



Crowd Sourcing for Operations: **FHWA EDC-5 Initiative**

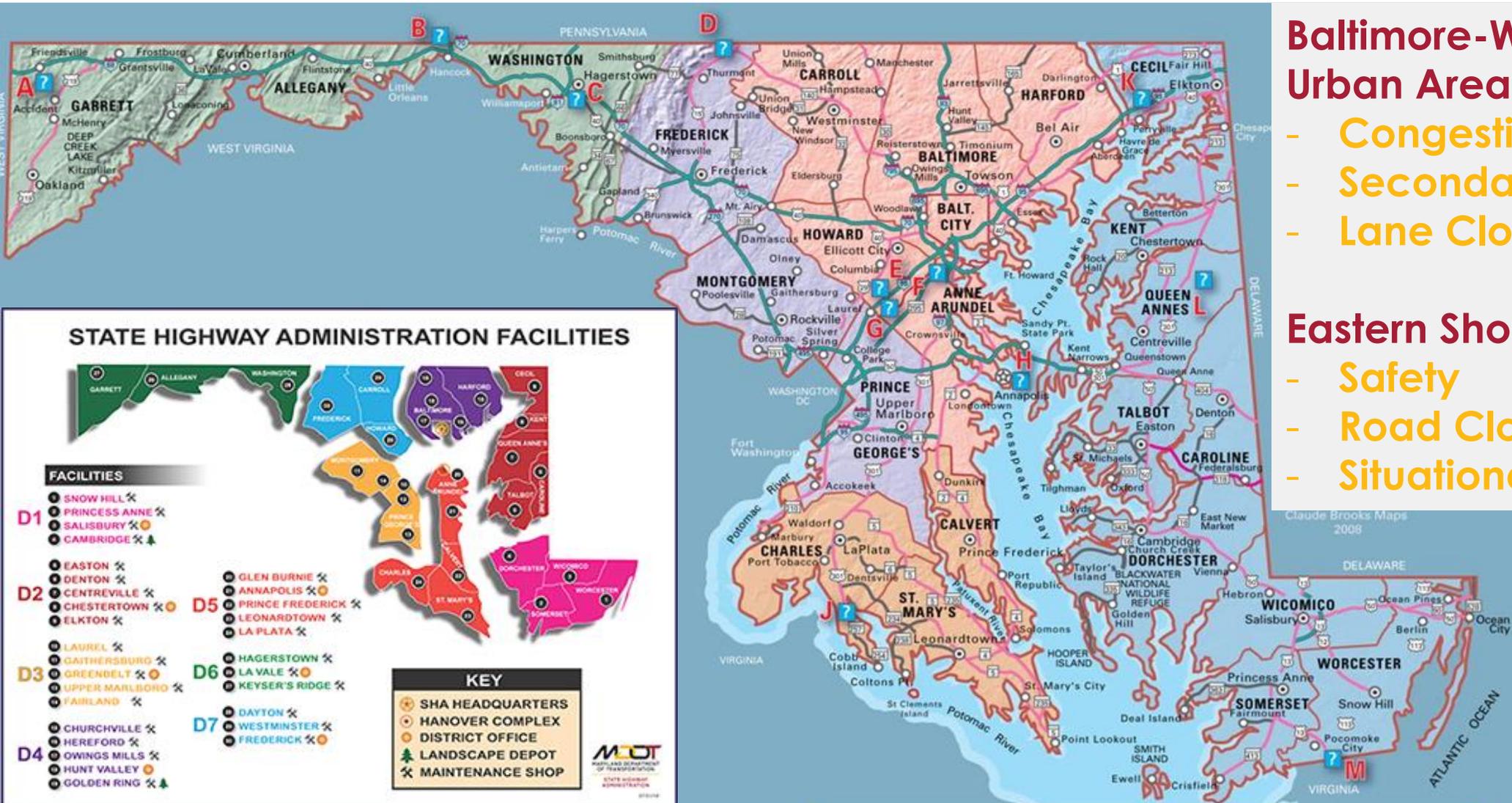
Gearing MDOT SHA for Next Gen **Transportation Mobility & Operations**

2020 MDQI Annual Conference

→ January 23, 2020 ←

Subrat Mahapatra
MDOT SHA Office of CHART & ITS Development

REGIONAL OPERATIONS CONTEXT



Baltimore-Washington Urban Areas

- Congestion
- Secondary Crashes
- Lane Closures

Eastern Shore, Western MD

- Safety
- Road Closures
- Situational Awareness

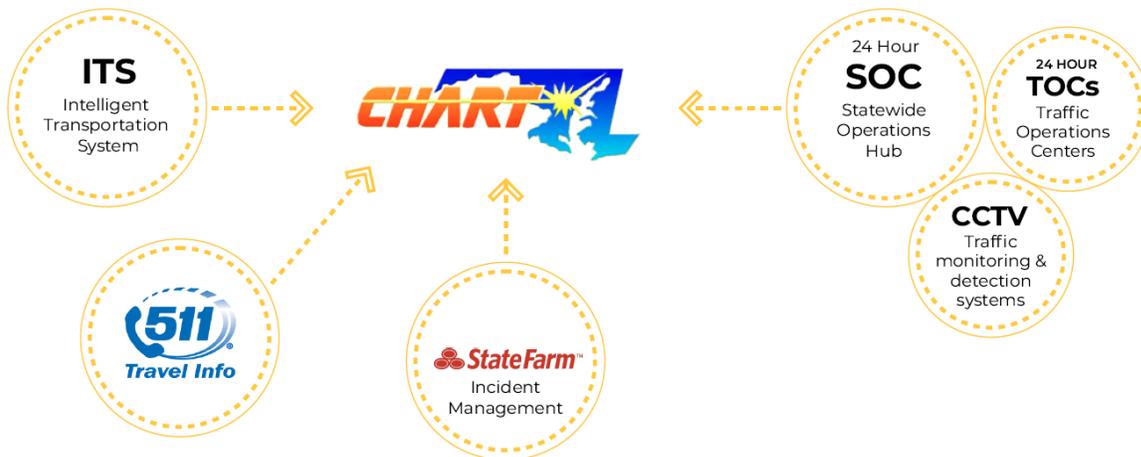
MDOT SHA CHART PROGRAM

Coordinated Highways Action Response Team (CHART)

Coordinated Highways Action Response Team (CHART) began in the mid-1980s as the “Reach the Beach” initiative, focused on improving travel to and from Maryland’s eastern shore.



