I-95 Corridor Coalition

Going My WAZE
to
Closing Real Time Data Gaps

CROWDSOURCING SUMMIT SUMMARY BRIEF

SEPTEMBER 14, 2017
Philadelphia, PA

CONTENTS

EXECUTIVE SUMMARY

Traffic operations strive to reduce congestion, increase safety, and mitigate the occurrence, severity, and impacts of incidents and events. To succeed, transportation agencies need a significant amount of situational awareness about where incidents are occurring, where speeds and volumes are changing, what routes people are taking and the effects of weather. Maintaining a high level of situational awareness 24/7 on all roads, all modes, across agencies and across borders is extremely difficult, expensive, and otherwise unattainable with traditional intelligent transportation systems (ITS) technologies like cameras and sensors. To address situation awareness challenges, many agencies are working with partners in both the public and private sector through data sharing or data procuring initiatives. The I-95 Corridor Coalition is exploring a particularly promising option: crowdsourced data.

Crowdsourced data are any data that are obtained directly from the general public and commercial vehicles that are using the facility and who are willingly, and often actively, engaged in utilizing applications and/or connected equipment that contribute back facility data. Crowdsourced incident, speed, and origin-destination data can come from cell phones with navigation apps, connected vehicles, among other options. Table 1 lists a few data types and sources.

Table 1. Crowdsourced Data Types and Supplier

Speed and Travel Time Data	Incident Data
• Google/WAZE	• Google/WAZE
• HERE	
• INRIX	
• TomTom	**Connected-Vehicles Data**
	• Heavy breaking events
Origin-Destination / Travel Behavior / Waypoints	• Fuel Consumption
• Airsage	• Headlight use
• INRIX	• Wiper use
• HERE	• Traction Control engagement
	• Rollover warnings

To assess if crowdsourced data is a cost-effective option for delivering the right type of information to agencies, the I-95 Corridor Coalition held a summit on September 14, 2017 in Philadelphia, PA. The Crowdsourcing Summit was a combined effort between the I-95 Corridor Coalition's Traveler Information Services Committee and the Delaware Valley Highway Operations Group (HOG). The one-day summit brought together over 70 diverse representatives from the I-95 Corridor HOG Regions (see Figure 1) with backgrounds in planning, operations and traveler information to learn strategies and methods being utilized by member states along the corridor with regard to crowdsourced data, in particular, WAZE. Sixteen of the seventeen eastern seaboard states participated either in person or via webcast.
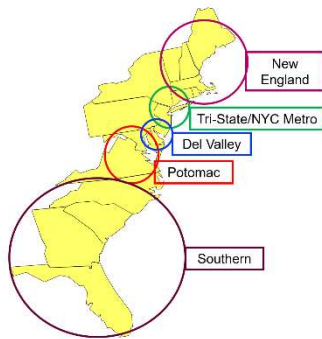
Figure 1. I-95 Corridor Highway Operations Group Regions

New England	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
Tri-State	Connecticut, New York, New Jersey
Delaware Valley	New Jersey, Delaware, Pennsylvania
Potomac	Maryland, DC, Virginia
Southern	North Carolina, South Carolina, Georgia, Florida

Six member Coalition agencies gave presentations on how their programs were using WAZE in: Advanced Traffic Management System (ATMS) Data Integration, Traveler Information Outreach, Traffic Incident Management and Data Analysis. This document contains brief high level briefs of each presentation that covers what the agency is doing with respect to WAZE, planned next steps and summit participant questions. The full presentations can be accessed at the following link:

http://i95coalition.org/events-calendar-event/crowdsourcing-summit/

The potential of crowdsourcing was clearly highlighted during the summit as was the fact that simply having access to these data is not a solution in itself. There are many technical challenges, intricacies and nuances that make these data difficult to turn into usable information. Agencies must deal with data quality, verification, and unfamiliar data formats. Negotiating agreements with the private sector can be difficult especially when the data supplier put restrictions on what can and can't be done with their data. Nevertheless, summit presentations demonstrated progress and shared the following key insights:

Table 2. Key Insights from Crowdsourcing Summit

Advanced Traffic Management System (ATMS) Data Integration Agency presenting: TRANSCOM Florida DOT	• Filtering the number of alerts that come into an operations center is essential (for either ATMS integration and simply use of WAZE data) • TRANSCOM is currently evaluating potholes alerts as well as pushing planned events and activities to WAZE • Florida is only filtering to accept alerts for crashes and road closures • ATMS Integrations with WAZE are just beginning to be studied. Florida is an exception in that they have been fully working with WAZE since 2014.
Traveler Information Outreach Agency presenting: PANYNJ Maine DOT	• PANYNJ pushes data to WAZE and their users- specifically for planned events • Maine is using WAZE to actively monitor events and push out traveler information to the public in its rural areas
Traffic Incident Management Agency presenting:	• Massachusetts is monitoring WAZE for all types of alerts

MassDOT	• Alerts in MA are split approximately 60% hazard reporting and 40% crashes • MassDOT is using WAZE data to dispatch their Safety Patrols and to improve Incident Management techniques • Data analysis has shown that agencies are being alerted earlier to crash events by WAZE and this is improving incident response
Data Analysis Agency presenting: Virginia DOT	• Virginia is evaluating the validity and reliability of the WAZE data by comparing it to information received through their Traffic Management Centers • Agencies are analyzing different types of WAZE alters to confirm that they are receiving valid data • Analyzing Jams and Irregularities is also an area of focus

The I-95 Corridor Coalition will take the information exchange from the September summit and further explore the policy challenges, procurement issues, fusion methodologies, data quality, analysis, and other technical issues related to obtaining better situational awareness through crowdsourced data. The Coalition will focus on crowdsourced data from both operational and planning perspectives. Specifically, the Coalition will explore challenges related to ATMS and 511 integrations, handling duplicate alert information, long-term storage planning and building analytics to validate crowdsourced data. At the end of this effort, Closing Real Time Data Gaps Project, the Coalition will:

- Synthesize agency successes, mistakes, and lessons learned;
- Develop guidance and model agreements for agencies negotiating contract terms and conditions;
- Outline approaches to address the technical challenges associated with validating, visualizing, and archiving crowdsourced data feeds;
- Demonstrate the value of crowdsourced data for managing incidents, maintaining situational awareness, planning activities, and research;
- Develop guidelines that support data sharing protocols within states and across state boundaries; and
- Provide in-person technical and/or procurement guidance support upon request.

