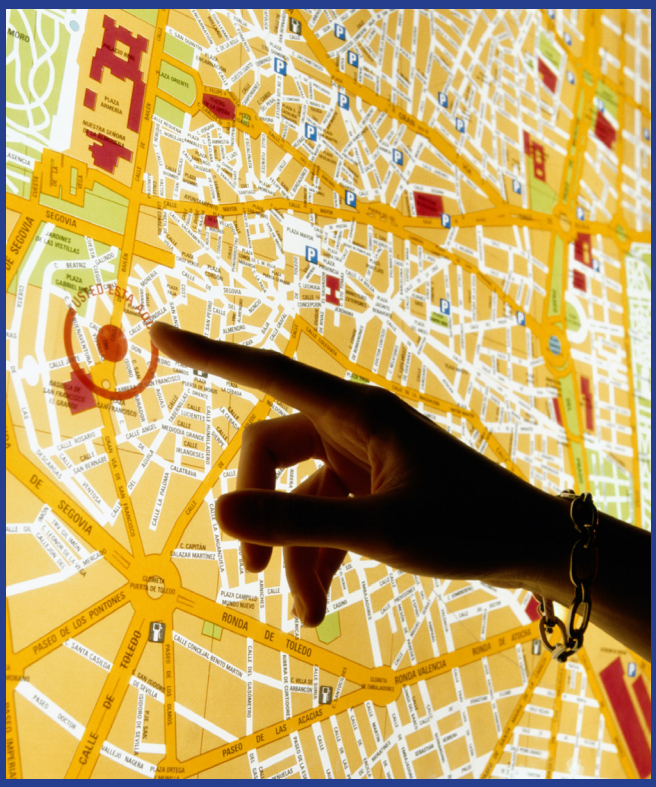
The value of applied research partnerships

Under JTRP, Purdue University Professor Dr. Darcy Bullock and his team of students and staff work with INDOT to identify and implement innovative ways to solve Indiana's most pressing transportation challenges. INDOT collects 2,000 half-mile segments of raw data from INRIX every 60 seconds from around Indiana, which it customizes to fit the needs of specific products, projects or APIs. It's important to stress that this is applied research, which means whatever is developed at Purdue is then implemented by INDOT.

Collaboration leads to breakthrough safety product

When it comes to applied research, there's no monopoly on good ideas. While INRIX is constantly researching, innovating and introducing its own suite of products, the collaboration with JTRP has led to the development of a potentially lifesaving product that wasn't on the company's radar. This new product originated from a vital need for addressing issues on Indiana roads.

After privatizing parts of I-90, Indiana had the capital it needed to make major investments into their transportation infrastructure throughout the state. Because many of these projects were located in rural areas on vast stretches of roadway where drivers don't typically encounter work zones, some drivers were caught unaware of a sudden backup or surprise work zone. This resulted in sudden breaking, rear-end collisions, and several fatalities.



DIY customized products vs. off-the-shelf traffic solutions

Not every state DOT or municipality has the staff, technical resources or ambitions to develop their own in-house traffic products from scratch, and then find a reliable source of raw traffic data to feed into it. Other agencies opt to license third-party solutions, such as INRIX Roadway Analytics, INRIX Trips, or INRIX Safety Alerts, which can satisfy the majority of their needs without the time and expense of developing customized products and tools. With that said, there are specific challenges and unique situations where customized solutions make sense.

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To address this problem, INDOT asked Purdue to build a backup detection tool that could identify and alert them to sudden slowdowns in traffic up ahead. A software engineer by the name of Howell Li at Purdue University wrote an algorithm and custom Web interface called Delta Speed Backups. The program detects sharp changes in traffic speeds and sorts them into real-time alerts to warn INDOT officials and public safety officers of hazardous slowdowns.

"With it, we could see where we had a backup, how long it had been there, and (then) filter the difference in traffic speeds between the adjacent segments, giving our operators an opportunity to react and do something about it. Balloon popups tell us where the worst ones are," said Cox. From there, proactive measures can be employed to prevent accidents, including state patrol interventions, roadway signage, or sending alerts to warn employees in work zones of sudden traffic backups. JTRP immediately saw the safety value of this program and shared their insights with INRIX.

"Dr. Darcy Bullock showed it to us, and this is one of those things where we looked at it and said, 'Man, that's something we should be rolling out across the country,'" said Ted Trepanier, senior director of Public Sector Services at INRIX. "This is a safety application that has a broad purpose." INRIX took the concept of scanning and filtering the system for delta speeds and created alerts around them, which became part of INRIX Safety Alerts suite known as "INRIX Dangerous Slowdowns." While the JTRP product was a great tool that worked well for Indiana, INRIX needed to fit the concept into a broader platform so it could scale nationally and internationally wherever INRIX data is available. "INRIX has built a similar product to reach a much wider audience, which is exactly what we hoped would happen," said Cox.