CHART is now a statewide, multidisciplinary program providing traveler information, traffic monitoring, traffic management, and incident response and management services through our long-standing partnership with State Farm.



Driving Maryland's TSMO Program

- Traffic & Roadway Monitoring
- Incident Management
- Travelers Information
- Traffic Management
- Emergency & Weather Management
- Statewide Radio Communications

CHART PROGRAM ENABLERS

40+

Emergency Responder Technicians

WORKING



COVERING



Operating in partnership with Maryland Agencies



SPEED DETECTORS



TRAFFIC COUNTING



CCTV CAMERAS



WEATHER SENSORS



FIELD REPORTS



LIVE TRAFFIC DATA

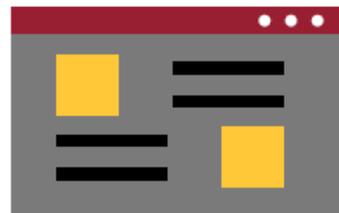
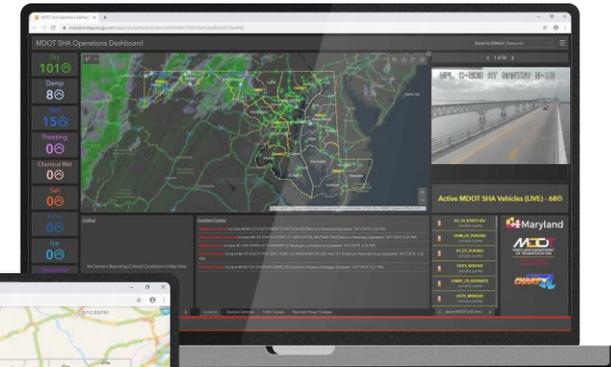
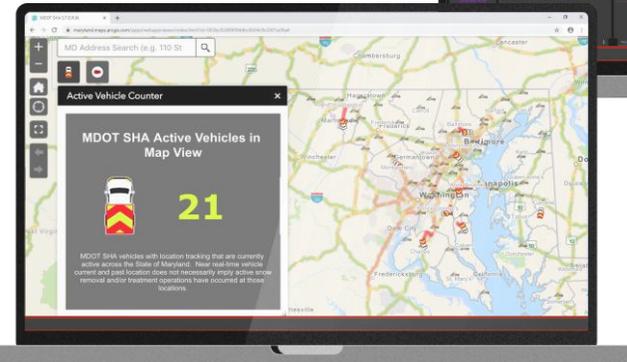


CHART Systems

- ATMS
- EORS
- LCP
- S.T.O.R.M.
- Ops Dashboard



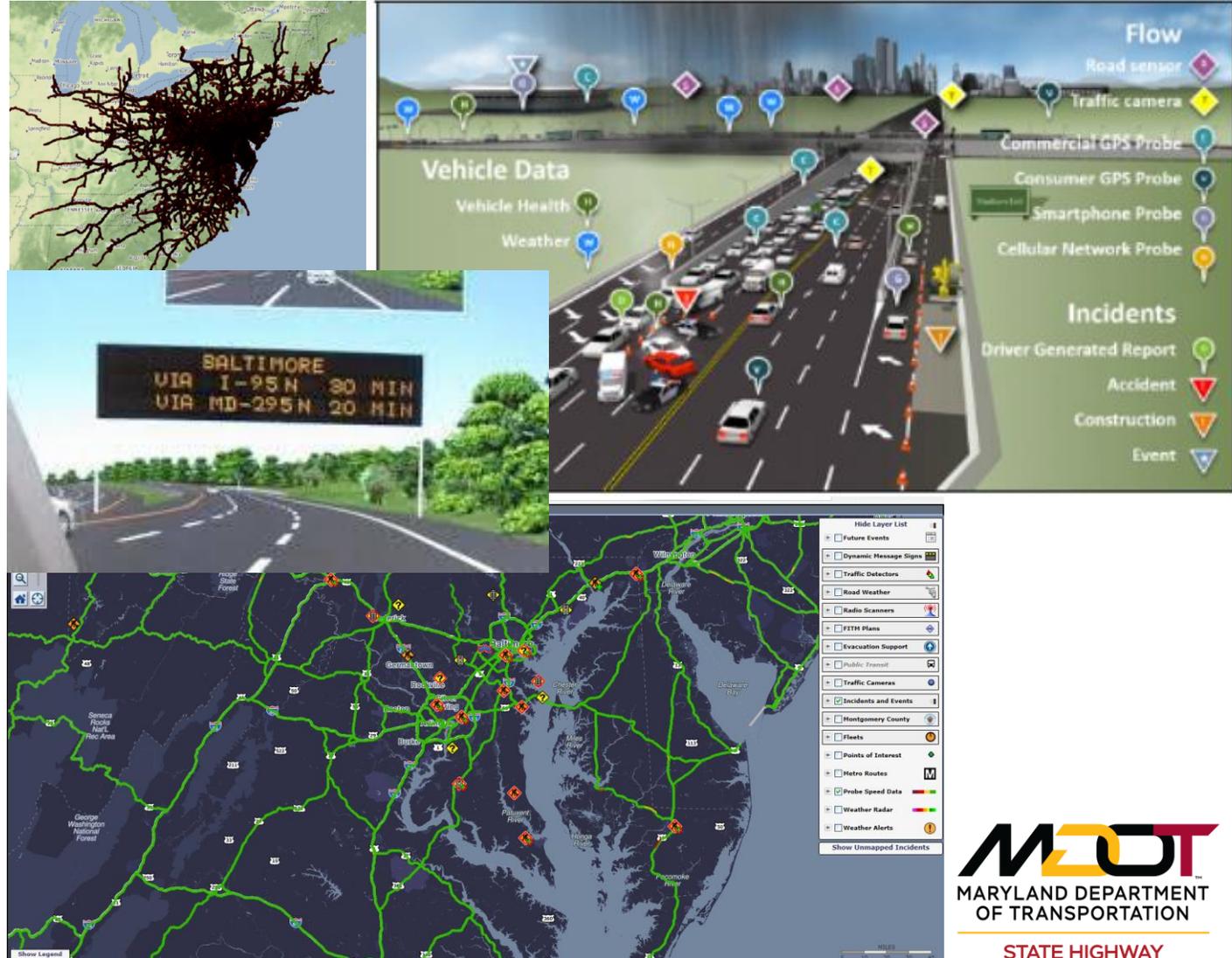
CURRENT USE OF CROWD SOURCED DATA FOR OPS