If your agency would like to learn more about this Coalition effort and receive in-person assistance, contact Denise Markow, TSMO Director (dmarkow@i95coalition.org).

ATMS DATA INTEGRATION

TRANSCOM: INTEGRATING WAZE DATA WITH PUBLIC AGENCIES' DATA

Robert Bamford, TRANSCOM

Filtering techniques used to assess alert notifications

The WAZE Feed
Agencies need to determine how to interact with Waze- will it be a one-way or two-way data feed? Should agencies just get data from Waze and use it or should they in return share data with Waze?
Waze is now working with agencies via one-click agreements. Waze has a typical "One click" user agreement and details of the agreement with the agency cannot be easily changed and adapted. It is an all or nothing acceptance process.
TRANSCOM has engaged with Waze and is regularly giving operations data to Waze in exchange for access to the Waze Events and Jams data feeds. XCM policy is that third party data is for informational uses only. Data from Waze is not integrated into Open Reach, due to restrictions of the one-click agreement and data configuration parameters that did not align with TRANSCOM agency defined requirements for data that are based on Federal data standards, such as TMDD.   The Waze data is available for review via the SPATEL Suite of Tools.

TRANSCOM filters the data feed to accept these alerts.	
ACCIDENT	Major, Minor, No Subtype
WEATHER HAZARD	On road, On road pot hole Weather fog Weather hail Weather heavy rain Weather heavy snow Weather flood Weather tornado Weather heat wave Weather freezing rain On road lane closed On road ice On road construction On road car stopped
ROAD CONSTRUCTION	CONSTRUCTION
ROAD CLOSED	Hazard, Construction, Event , No Subtype

TRANSCOM is currently only looking for pot holes, on road closed alerts, and some of the weather alerts.
TRANSCOM reduces alerts to unique events, which reduce the duplicate events received significantly.
TRANSCOM uses the Waze provided rating threshold to identify which Waze alerts needs to be promoted or ignored. Threshold is currently set to an event rating of 5.
What does data look like? There is a Lat/Long content included, however the date does not always include agency, roadway, direction, type of accident, specifics

| Use Case Scenario- TRANSCOM AND WAZE |
|---|
| On a sample day, TRANSCOM received 3.2M overall Waze alerts. Once filtered, the alerts reduced to 2M alerts (got rid of unimportant categories) Next filtered to only unique events and reduced alerts to 66k Filtered for unique alert counts with confidence >3 and reduced events to 2400 Filtered out NJ511 alerts and reduced to 971 |

TRANSCOM does the same for Jams filtering for unique jams with congestion level 5.

TRANSCOM is also trying to figure out how to deal with "false alarms" that is Waze jam events being reported by Waze users that are considered normal or recurring congestion by TRANSCOM Member Agencies standard protocols and do not require immediate action.

FEEDBACK TO WAZE

TRANSCOM provides all planned and active events to Waze. Waze publishes everything that TRANSCOM gives them and sometimes blindly not taking into account the temporal nature of planned road closure announcements. Waze posted Thanksgiving 2017 to its users on April 2017, TRANSCOM worked to update data feed for Waze to include only Active Events.

TRANSCOM, based on feedback from its Member Agencies, modified the data feed service provided to WAZE to streamline the Event Message structure from 160 to 70 characters. This change ensured that the more valuable content was displayed to application users and that users didn't have to go into the tool and it would be obvious at a glance what events were in the Waze app
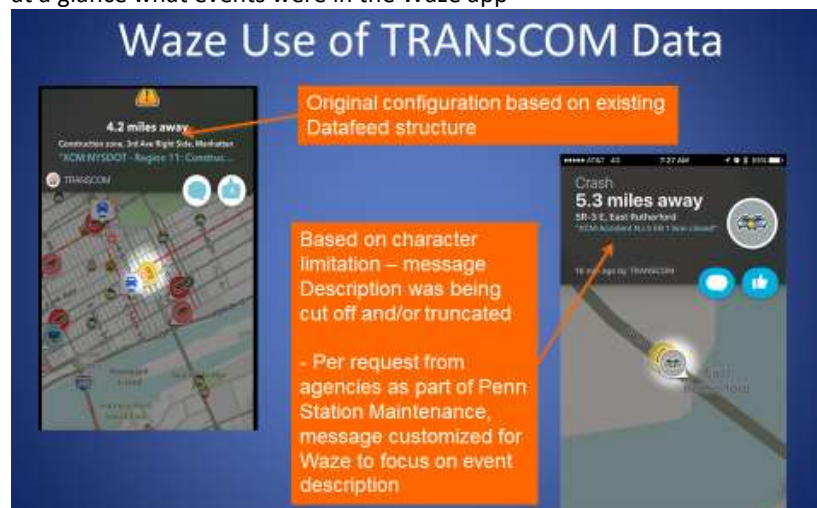
NEXT STEPS

TRANSCOM is planning to use other crowdsourcing providers and is working with Uber on securing a data feed as well as working to generate a data feed specification for its Member Agencies in support of the Connected Vehicle Program.

Q & A

Q: What confidence factors and reliability were you using? How were you filtering?

A: The event is posted, then updates happen and confidence goes up, we report when confidence is greater than 3, that's the threshold level for notification.

Comment (PA Turnpike): We get a lot of thumbs up around Philadelphia and Pittsburgh.
We don't necessarily have a lot of confidence in really low volume areas where there is low saturation.
WAZE suggests adding an attribute field for thumbs-up.

