Talking Transportation Technology (T3) Webinars

INTELLIGENT TRANSPORTATION SYSTEMS
PROFESSIONAL CAPACITY BUILDING

Data Sources and Management

Part 2 of 5 in the Crowdsourcing for Operations Course via Webinar

Course developed by the Federal Highway Administration (FHWA) Every Day Counts (EDC) Crowdsourcing for Operations

Tuesday, June 20, 2023 – 1:00PM ET

U.S. Department of Transportation

INTELLIGENT TRANSPORTATION SYSTEMS
PROFESSIONAL CAPACITY BUILDING

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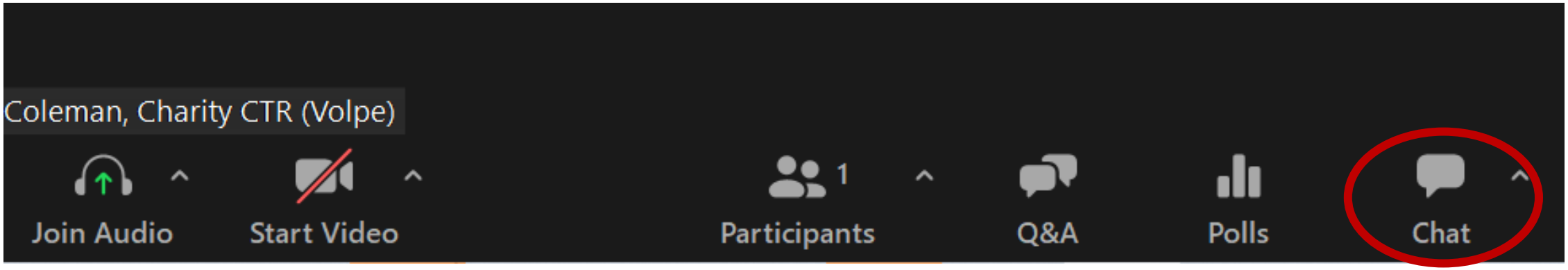
Ask a Question / Make a Comment

INTELLIGENT TRANSPORTATION SYSTEMS
PROFESSIONAL CAPACITY BUILDING

Use the Chat Pod

- Click on Chat icon on your screen
- Submit your question or comments in the Chat window



Questions/comments will be addressed after the last presentation, as time permits

Intelligent Transportation Systems Joint Program Office (ITS JPO)
Professional Capacity Building (PCB) Program Presents

Data Sources and Management

Part 2 of 5 in the Crowdsourcing for Operations Course via Webinar

June 20, 2023

Course developed by the Federal Highway Administration (FHWA) Every Day Counts (EDC) Crowdsourcing for Operations Innovation, and delivered by the FHWA Office of Operations

U.S. Department of Transportation
Federal Highway Administration

Every Day Counts
Innovation for a Nation on the Move

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Today's Host and Presenters

Source: FHWA.

Ralph Volpe, Host
EDC-6 Crowdsourcing Colead

FHWA Resource Center Operations Technical Service Team

Source: MoDOT.

Alex Wassman, Instructor
Traffic Management and Operations Engineer
Missouri Department of Transportation (MoDOT)

Source: KYTC.

Chris Lambert, Instructor
Systems Consultant
Kentucky Transportation Cabinet (KYTC)

Webinar Agenda

1:05 p.m. FHWA EDC-6 Crowdsourcing Innovation and Course Background

1:10 p.m. Data Sources Lesson

1:40 p.m. Data Management Lesson

2:05 p.m. Question and Answer

2:30 p.m. Webinar Close

Source: Unsplash.

Every Day Counts
Innovation for a Nation on the Move

HOP-23-P029

U.S. Department of Transportation
Federal Highway Administration

What Is Every Day Counts?

State-based model

Proven but underutilized innovations

2-year cycles

http://www.fhwa.dot.gov/innovation/everydaycounts/

EDC-6: Deeper Crowdsourcing Roots for a Bountiful Suite of Benefits

Adding data sources and applications

Improving data management

Improving archived data usage

Sharing and integrating data

Source: FHWA.

Crowdsourcing Course-in-a-Box

Course Goals:

- Broaden understanding and knowledge about how crowdsourced data can improve transportation operations
- Help participants consider whether specific applications of crowdsourcing may meet their organizations' needs

Course Tools:

- Editable instructor templates
- Instructor materials
- Course slide decks
- Student materials

Source: Pixabay.