• Real time applications

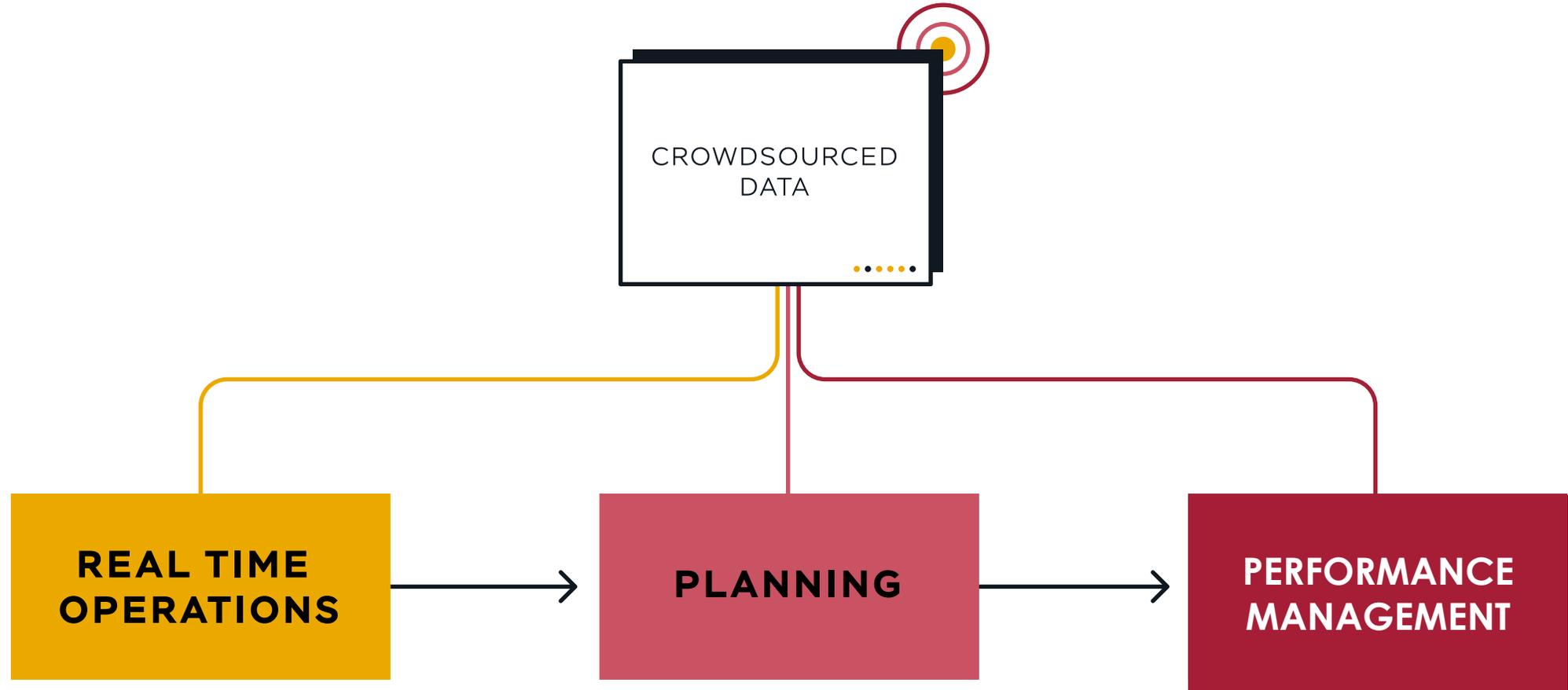
- System Monitoring
- Incident Mgmt.
- ATM/ ICM

• Archived data applications

- Perf. Evaluation
- TSMO Decision-making

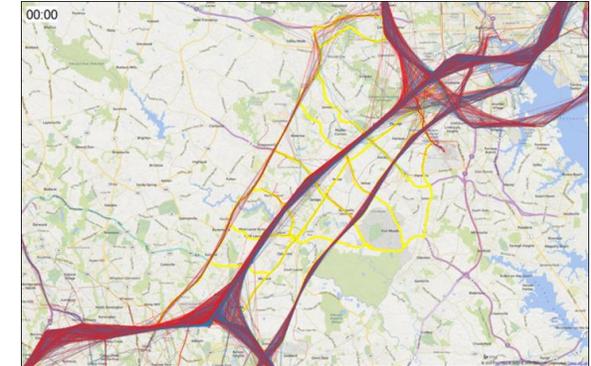
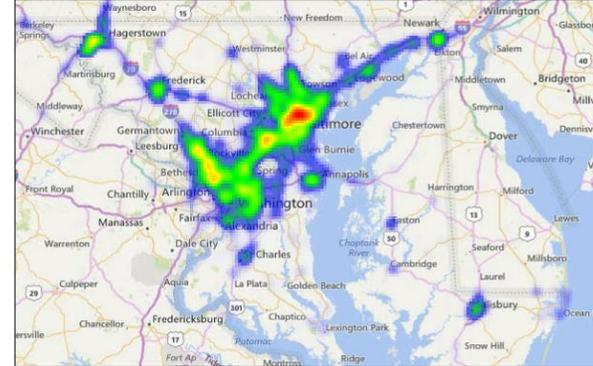
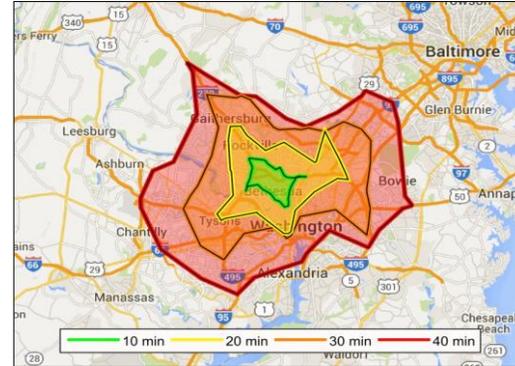
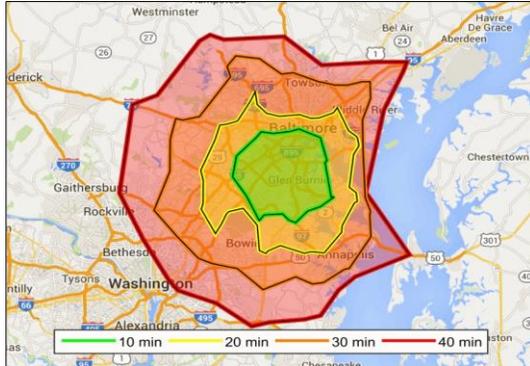