Q: How do you address legal concerns about filtered out data like a missing sign for example? We are looking for transportation data, but why would we filter smaller issues that may cause some legal issues if roadway users know what kind of data we're getting?

Comment (PANYNJ): Several years ago, we were trying to auto-map potholes via accelerometers. We don't need to do it anymore because of Waze. Rather than have data be an Achilles heel you can use it as a shield. We publish a map of where potholes are and now that's not a 'oh you didn't fix potholes' it's a 'oh we have a resource where you can in real time see potholes so we're not liable'
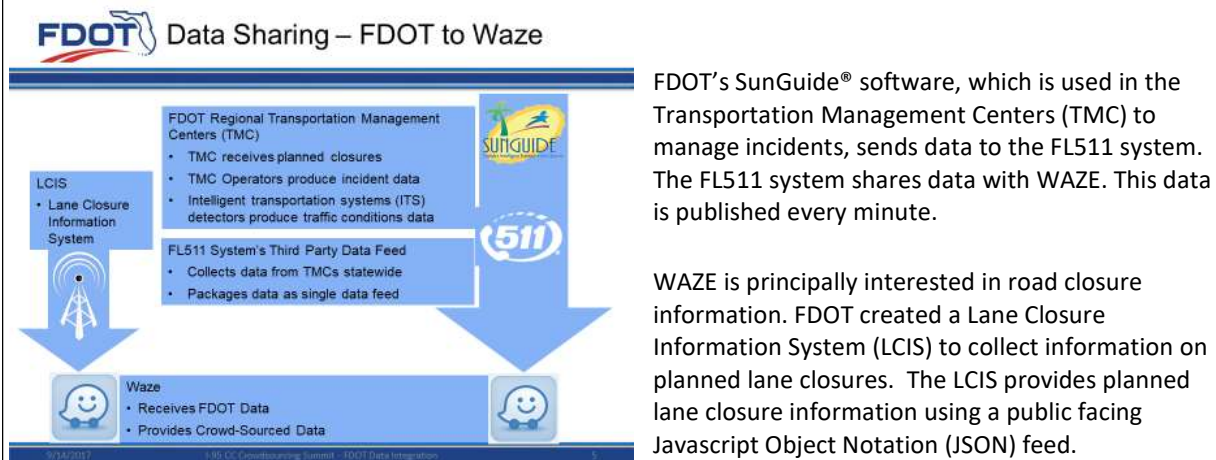
FLORIDA DOT: WAZE INTEGRATION

Russell Allen, Florida Department of Transportation

Florida's WAZE Integration Program

Goal: Use WAZE to obtain incident data on Florida's state arterial roadways that do not have Intelligent Transportation System equipment deployments.

The WAZE FEED
FDOT was one of the first state DOTs in the US to enter an agreement with WAZE. FDOT has been collecting and working with WAZE data since 03/28/2014.

FDOT's SunGuide® software, which is used in the Transportation Management Centers (TMC) to manage incidents, sends data to the FL511 system. The FL511 system shares data with WAZE. This data is published every minute.

WAZE is principally interested in road closure information. FDOT created a Lane Closure Information System (LCIS) to collect information on planned lane closures. The LCIS provides planned lane closure information using a public facing Javascript Object Notation (JSON) feed.

Attribution is provided by both FDOT and Waze. When an event is created in the SunGuide software and notification for the event came from Waze, then the information for the event is passed to the FL511 system with a tag indicating we need to give attribution to Waze. FL511 will provide attribution to Waze when the event is posted on the different FL511 platforms. If an event is posted on Waze that was created from data in the FL511 data feed, then attribution is provided to FDOT.

The JSON – Javascript Object Notation is updated every 2 minutes. There are three primary types of data:
- – Alerts: Crashes, Abandoned Vehicles, etc.
- – Jams: Stalled or slow moving traffic
- – Irregularities: Similar to Jams, but with wider impact

FDOT is only using Alerts today. The feed includes a few quality control measures for alerts. These are:
- - Report Rating: How "experienced" is the Wazer who originally reported the alert?
- - Reliability: Uses the Wazer's report rating and the positive feedback from Wazers
- - Confidence: Uses the positive feedback from Wazers

FDOT uses the reliability score to filter data.

The WAZE READER
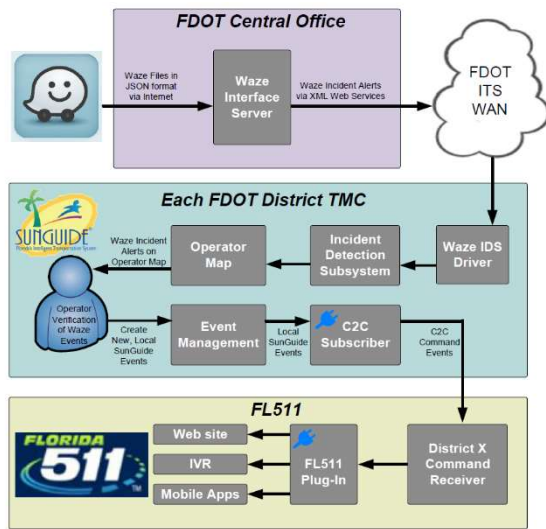
The WAZE Reader checks for WAZE feed data consistency and has email notifications set up. Changes in the WAZE data feed can occur and should not adversely affect program operations.

FDOT filters out all WAZE alerts concerning weather, chit-chat, debris, vehicle on shoulder, vehicle on roadway, missing signs, pot holes, construction and other miscellaneous alters.

About 90% of the data WAZE publishes to the FDOT data feed is filtered out.

FDOT only looks at crashes and road closures. FDOT filters out crashes and road closure alerts that WAZE obtained from FDOT as these events are already in the SunGuide software.