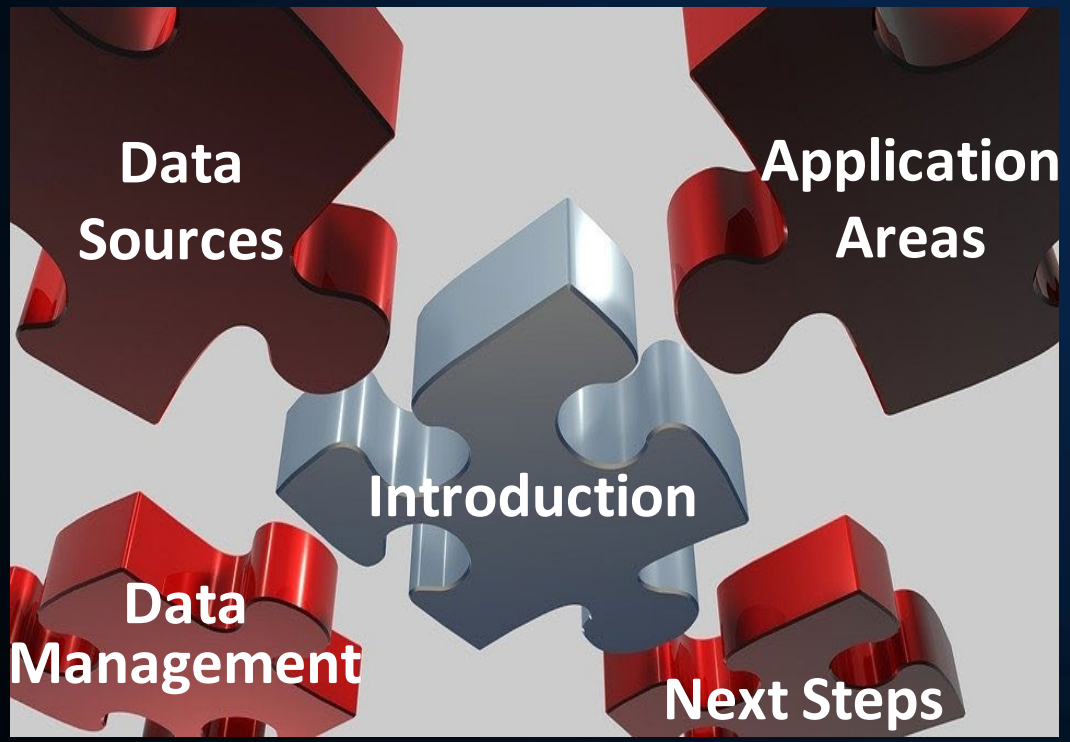
Whom Is the Course Targeting?
Transportation Groups

- Traffic management centers (TMCs)
- Traffic signal systems
- Operations
- Maintenance
- Public works departments
- Emergency planning
- Work zone
- Safety and planning

Consider nontraditional invitees such as policymakers, local elected officials, administrators, or other leaders.

Course Is Modular by Design

5 Lessons:



Source: Adapted from Pixabay.

6 Application Modules:

- Traffic incident management
- Traveler information
- Arterial management
- Work zone management
- Road weather management
- Emergency management

Crowdsourcing Course Delivery by Webinar

Webinar	Date	Course Lessons and Modules (Click to Register)
1	May 16	Crowdsourcing Introduction and Applications Lessons
2	**June 20**	**Data Sources and Management Lessons**
3	July 18	Traveler Information and Traffic Incident Management Modules
4	August 15	Road Weather and Arterial Management Modules
5	September 19	Emergency and Work Zone Management Modules and Next Steps Lesson

Summary of Webinar 1 Lessons

Introduction

- Crowdsourced data help fill gaps in geographic coverage, improve information timeliness, and remove jurisdictional stovepipes.
- Crowdsourced data help agencies increase travel time reliability, improve safety, and save cost.

Application Areas

- One data source can benefit multiple transportation systems management and operations (TSMO) strategies.
- Real-time crowdsourced data can be archived for many more uses such as project prioritization or before and after studies.

Introductions

Please enter your name, agency, and job title in the chat window.

Source: FHWA.

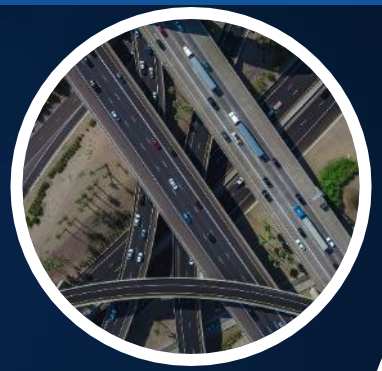
LESSON: Data Sources
INSTRUCTOR: Alex Wassman, Missouri DOT

Source: Pixabay.