Iowa Department of Transportation was first to utilize INRIX Dangerous Slowdowns, along with other INRIX real-time traffic services, to monitor, measure and manage the state's road network. "Drivers in Iowa, like many others around the world, are regularly confronted with traffic, and tackling congestion is a top priority for us. Secondary collisions at the queue is a problem plaguing roadways worldwide that also needs solving," explained Scott Marler, director of traffic operations at Iowa DOT. "We are using Dangerous Slowdowns and other INRIX services to keep drivers safe and congestion at a minimum."

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Looking ahead to “the next big thing” in Indiana transportation

Indiana has a lot of rural areas with long stretches of road between interchanges. There are few cameras, speed sensors, or intelligent transportation systems of any kind. For this reason, INRIX data helps fill in the gaps where other sources of data are not available. While ITS systems are starting to be deployed at interchanges and along busier routes and problem spots, INDOT relies on INRIX for traffic data for many parts of the state. Purdue and INDOT continue to work on interesting projects that can improve congestion and safety. Some examples of projects currently underway include:

- **Winter recovery forecasting:** Using INRIX data, JTRP is combining traffic, weather conditions, and historical data to better predict when roads will become passable and safe for driving after large winter storms or flooding. While not currently available, development and testing are underway.

- **Traffic signal retiming**: Using staff to physically drive and document the time it takes to move through traffic signals is an inefficient way to check timing or test the effectiveness of newly timed traffic signals. Using INRIX data, INDOT traffic engineers are able to model, test and recalibrate traffic signals much more quickly and easily without performing live runs.

What does it take to get INRIX data for your research project?

Currently, INRIX has applied research relationships with Texas A&M University Transportation Institute and University of Maryland Center for Advanced Transportation Technology, that receive complimentary or discounted pricing forINRIX data.

According to Ted Trepanier, INRIX believes that being responsive to researchers plays a pivotal role in evolving the transportation industry: “At INRIX, we honestly enjoy working with researchers because most of the people here really care about transportation, safety and mobility issues. We believe in the cause. As corny as that might sound, we’re champions of moving research forward because it does make a difference in the world, and especially our industry.”

Are you a researcher who could use INRIX data to move your project forward? Reach out to INRIX at name busdev@inrix.com and start the conversation.

PRODUCT HIGHLIGHT:

About INRIX Safety Alerts

The Safety Alerts product suite – made up of INRIX Dangerous Slowdowns, INRIX Incidents and INRIX Road Weather – collects real-time data from vehicles and a range of other sources to help drivers around the world avoid sudden stops or road hazards and aid transportation agencies in managing their road networks better.

INRIX Dangerous Slowdowns helps prevent back-of-queue, rear-end collisions where rapidly forming congestion creates a situation that requires advance driver awareness. Based on real-time data from vehicles on the road, the location-based notifications warn drivers and transportation agencies of sudden reductions in speed or stopped traffic on the roadway.

INRIX Incidents keeps drivers and transportation planners informed about congestion, accidents and construction on the road. Using more than 400 data sources, Incidents provides the most comprehensive and accurate global dataset of anomalous roadway conditions. According to an independent study by Frost & Sullivan, INRIX Traffic had a 100% detection rate of the recorded incidents, followed distantly by competing services.

INRIX Road Weather is the first service to use real-time and predictive atmospheric data to give drivers advance warning of dangerous weather-related road conditions tied to individual road segments. Unlike other services, Road Weather provides drivers with critical information about the roads themselves, including the type of precipitation, surface conditions (including hard to detect black ice) and visibility. The identification of hazardous road conditions can also be utilized by transportation officials for real-time management of road networks or advanced maintenance planning.

WILDCAT CREEK BRIDGE CLOSURE

INRIX Real-Time Traffic: Traffic Detour Solution

CHALLENGE: The unexpected closure of an interstate is a massive undertaking involving a variety of stakeholders. Such was the case in August of 2015, when pier settlement of the Wildcat Creek Bridge on I-65 N in Indiana required an unplanned closure of a 37-mile stretch of the interstate for 31 days. The detour route had little existing intelligent transportation systems (ITS) infrastructure to assist engineers with managing operations.

SOLUTION: INDOT worked with Purdue University to develop a real-time dashboard to identify the appropriate diversion routes by analyzing traffic flow along alternate routes. Using INRIX Real-Time traffic, INDOT monitored speeds along six segments of road to identify the best diversion route. Vehicle data was used to create real-time dashboards hosted on a website for use by Indiana Department of Transportation (INDOT) engineers and public safety officials to monitor mobility and queuing on the 62-mile detour route.

RESULTS: To ensure the best possible traffic operation along the corridor, INDOT constructed three temporary signals, changed the operation of one flasher, installed 59 signs, deployed 15 message boards, and retimed the signals on US-231 to prioritize the detour traffic. Immediately after the implementation of optimized timings on the corridor there were substantial improvements in corridor operations. Purdue University's freshman student move-in day was a concern, but it did not add substantially to traffic delays. Strong collaboration between INDOT, Purdue University researchers, and public safety officials allowed for anticipation of potential problems. After the closure, traffic returned to normal levels.