INTEGRATION WITH SUNGUIDE ATMS

The goal of integration is to make processing Waze events more efficient for operators.
WAZE Phase 1 Integration used SunGuide's Center to Center module.
WAZE Phase 2 Integration is a direct XML feed that uses SunGuide software's Incident Detection Subsystem (IDS) instead of Center-to-Center. Below are sample alerts retrieved through the IDS.

The IDS will retrieve data using a web services interface.
Operators no longer need to monitor the map for new Waze events.
Waze events generate an alert box.
Operators can select alerts for further action.
Some Waze alert information can be automatically populated such as Event locations and Notifications.
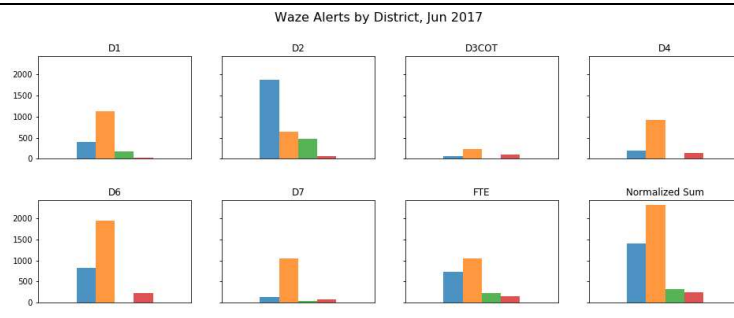
Analysis has also shown that some alert types were not being used in the centers. So, the filtering was updated to prevent some types from even being sent to the Districts.

FDOT POLICIES

For Instrumented state roads, FDOT confirms Waze events prior to posting to Florida's 511 (FL511) system
For Non-instrumented state roads covered by FL511 system, WAZE events are posted as "unconfirmed".
For Non-instrumented state roads not covered by FL511 system, floodgate messages are posted for road closures. This was done after Hurricane Irma.

NEXT STEPS
FDOT will perform further analysis to see which Waze alerts are flagged as false alarms by TMC Operators.
FDOT will compare when Waze alerts are closed and when the corresponding SunGuide software events are closed.
FDOT will work on identifying how many WAZE alerts correspond to a single SunGuide software event.
FDOT selects roadway names using shape files. This roadway name selection is needed in order to have roadway names that are consistent with the SunGuide software roadway names. At complex geometries, this roadway name selection can be incorrect. FDOT will research methods to reduce the number of incorrect roadway selections.

Q & A
Q: What is your ATMS?
A: SunGuide software. The software was developed based on TxDOT's Lonestar software. The software was developed by Southwest Research Institute.
Q: Are the ATMS providers catching on?
A: We have in-house contractors from SWRI, we have seasoned data people. In-house consultants work with SWRI – they discuss it among each other. There is an active relationship with WAZE.
Q: Does WAZE have a standard for when incidents are removed?
A: The algorithm is proprietary. It uses more than just a timeout.

FDOT, WAZE & Hurricane Irma
WAZE was an active partner during Hurricane Irma. They told motorists that shoulder use was open (emergency shoulder use lanes) during the hurricane. Waze was actively providing information on road closures after Hurricane Irma and helped show when FDOT opened roads.
Using ArcGIS online, FDOT talked to WAZE and Google and they could draw closures and detours and give other organizations access to the GIS files.

TRAVELER INFORMATION OUTREACH

PANYNJ: PROS AND CONS OF "THE CROWD" IN CROWDSOURCED DATA AND HOW TO MANAGE THEM

Ted Bobowsky and Brendan Kaplan, Port Authority of New York & New Jersey

Feeding data directly into WAZE to provide Traveler Information

| PANYNJ Mission	
	It is a strategic priority of the Port Authority of NY & NJ (PANYNJ) to partner with Google, Apple, Waze and other crowdsourcing data providers. Due to the large install base of these platforms, it is vital to ensure that agency gathered understanding is represented to improve customer routing based on conditions and communicate to set expectations and improve experience. Agency Operated Centers (AOC) act as a clearing house where all data feeds come in and get processed.

The WAZE User

There are about 2.4 million Waze users in the NY metro area.
Who is the "Crowd?" It is Waze users and Waze map editors.
Waze User Levels assess engagement, participation, and 'trustworthiness' in Waze.
Waze Users accumulate "points" toward the next level each time they report data.
There are 5 levels starting at Level 1 as a new user.
Level 5 is an advanced user who is reporting events and correcting maps on a regular basis.
Higher level users have higher validation weights when reporting information.
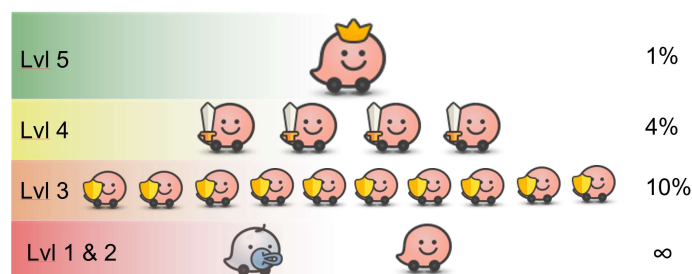
Use Case Scenarios – PANYNJ and WAZE

	Estimates that compare Waze presence at facilities compared to PANYNJ vehicle counts over several days indicate that 50% of all drivers at LaGuardia airport are using Waze. PANYNJ reported the opening of an "escape hatch" in the airport in real-time by making them aware of the upcoming opening and letting advanced Waze users report the opening and update the Waze base map in real time. This allows the Waze navigation tool to discover a new route and immediately redirect Waze users through the "escape hatch".

PANYNJ uses Waze to report open & closed roads based on bridge upgrade schedules in a similar fashion.
PANYNJ uses Waze and Waze Users to validate and correct the location of a building entrance (Point validation) in the NY & NJ region to improve Waze navigation precision. By building a codex of points of interest and uploading to Waze, when users type it in, Waze knows where and how to route.
PANYNJ uses Waze to push road closure announcements/notifications to affected Waze users directly. Notifications are sent to selected Waze users that have either shown a regular use of the road affected on their Waze activities or are driving on the affected road at the time the notification is being sent.