Lesson Objectives

1. Describe the different types of crowdsourced data

2. Understand differences between crowdsourced and traditional intelligent transportation systems (ITS) data



All Photos Source: Unsplash.

Crowdsourced Data Characteristics

- Greater volume, velocity, and variety than traditional ITS Infrastructure
- No roadside ITS infrastructure such as loop detectors required
- Active or passive data collection
- Real-time or archived data

Source: Unsplash.

Sources of Crowdsourced Data for Transportation Operations

1. Vehicle probe
2. Navigation app
3. Social media
4. Connected vehicle
5. 311 and 511 apps
6. Multimodal probe data

Source: Pixabay.

What is the typical frequency of real-time data from many common crowdsourced data providers?

A. Every second or two

B. Every minute or two

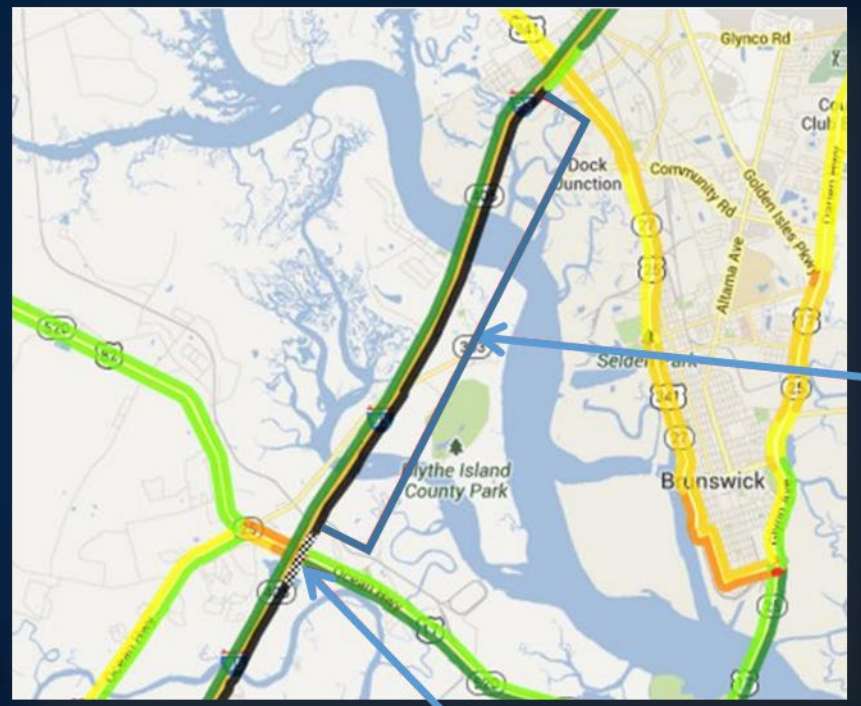
C. Every 10 or 20 minutes

D. Every hour or two

Source: Unsplash.

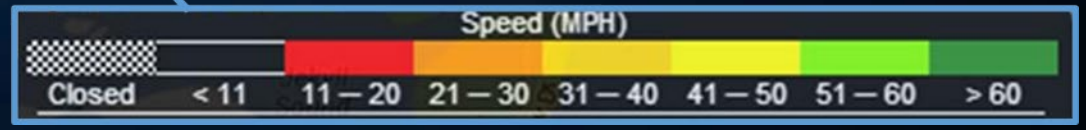
1. Vehicle Probe Data

- Source data
- Data providers
- Data elements
- Data frequency
- Common uses



Sample of vehicle probe data fields

Segment ID
Date/Time
Direction
Length
Speed
Hist. Average
Free Flow
Travel Time



Source: Adapted from I-95 Vehicle Probe Project II Interface Guide, 2018.