CROWD SOURCED DATA OPPORTUNITIES



CROWD SOURCED DATA FOR TSMO PLANNING

ACTIVITY ZONES, TRAVEL TIME CONTOURS, ACCESSIBILITY MAPS



- Heat map of trip origins reveals main trip generators
- Trips from activity zones are used to derive isochrones
- Compute trip-based performance measures
- Determine distribution of traffic along major routes
- Estimate turning movements at major intersections

Maryland DOT is NOW a Waze's Connected Citizens Program (CCP) Partner

INNOVATION

New Waze Partnership Provides Instant Communication with Customers



waze
OUTSMARTING TRAFFIC, TOGETHER

- Partnership Agreement on Oct 1, 2019 and MDOT SHA joined over 100 other CCP partners.
- Waze CCP Training/ Workshop on Oct 29, 2019
- MDOT SHA attended the FHWA EDC-5 Crowdsourced Data Peer Exchange Dec 10-11, 2019.

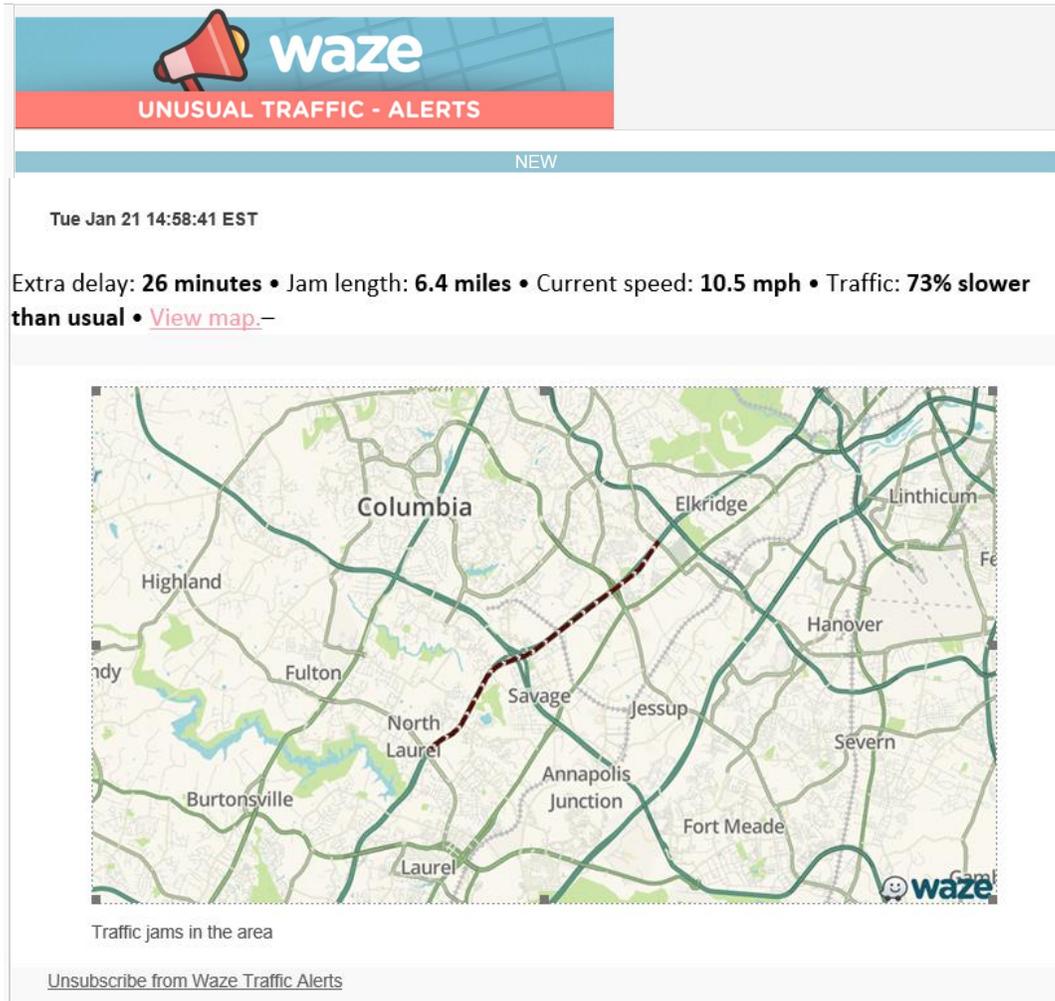
Sharing information in real-time with motorists is one of the best ways we can improve customer service and safety," says MDOT SHA Administrator Greg Slater. "This partnership allows us to share road closure and detour information on the Waze platform instantly, arming our customers with the information they need when planning a trip on our roadways."

Crowd Sourced Data through the Waze CCP Partnership

- Waze provides MDOT various data streams through the CCP Partnership
 - **Alert data** – includes accident, construction, road closure, weather and hazard events reported **as perceived by Waze users**.
 - **Jams data** – provides average speed, jam length, and delay when traffic differs from typical.
 - **Municipal user indicator** – indicates whether a report was pushed by a pre-specified municipal (DOT) user.