 PANYNJ worked on validating and correcting road signs in the NY & NJ region to ensure that Waze voice direction matched the displayed road signs caption on the route selected to improve experience and safety.

NEXT STEPS

Currently trained desk staff uses these tools, but the Port Authority of NY & NJ wants to automate and integrate Waze with the Agency Operation Centers so they can share data with everyone else. They are currently working on defining the requirements.

PANYNJ is not currently paying too much attention to Waze data validation and ratings.

PANYNJ is currently working with Waze to include Waze data with other sources in an enterprise product

Q & A

Q: What is the ability to schedule traffic events, voice prompts, push data? What level AOC employee does this?

A: Currently - Ted Bobowsky, Andy Kaplan, and Brendan Kaplan are the ones who originally started prescheduling traffic events in WAZE but now they are training at desks in AOC (3 shifts of 3 people on weekdays, weekend crews too) – showing them how to identify road segments that need to be closed, easy to click links and close roadways – but harder to find within the road network. Brendan oversees it but is eventually stepping away.

Q: Is thumbs up validation or is it just thanking the user?

A: It is fuzzy logic – we don't have to pinpoint an exact answer – if a target is described around the periphery, we can reasonably ascertain it's the right one (ex. Seeing furniture in a dark room based on small amounts of information) – it doesn't really matter – when more thumbs up happens, events happen

Q: How are updates made to the base map?

A: Waze performs QA/QC for changes to the base map, members of the crowd can make base map changes based on their user level.

Q: The base map does not only include PANYNJ assets (NY/NJ DOT, etc.), are you editing things that aren't really yours?

A: We edit based on the information coming into AOC, we have responsibility for our stuff, but we get data from other sources too – but we only proactively edit ours. We'll take responsibility if people are pushing data.

Q: How are you determining the Waze penetration rate?

*A: Each road segment has a discrete ID; polygonal regions and we can see how many people are in those areas within a specific timeframe; **wazestats.us** – keeps track of users in a polygon census tract – we reach out to Waze HQ for other polygons; we are developing updated feature sets for high-use Waze partners.*

Q: Have you worked with HERE or TomTom directly? Does the info in Google maps always match what you put in the Waze map? How about incidents on google maps?

A: Waze is easier for us; we communicate with both WAZE and Google though.

We can't distribute Waze base maps based on legal derivative – for now we just communicate with our schematics – Waze base maps sometimes are updated in Google maps (it is one tile update – changes by all editors are committed all at once after consideration. We give information directly to Google sometimes.

We have done no work on traffic incidents.

MAINE DOT: MAINE WAZE

Clifton Curtis, Maine Department of Transportation

Using WAZE in rural settings

Mission: Maine has a population of about 1.3 million people that jumps to about 4 million people during summer season. How can they provide reliable traveler information to the tourist population?
Maine DOT Map Viewer Tool
Maine DOT developed a public "common operating picture" web application called the "MaineDOT map viewer" (http://www.maine.gov/mdot/mapviewer/) to monitor traffic operations in real-time using ESRI GIS web, various base maps and GIS layers including two Waze GIS layers for alerts and traffic.
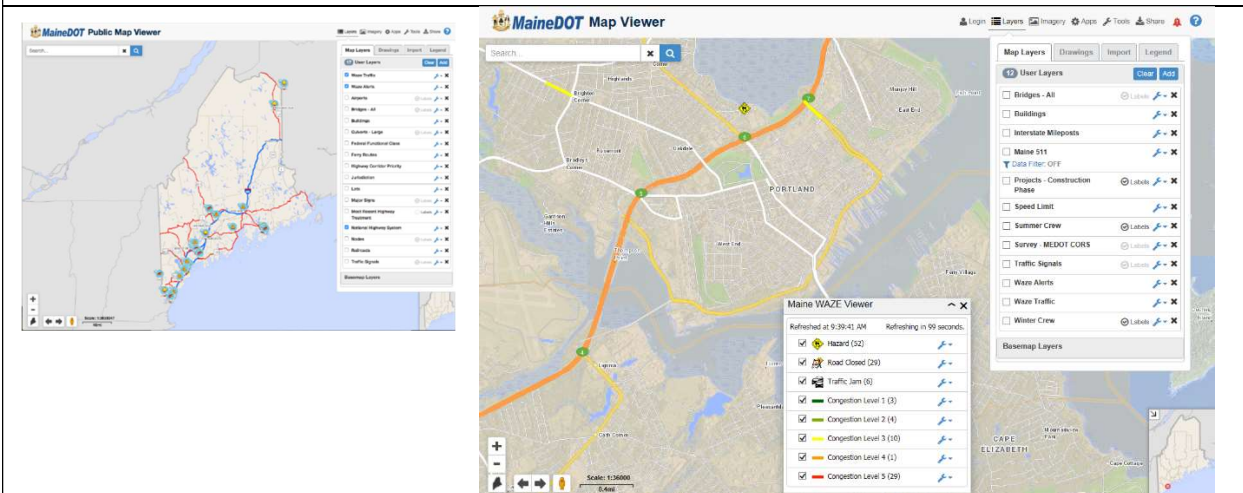
Currently this mapping tool is used by Maine to monitor the transportation network. There is a public and private version. The public version is made available for emergency responders to view the big picture.
Waze reports in the State of Maine are monitored as shown above.
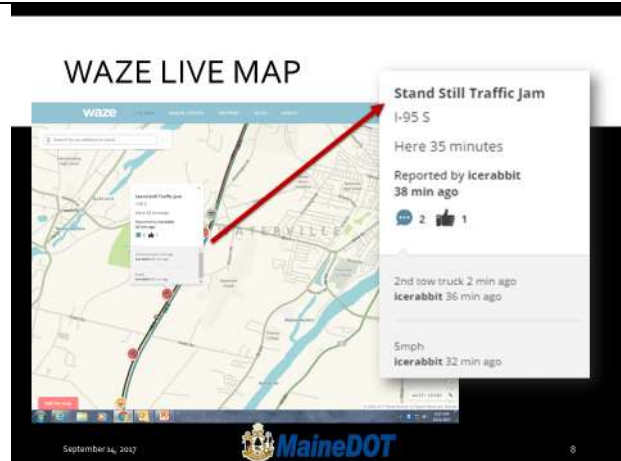
When an alert is generated, TMC reviews the details, such as location, when reported, ratings score and report confidence. Verification with police is important when thresholds are reached.