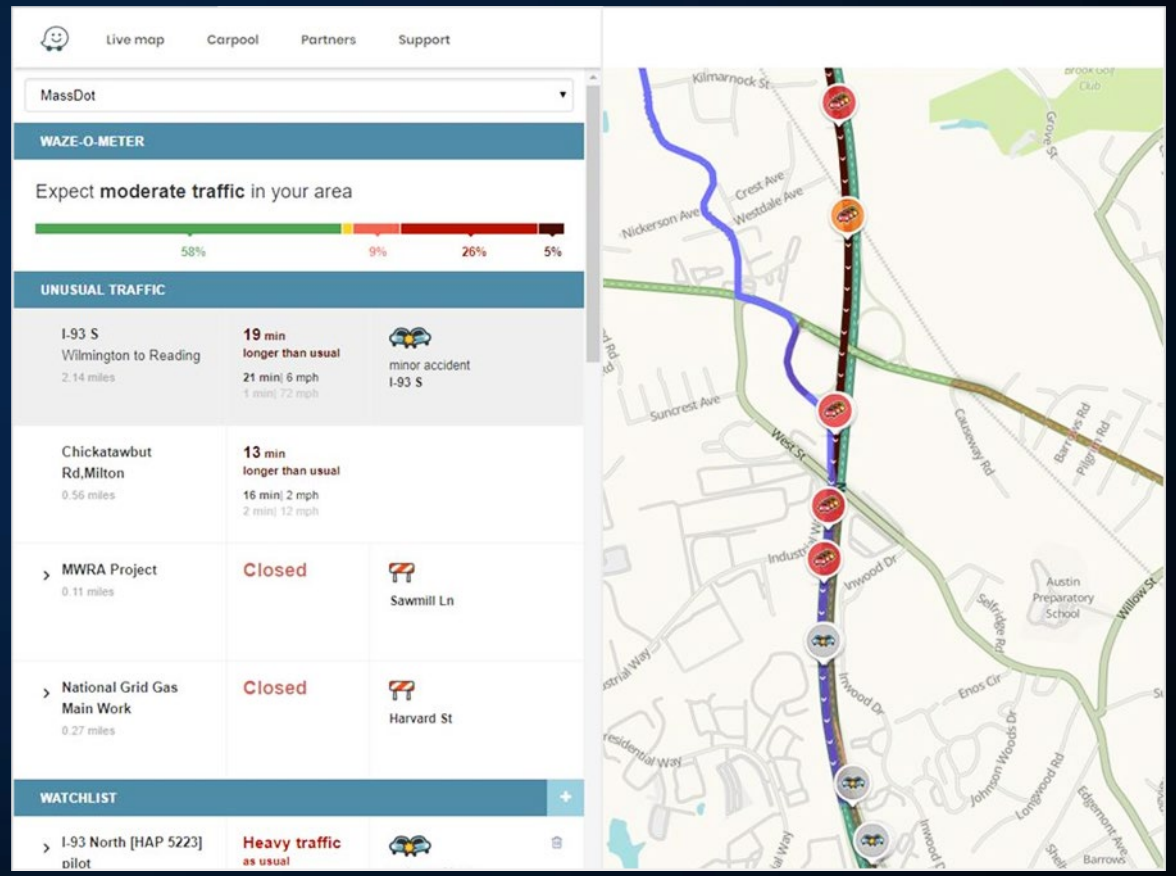
1. Vehicle Probe Data Characteristics

Characteristic	High-Level Descriptors
Data sources	Cellular triangulation, fleet and traveler Global Positioning System (GPS) devices or applications, connected vehicle data, and State or local ITS data.
Data providers	INRIX®, HERE®, TomTom®, Verizon®, and others.
Data elements	Speed and travel time by road segment, traffic event alerts, traffic tiles with color-coded speeds.
Data frequency	Typically, real-time data are transmitted every minute. Some vendors also offer archived data.
Common uses	Real-time traffic monitoring, real-time traveler information, archived data for performance, before and after studies, project prioritization, and planning for operations.

Missouri Crowdsourced Data Use Case #1: Rural Queue Warning System

2. Navigation App Data

- Source data
- Data providers
- Data elements
- Data frequency
- Common uses



Source: Massachusetts DOT, screen shot of event through Waze® Tool.