Waze CCP Partnership in Action – Quick Wins

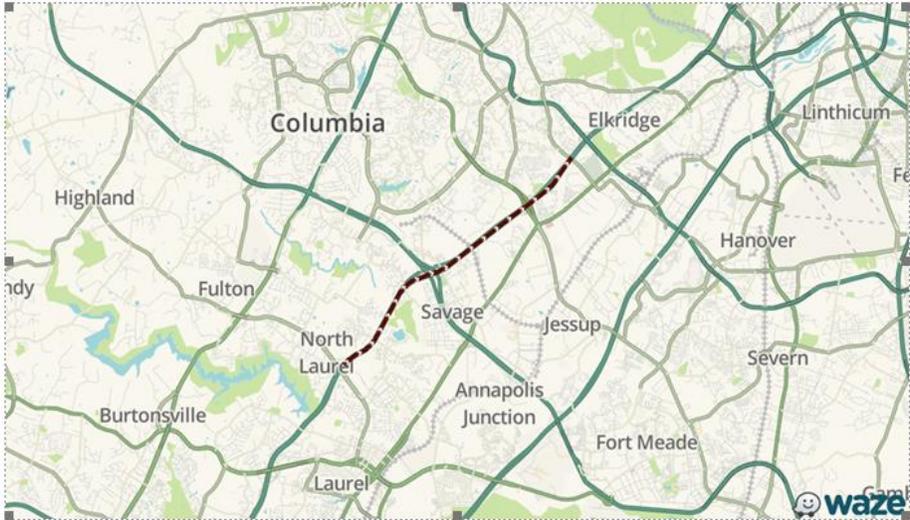


waze
UNUSUAL TRAFFIC - ALERTS

NEW

Tue Jan 21 14:58:41 EST

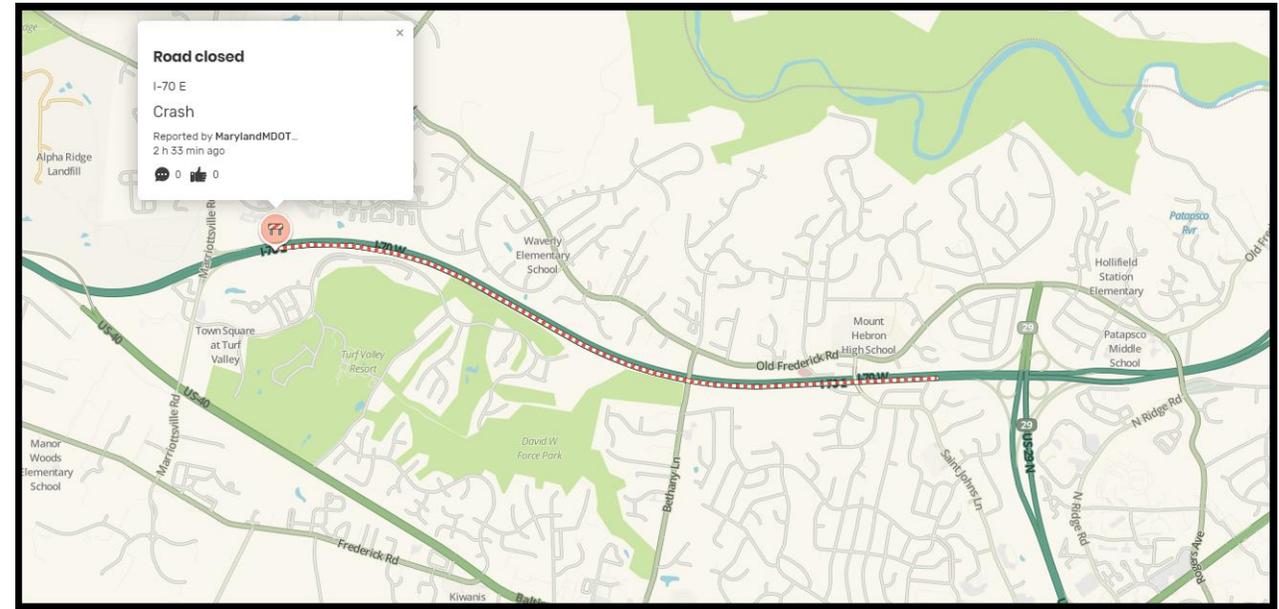
Extra delay: **26 minutes** • Jam length: **6.4 miles** • Current speed: **10.5 mph** • Traffic: **73% slower than usual** • [View map.](#)



Traffic jams in the area

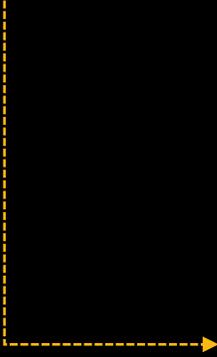
[Unsubscribe from Waze Traffic Alerts](#)

MDOT SHA's First Waze Entry Oct 31, 2019



"I wanted to share with this group an exciting first step in our Waze journey....It may seem like a small step and we definitely aren't the first to the gate, but I believe this is a pretty monumental leap forward for our TMC Operations."

Jason Dicembre, Chief, TMC Operations, CHART-SOC



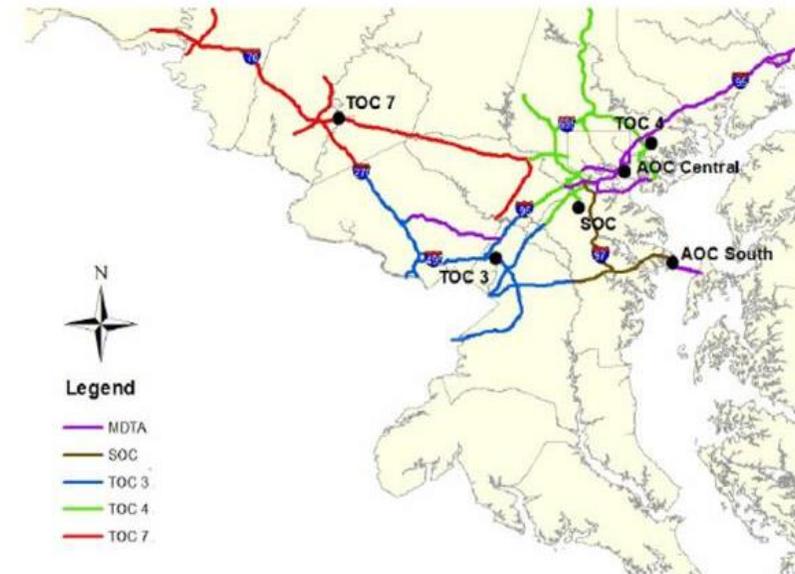
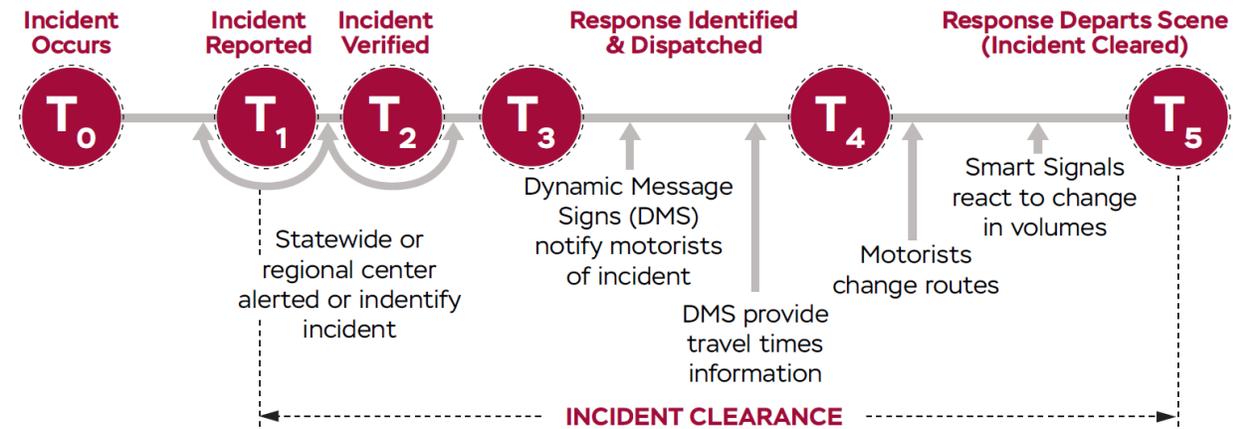
WAZE CCP Data for Operations