These thresholds can include >10 min delays, a high reporter rating, citizen calls, checking the Waze Live Map and seeing an event, etc.

The Waze live map also provides things like live updates. A Waze user can share with others messages, such as: (2nd tow truck just showed up, etc.)

From:	MaineDOTRadioRoomDispatchers@maine.gov
To:	
Cc:	
Subject:	295 south mile 43 closed

Sent: Thu 7/27/2017 2:57 PM

MAINE SAGADAHOC RICHMOND 2
VEHICLE ON FIRE 295 SOUTH MILE 43 RICHMOND CLOSED DUE TO VEHICLE ON FIRE.

295 mile 43 closed due to camper on fire and has propane on trailer.
DOT CREW BEEN CALLED 214 heading that way.

Sent from Compass user t_whitman:DOT-CT1ADTMO001:5816

Once verified an internal notification is sent to agency stakeholders/responders through the ATMS which explains what is happening and actions that are being taken so they have information about a situation before starting their own protocols.

Six minutes after seeing the report come in, we have observed, verified, notified the crew and disseminated information to the public.

CHALLENGES/LIMITATIONS

Waze at times is slow at posting traffic delays.
Google has more users and actually provides better real-time delay reporting.
Once enough Waze users are caught in the queue then traffic information becomes relevant and current. It updates on its own. Maine can monitor traffic delays in our internal mapping tool: Map Viewer. It is updated every two minutes.
Not every crash is reported in Waze for a variety of reasons.
Crashes on secondary roads, at times show up as delays.
Waze users report crashes, but not details like lane or real-time traffic information, so Maine's TMC goes to Google maps to see delays quicker and uses Google/Maps/Directions (point to point travel directions to find delays). One can see people using ramps as detours and secondary roads.

Maine DOT sometimes receives erroneous reports from Waze users. Maine DOT assumes that Waze users "fat fingered" the alerts and sent it too fast. For example, users tap the wrong icon when submitting the alert.
Maine DOT is still trying to figure out how to deal with this kind of real-time erroneous and fuzzy data

Expectations in NYC and Maine are different. Maine is a large rural state with a high tourist population.
WAZE is an affordable option for awareness of travel conditions.

NEXT STEPS

MaineDOT is looking at Google's API for speed info since there is good data to monitor.
There is a need to find an automatic refreshing tool for Waze's Traffic Tool and Google maps. Because web pages do not automatically update themselves.
MaineDOT wants to add Waze notifications (as unconfirmed events) to the Traveler Information System for public awareness. The idea is to show this information and let the public see they can contribute to travel conditions.
Being a rural state, crowdsourcing data does not cover remote roads late at night, or during storms.
DOT will continue to report events missed by crowdsource data.
Maine DOT has begun working with ESRI GIS web tools. There are many opportunities to enrich our data to better understand highway performance and situational awareness.

Q & A

Q: Is anything automated with emails, twitter, ATMS?

A: *No, in the future maybe, we still want TMC operators to check and look at significance of things, we get a lot of minor accident reports that don't affect traffic. People are still manually importing information from one means to another.*

TRAFFIC INCIDENT MANAGEMENT

MassDOT: Highway Operations Center Traffic Desk – Using Crowdsourcing Applications for Traffic Incident Management

Chester Osborne, Massachusetts Department of Transportation

Using WAZE in Traffic Incident Management

Mission: MassDOT is trying to understand if and how Social Media can be leveraged for Event Detection to compress the TIM Continuum and support safe-quick clearance.
MassDOT has been running a WAZE pilot at the Highway Operation Center (HOC) in South Boston. The pilot is currently in Phase 2.   In November, the HOC will make a detailed review of the last 14 months of data and develop next steps.
The WAZE Pilot – Phases 1 & 2
Phase 1 consisted of monitoring multiple social media channels to include WAZE, Twitter, Radio, television and other sources and logging the WAZE data using the WAZE Traffic desk application on a representative 10-mile road segment during the hours of 6-10 am and 3-7pm when employee resources allowed.   614 events were detected which translated to about one new event per hour (a 10-mile segment was used)   -50% of reported alerts were gone on arrival (GOA) of the Highway Assistance Patrol (HAP).   25% of events were cleared with HAP resources only; 25% of events required additional resources to HAP.   Phase 2 is underway and consists of monitoring and logging data from WAZE, on five 10-mile road segments for a few hours a day.   During Phase 2, we are seeing a similar alert rate of one new event per hour (a 50-mile segment).   In 90% of the cases, the WAZE pilot was the earliest to report low level events but people still call 911 first when coming across major events.   WAZE alerts are typically following a 40/60 split. 40% of WAZE alerts are crashes and 60% are hazards.   In both phases, the work is performed manually by HOC operators using the WAZE Connected Citizen Program tools, no automation was developed.
CHALLENGES/LIMITATIONS
The WAZE web interface is missing key map icons (mile markers, exits) that would help reacting to and managing alerts much more efficiently.   There is a lack of control on what WAZE reports and how their tool works ("We don't own it").   Operators cannot deploy a response directly from the WAZE app.   Agencies have no idea what is going on under the hood. The WAZE tool is a black box – should it be trusted?   What if we integrate WAZE within our system and they start charging one day?   WAZE pilots currently show that people use WAZE to reports low level events only and therefore this only helps with the detection of minor incidents.   The Connected Citizens Partnership (CCP) interface has limitations to geographic areas an operator can monitor   They need to automate for large scale.   There is a high gone-on-arrival (GOA) rate. Agencies must be able to understand the 'watershed' moment when an event looks like a gone-on-arrival to when an event looks like an actual incident   WAZE reporting is not evenly distributed as WAZE users are not uniformly distributed across the state.