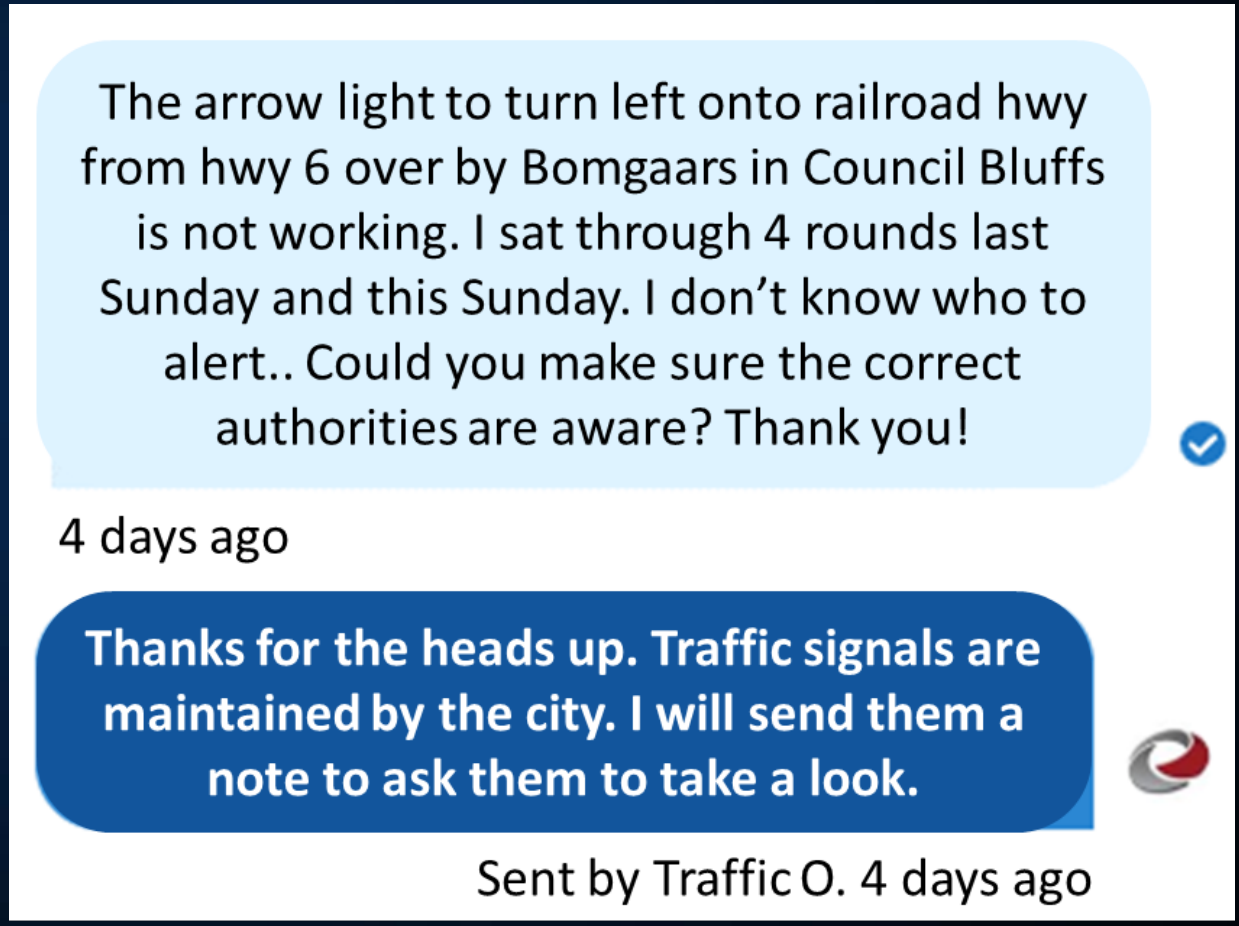
2. Navigation App Data Characteristics

Characteristic	High-Level Descriptors
Source data	User account data, traveler reports, mobile app GPS, historic data, State-provided road closure data.
Data providers	Waze®, Google Maps®, others.
Data elements	Waze provides jams (length, speed, delay), alerts (crashes, stalled vehicle, potholes, weather hazards), reliability and confidence scores.
Data frequency	Typically, real-time data are transmitted every 2 min. Some analytics vendor partners access 1-minute Waze® data.
Common uses	Real-time traffic monitoring, real-time traveler information, archived data for performance, before/after studies, traffic incident management, road weather management, work zone management, project prioritization, and operations planning.