- Opportunity Areas

TRAFFIC INCIDENT DETECTION & TIM

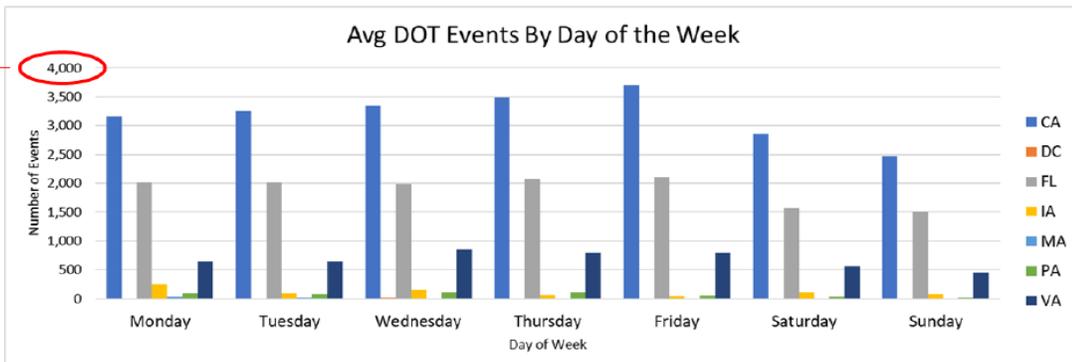
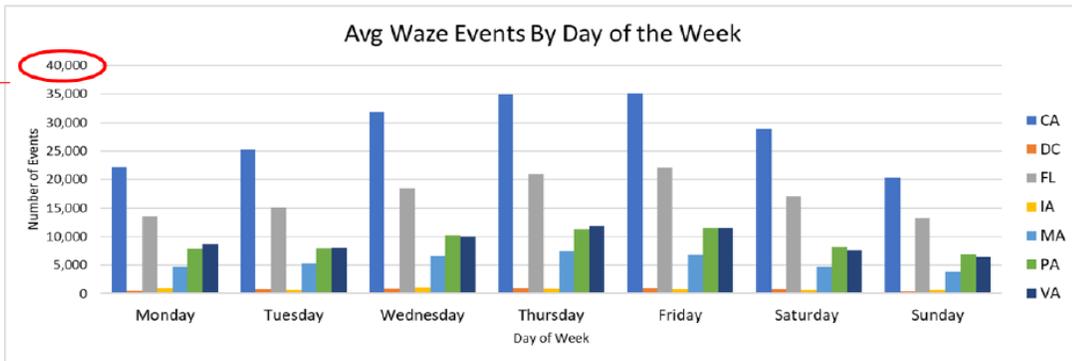
Traffic Incident Detection – expanding geographic coverage, resolution, and timeliness of incident detection through real-time data

- Freeway facilities where CCTV and other ITS have limited coverage
- Major arterial corridors (non-CHART patrolled MDOT owned routes and non-state routes) to more quickly detect and clear incidents.



More Incidents Reports & Faster Alerts thru' Waze CCP

10X More



State	Avg Waze Events Per Day	Avg DOT Events Per Day
CA	28,389	3,184
DC	777	16
FL	17,210	1,895
IA	810	114
MA	5,613	14
PA	9,171	70
VA	9,168	681

Note:
 • Waze data excludes jams event type
 • 3 Month Period of 3/17 - 5/17 displayed

Response Time (mins)	Total		
	Incident	Disabled Vehicle	Sub-total
TOC-3	13.37 (3,336)	16.07 (1,601)	14.25 (4,937)
TOC-4	14.03 (5,405)	17.18 (2,869)	15.12 (8,274)
TOC-7	12.21 (2,723)	13.39 (860)	12.49 (3,583)
ESTO	7.10 (106)	8.39 (52)	7.53 (158)
SOC	15.14 (4,625)	18.89 (2,301)	16.38 (6,926)
AOC	7.09 (5,663)	11.98 (3,353)	8.91 (9,016)
OTHER	8.28 (18)	11.41 (25)	10.10 (43)
Weighted Average	12.10 (21,876)	15.45 (11,061)	13.23 (32,937)

Source: 2018 CHART Evaluation Report

Type of Event	Total Number of DOT Events During This Period	Total Number of Waze Events During this Period	Percentage of Events that were Reported By Waze First	Average Time that a Waze Event was Reported Before a DOT Event
VA Crashes	5,989	63,708	57.6%	3 Minutes Earlier
FL Crashes	18,242	186,146	80.4%	3 Minutes Earlier
CA Crashes	*135,865	336,581	39.1%	4 Minutes Earlier



ARTERIAL OPS/ SIGNALS TIMING & CORRIDOR MANAGEMENT

Traffic Signals Timing

- Identify traffic signals failures, changes in signal performance.
- Conduct simple before/after assessments of changes to traffic signal timing using archived Waze data.

Active Corridor Management

- Using real-time and archived Waze data to support real-time operations along major corridors that includes traveler information and other ITS strategies

Road Weather Management

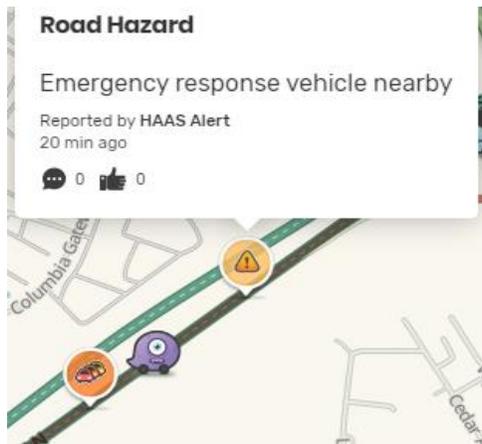
- Conduct road weather management through data integration (AVL, Waze reports, and other data).