Life Cycle of a Waze event

What happens in a WAZE Event?

Front users pass by the event, there is low reporting %

Some up front may report, but are not sure

Most in the queue will be in the queue but not sure what is happening.

Once speed drops below 20 mph, users observe the event and report it. This is most often the time of WAZE detection. Operators have learned that a hazard icon with unusual traffic behind it is a real event.

Agencies need to understand the lifecycle of a WAZE event. How to define the "Watershed moment", the earliest moment when the alerts can no longer be ignored? Earlier witnesses won't report unless they are level 4 or 5 WAZE users. Once WAZE users start to get impacted by the incident they are starting to report it. Typically hazard alerts are reported first, then alerts of speed slow down. Once speed alerts have reached 10-15 mph, WAZE alerts of any kind are coming from everywhere (hazards, accident, jam and police reports)

NEXT STEPS

Develop WAZE Pilot Phase 3, possible functions include;

Filter and visualize historical data

Review the use of MassDOT RTTM Go-Time data to search for incidents, throughput patterns and early event indicators.

Investigate the use of machine learning to identify trigger points

Perform tests in camera equipped areas to validate developed models

Share results and consider integration into ITMS.

MassDOT would like to know how they could validate alerts coming through the WAZE data feed and is contemplating correlating WAZE data and other social media and news data to assess the potential to increase alert credibility using multiple crowdsourced and non-crowdsourced data sources

MassDOT views WAZE as a way to supplement traditional methods of detection

MassDOT found discernable patterns in the 5 to 10 min before the crash alert in Bluetooth data. Earlier detection could be done using a combination of WAZE alerts and Bluetooth patterns.

MassDOT is interested in exploiting these patterns in their tunnels by leveraging the Tunnel beacon (Bluetooth) deployment that provides connectivity continuity inside tunnels to WAZE and Google Maps and subsequently reduce the risk of crashes in tunnel.

Q & A

Q: How do you deal with operators' resistance?

A: Retraining, support and sell it.

Q: Have you received backlash on diverted traffic small routes?

A: Yes, and we offer traffic calming/control devices. We may look to code the roads for speeds and WAZE is not for commercial vehicles.

Q: What kind of false WAZE data have you encountered?

A: When WAZE is redirecting traffic around an event or incident, people are redirected by WAZE on arterial streets and are driving too fast. So, residents affected by the increase traffic speed and volume have been putting false information on WAZE such as car crashes or construction alerts in the hope that WAZE will redirect people away from their neighborhood.

Q: How much exposure to this new technology approach has been presented to Executive management and what has been their response?

*A: They have seen all of it and are for it.*

CROWDSOURCING DATA ANALYSIS

VDOT: EVALUATING WAZE DATA AND NOTIFICATIONS
Michael Fontaine, Virginia DOT / Virginia Transportation Research Council

Analyzing the quality of WAZE data

WAZE DATA ANALYSIS
VDOT owns and operates what would be county roads in other states, but only has dense camera coverage on urban freeways. They are hoping to glean some knowledge about rural areas from the WAZE data.
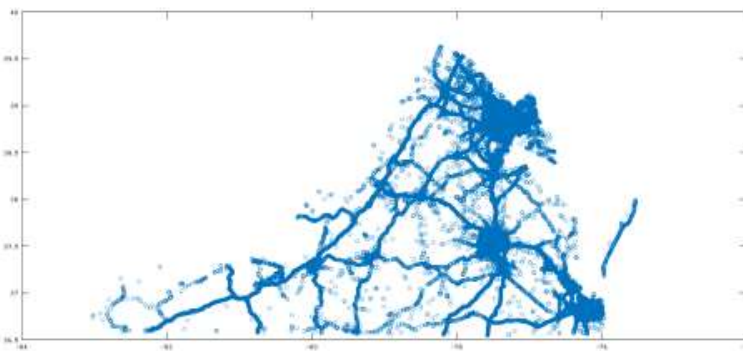
VDOT collected Waze data from February, 5th 2017 to February, 25th, 2017 across the entire state of Virginia. All alerts on all roadways were captured representing a total of 329,368 events with an average of 16,000 events per day.
Waze reported about 20 times more incidents than VaTraffic.

