

# Crowdsourcing for Operations Case Study Kentucky Transportation Cabinet



U.S. Department of Transportation  
Federal Highway Administration



## The Start of a Crowdsourcing Journey

The Kentucky Transportation Cabinet (KYTC) maintains 35 percent of the 78,000 miles of the State's public roads and streets, serving its 4.5 million residents and freight carriers.<sup>1</sup>

Crowdsourcing improved operations at KYTC beginning in September 2014, when the agency joined the Waze® Connected Citizen Partnership. This partnership allows KYTC to provide Waze® information, such as road closures, snowplow locations, and emergency event shelter locations. In turn, KYTC can access anonymized user reports and traffic congestion data from Waze®.

Waze® data are only one piece of the puzzle. KYTC currently processes 15 to 20 million records per day from 14 different data sources, including third-party providers of commercial traffic, weather, and freight data and social media. KYTC integrates these varied data in-house to better manage transportation in the State.

## Traffic Incident Management

KYTC's Big Data System enables its Traffic Management Centers (TMC) to become aware of incidents earlier than through traditional methods. The system compares Waze® event reports to HERE® vehicle probe speed data at a particular point on the KYTC linear referencing system every two minutes. When certain speed and event reliability thresholds are met, the system delivers an email to TMC operators that integrates information detailing the district, facility, and mile point data, along with relevant Waze® reports, weather profile, and vehicle probe speeds.

The KYTC system-generated email, which also includes links to more detailed data, helps operators understand the nature of the event better, allowing them to better plan their response.

Source: Adapted by Federal Highway Administration (FHWA) from Pixabay and Unsplash.



Figure 1. Screenshot. Kentucky Transportation Cabinet incident alerts.  
(Source: KYTC.)

KYTC provides information in real time to response agencies, such as Kentucky State Police and Kentucky Emergency Management, offering a single, shared view of incidents from which to make decisions during emergencies. Traffic incident management committees also have access to the systems' analytics dashboards to facilitate after-action reviews and support training.

<sup>1</sup> Kentucky Long-Range Statewide Transportation Plan. 2006.

## Traveler Information

The KYTC Big Data System produced interfaces to replace the agency's legacy 511 phone hotline system, resulting in significant annual savings with new functionalities. According to a December 2019 interview FHWA conducted with a KYTC Big Data Environment Developer, KYTC in-house staff developed the replacement interfaces for the legacy 511 system in under 200 staff hours. The new system, GoKY, includes real-time crowdsourced information in addition to reports from KYTC's TMCs. KYTC cited that by aggregating, processing, and publishing information in a timely, accurate, and reliable manner, GoKY meets Federal requirements for the Real-Time System Management Information Program (23 C.F.R. §§ 511.301-315).

## Work Zone Monitoring

By filtering vehicle probe data to very precise segments of the roadway to only cover work zones, KYTC can understand the work zones performance with more granularity than ever before. KYTC can now observe the short-term or long-term impacts from work zone-related activities, such as lane closures, speed limit changes, stationing of law enforcement, or other speed deterrent technologies.

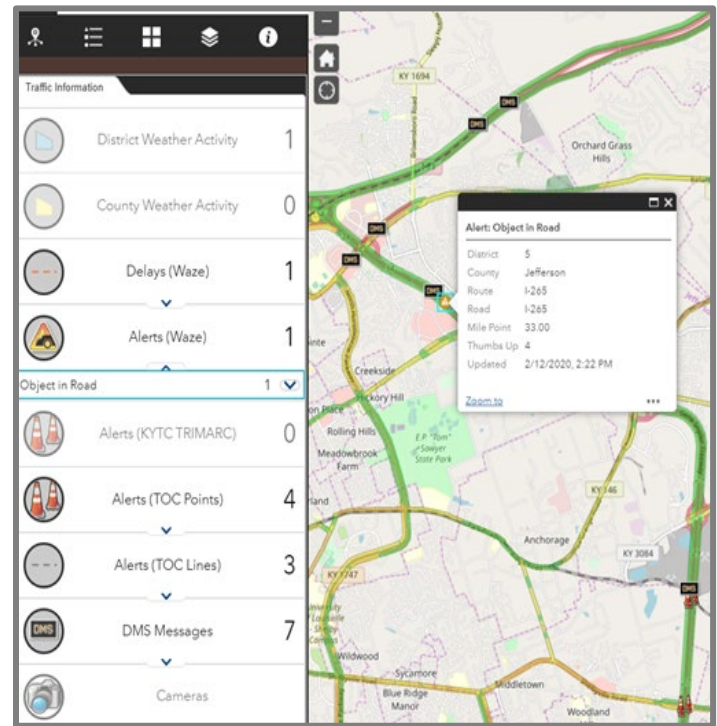
## Snow and Ice Operations

From the 2014 real-time system to the present day, KYTC has continued to enhance its roadway weather observation system to provide better information for snow and ice operations. Decision support interfaces overlay air and pavement temperatures with snowplow and crash locations. Analytics dashboards complement mapping dashboards to help operators better manage snowplow routes. For example, operators can view the spread materials volume by linear mile on the same graph with the number of Waze® road hazard reports.

## Kentucky Transportation Cabinet's Big Data Environment

KYTC's in-house Big Data infrastructure manages the real-time operational data that drive the described applications

and others. This infrastructure is based on open-source, distributed computing software.



**Figure 2. Screenshot. GoKY 511 traveler information.**  
(Source: Kentucky Transportation Cabinet.)

KYTC was an early adopter of the data lake concept, in which aggregate, raw data are stored in their native form. The data lake allows KYTC to pull data for new use cases as they arise. The data lake also provides resilience for when a mistake is made with production data.

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