INTEGRATION WITH COMPLIMENTING TECHNOLOGY APPLICATIONS - HAAS ALERTS

- Raising Situational Awareness, TIM on Roadways, “MOVE OVER” law
- Smarter Work Zones with ITS enabled cones/ devices that provides Waze alerts etc.

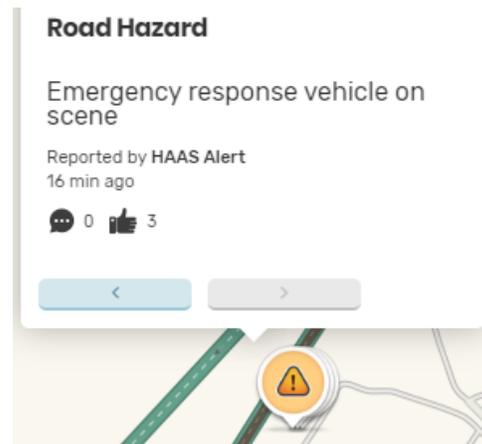
Waze Notifications for an I-95 Crash

- 6:42 AM – Crash warning posted by a civilian
- 6:59 AM – MDOT Vehicle posts a HAAS Alert ~1.5 miles prior to the crash site
- 7:04 AM – MDOT Vehicle posts a HAAS Alert at the crash site



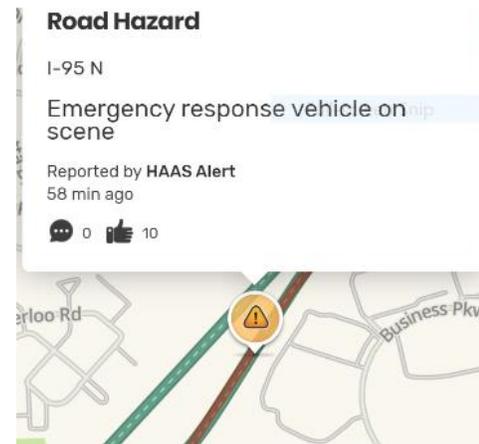
6:59 AM HAAS Alert
after 20 min

0 "Likes"



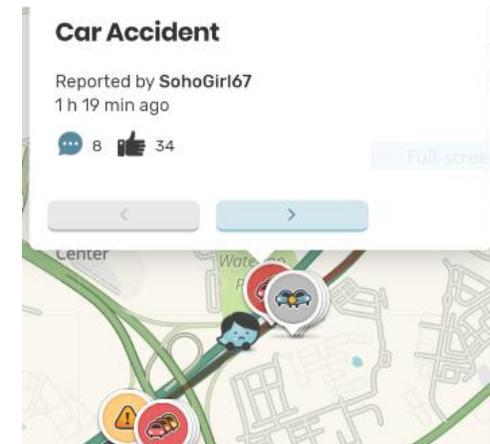
7:04 AM HAAS Alert
after 16 min

3 "Likes"



7:04 AM HAAS Alert
after 58 min

10 "Likes"



6:42 AM civilian alert
after 1 hr 19 min

34 "Likes" / 8 Comments

OTHER CROWD SOURCED DATA FOR OPS - INRIX HELP

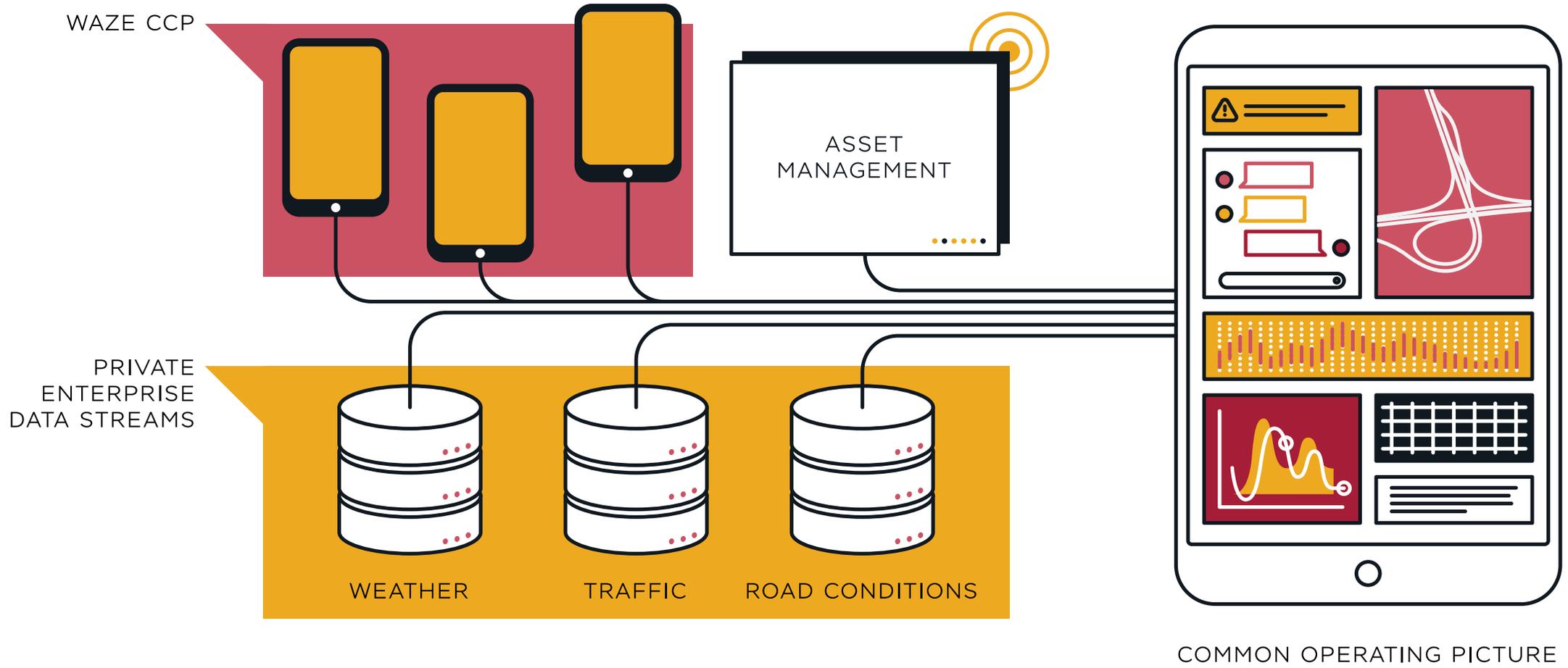
- In the process of acquiring INRIX Highway Emergency Link Platform (HELP)