Over the three-week period, Waze reports tended to be most heavily concentrated on urban routes and major interstates. Data on rural primary roads was more sparse.
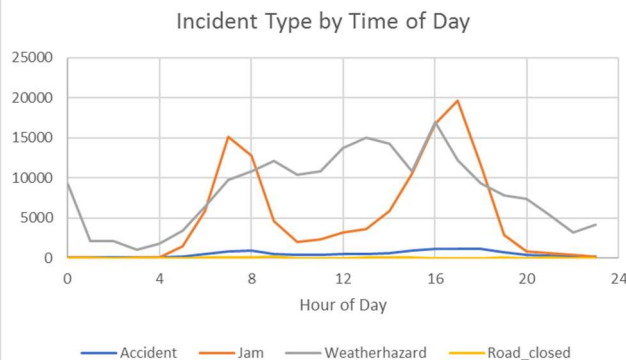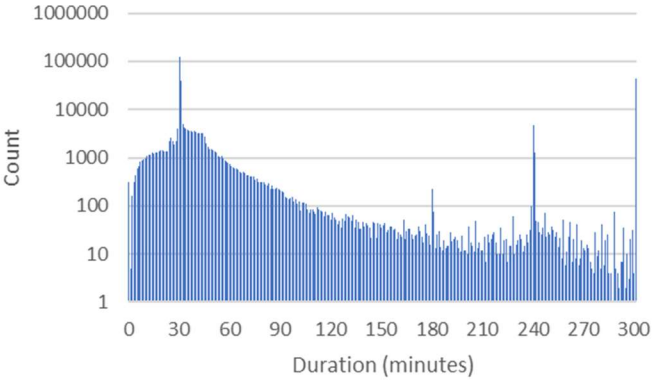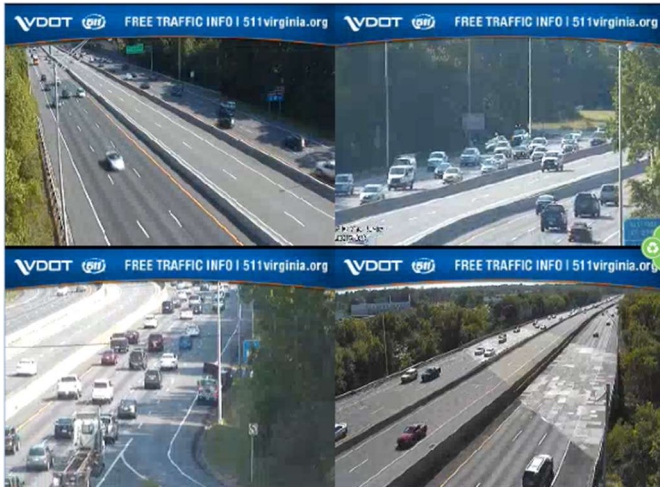

Waze reports varied over time during the three-week period. On weekdays, reports were mainly within cities and on major highways. Peak Waze usage tended to coincide with peak periods, mainly due to jam reports. Crash and hazard reports were more numerous during the day, but did not follow the volume patterns as closely.

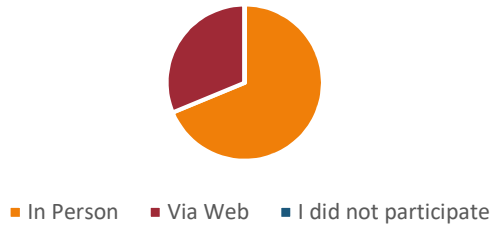| |
|---|
| Out of all the events reported through Waze, "car stopped on shoulder" and jam events were the main events reported. |
| VDOT did not observe any score below 5 in reliability during the three-week period.
98% of all incidents reported were either a reliability rating of 5 or 6. |

VDOT/VTRC investigated the duration of incidents during the three-week period. They plotted a histogram of the number of incidents per incident. It appears that large peaks (large number of incidents appeared at 30, 240 and 300 min. This may be Waze cleaning up incidents after a default timeout threshold.

VDOT/VTRC has performed a ground truth experiment to assess Waze incident timelines.

They compared Waze incident alerts on I-64 in Norfolk, VA with actual screenshot captured of I-64 traffic at the time of incidents.

They used RITIS to capture 1 min video frames and compared it to Waze data and logged time for both Waze and video feed.
There were cases where WAZE reported an event and nothing was visible on the cameras.

It is also important to consider both the time the incident is logged into TOC database, as well as time when camera repositions onto the incident. The TOC operator is often aware of an incident several minutes before entering it into the database

CHALLENGES

VDOT identified another difficulty with Waze data concerning roadkill and potholes alerts. It appears that Waze users are reporting road kills for animal such as squirrel and blue jays which are not considered significant to VDOT TOCs.

Pot holes to the contrary were reported accurately reported by Waze users, based on a limited sample.

VDOT is unable to report more detailed results of the data quality analysis until Waze grants permission.
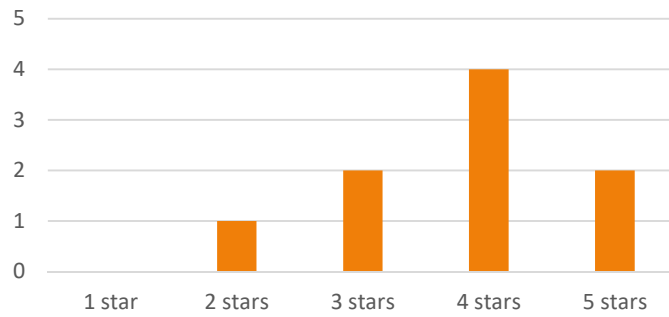
# SURVEY RESPONSES TO CROWDSOURCING SUMMIT

Participation Method

- In Person
- Via Web
- I did not participate

Q1 - How did you participate in the Crowdsourcing Summit?

Importance of Crowdsourced Data

1 star | 2 stars | 3 stars | 4 stars | 5 stars

Q2 - How important is the use of crowdsourced data to your agency?

How Worthwhile was the Summit?

- Not
- Somewhat worthwhile
- Very
- Extremely
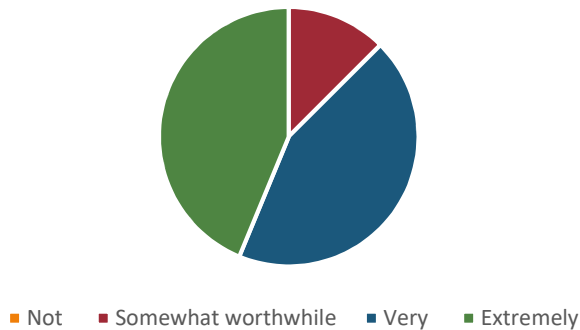
Q3 - Rate the Crowdsourcing Summit overall

How frequently should the meetings be?

- Quarterly
- Semi-Annual
- Annual
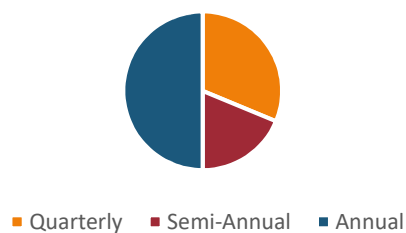
Q4 - With what frequency would you like to have these specifically-themed meetings?