The screenshot shows the CIRIS web application interface. At the top, there is a header with the CIRIS logo and navigation links. Below the header, there is a yellow banner with the text "I-80 EB closure between exits 90 - 97". The main content area is divided into two sections. The first section is titled "Registered Users" and contains a table with columns for "Select", "Phone #", "Contact By", "Veh. Type", "Driver", "Num. Occupants", "Last Contacted", and "Contact History". The table lists four entries, all with "Text Message" as the contact method and "Car/SUV/Small Truck" as the vehicle type. The second section is titled "Registered Users - Last Known Location" and features a map showing the locations of the registered users, marked with blue dots along a red-shaded area representing the closure zone.

Select	Phone #	Contact By	Veh. Type	Driver	Num. Occupants	Last Contacted	Contact History
<input type="checkbox"/>		Automated Phone Call	Commercial Vehicle (includes Tractor Trailers and Delivery Trucks)	Driver	1	12/15/2016 4:44 PM	view
<input type="checkbox"/>		Text Message	Car/SUV/Small Truck	Driver	1	12/15/2016 4:44 PM	view
<input type="checkbox"/>		Text Message	Car/SUV/Small Truck	Driver	1	12/15/2016 4:44 PM	view
<input type="checkbox"/>		Text Message	Car/SUV/Small Truck	Driver	2	12/15/2016 4:44 PM	view

The screenshot shows the WEA and Public Site mobile application interface. It is divided into three main sections. The first section is an "Emergency Alert" for I-78 Exit 151 to 110, which is closed due to severe weather. The second section is a "CLOSURE" notification for I-80 EB closure between exits 90-97, accompanied by a map showing the closure zone. The third section is a registration form with fields for "MOBILE PHONE # (NUMBERS ONLY)", "CONTACT ME VIA:" (Text Message), "WHAT TYPE OF VEHICLE ARE YOU IN?" (Car/SUV/Small Truck), "HOW MANY OCCUPANTS ARE IN YOUR VEHICLE, INCLUDING YOURSELF?", and "ARE YOU THE DRIVER OR A PASSENGER?" (Driver). The form also includes buttons for "Register for this Closure" and "Message History".

OVERALL PERFORMANCE MANAGEMENT



FHWA EDC-5 PROGRAM / MDOT SHA TECHNICAL COLLABORATION

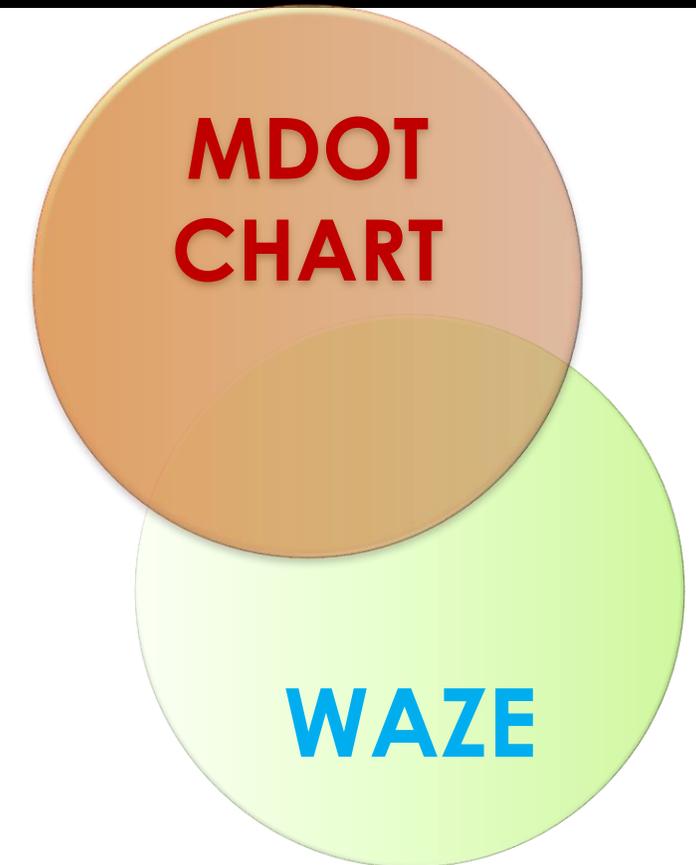
- **MDOT SHA will provide access to** incident and speed datasets and OMOC network
- **EDC-5 Program Team will collect** Maryland Waze Alert data over 3 – 6 months and other Waze data for freeways and priority arterial corridors.
- **EDC-5 Program Team will integrate data** using the OMOC linear referencing system.

- **EDC-5 Program Team will conduct analytics to define Waze value add** including more incidents detected, improved detection time, and other opportunities.
- **EDC-5 Program Team will develop and make available a web-enabled platform** to provide visualization of analytics.

By 2020, MDOT SHA aims to build the business case/ foundation for mainstreaming Waze CCP type of data for TSMO decisions.

UNDERSTANDING WAZE OPPORTUNITY POTENTIAL

- **Does Waze provide event data in geography where CHART does not have coverage?**
 - Major arterial corridors
 - Rural areas
- **For freeway corridors where CHART has coverage:**
 - Does Waze capture events that CHART does not?
 - What doesn't Waze capture that CHART does?
- **Timeliness** – Does Waze offer earlier detection compared to our existing data?
- **Accuracy** – Does Waze offer realistic geographic and event/severity information?



LINKING WAZE DATA FEEDS TO OTHER DATA SOURCES



FHWA/ MDOT SHA EDC 5 COLLABORATION OUTCOMES

- Improvements in detection (timeliness and # events detected) through Waze - **reduces delay, secondary crashes**
- **Improve efficiency** of existing CHART patrols and FITM route planning
- Understanding incident frequency, duration and patterns on arterial and minor roads – **improve Ops and safety**
- Real-Time TSMO/ TIM performance measures accessible by varied stakeholders within and outside DOT – **enhance regional Ops**
- Potential uses of real-time Waze data for **ATM/ ICM**

QUESTION?
THANK YOU!

CONTACT INFORMATION

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