Missouri Crowdsourced Data
Use Case #2
Waze Events for Incident Identification

3. Social Media

- Source data
- Data providers
- Data elements
- Data frequency
- Common uses

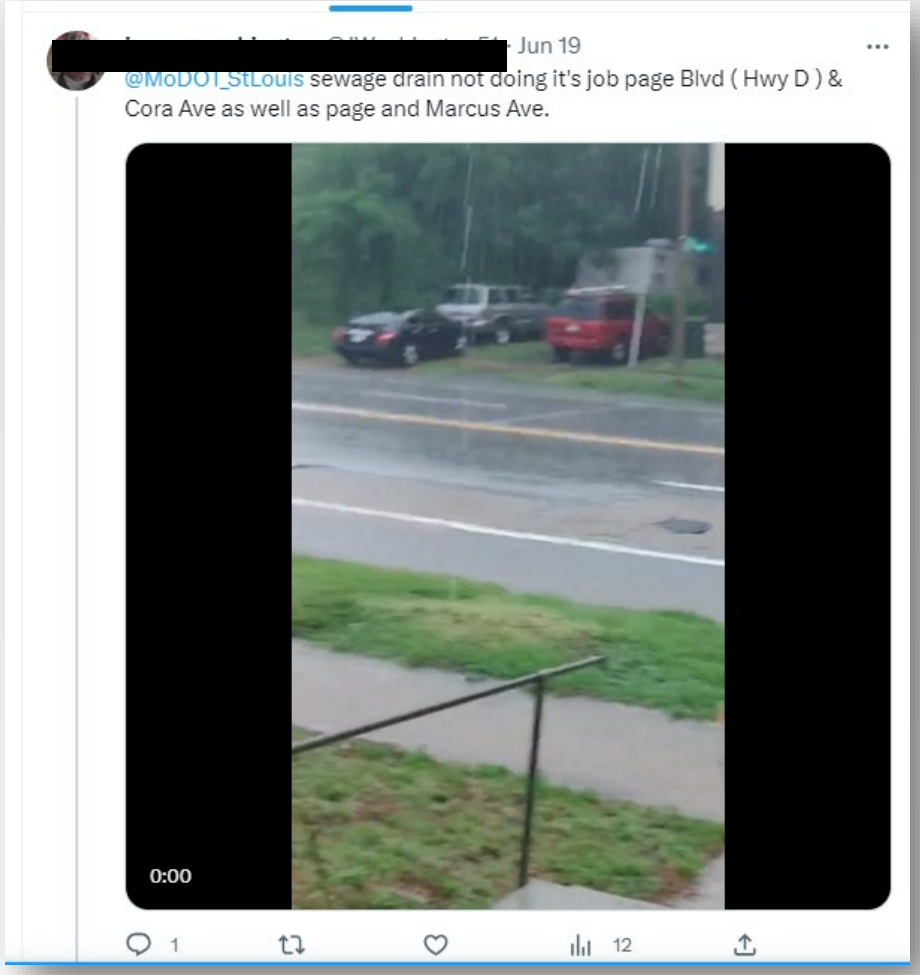


Source: Iowa DOT.

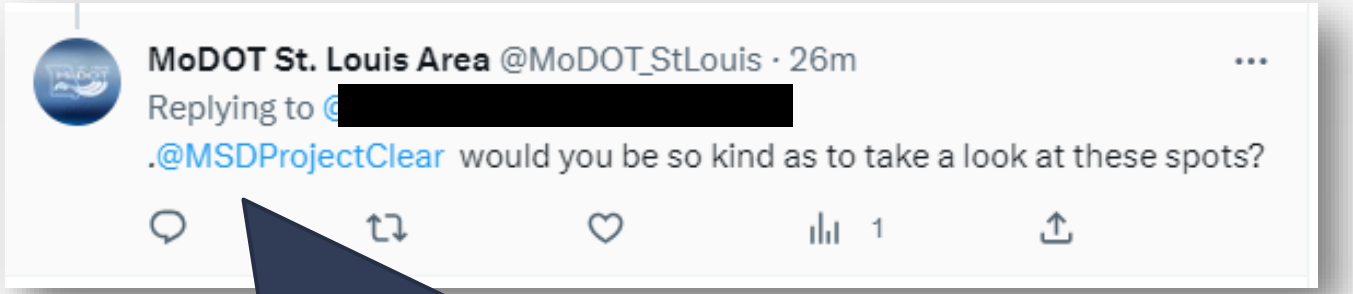
3. Social Media Characteristics

Characteristic	High-Level Descriptors
Source data	Individuals actively sharing information. State and local agency communication to the public.
Data providers	Twitter®, NextDoor®, Facebook®, Instagram®, blogs, LinkedIn®.
Data elements	Photo, text narrative, video, links to relevant information.
Data frequency	Near realtime.
Common uses	Planned special events, traveler information, public sentiment analysis.

Missouri Crowdsourced Data
Use Case #3
Social Media for Maintenance



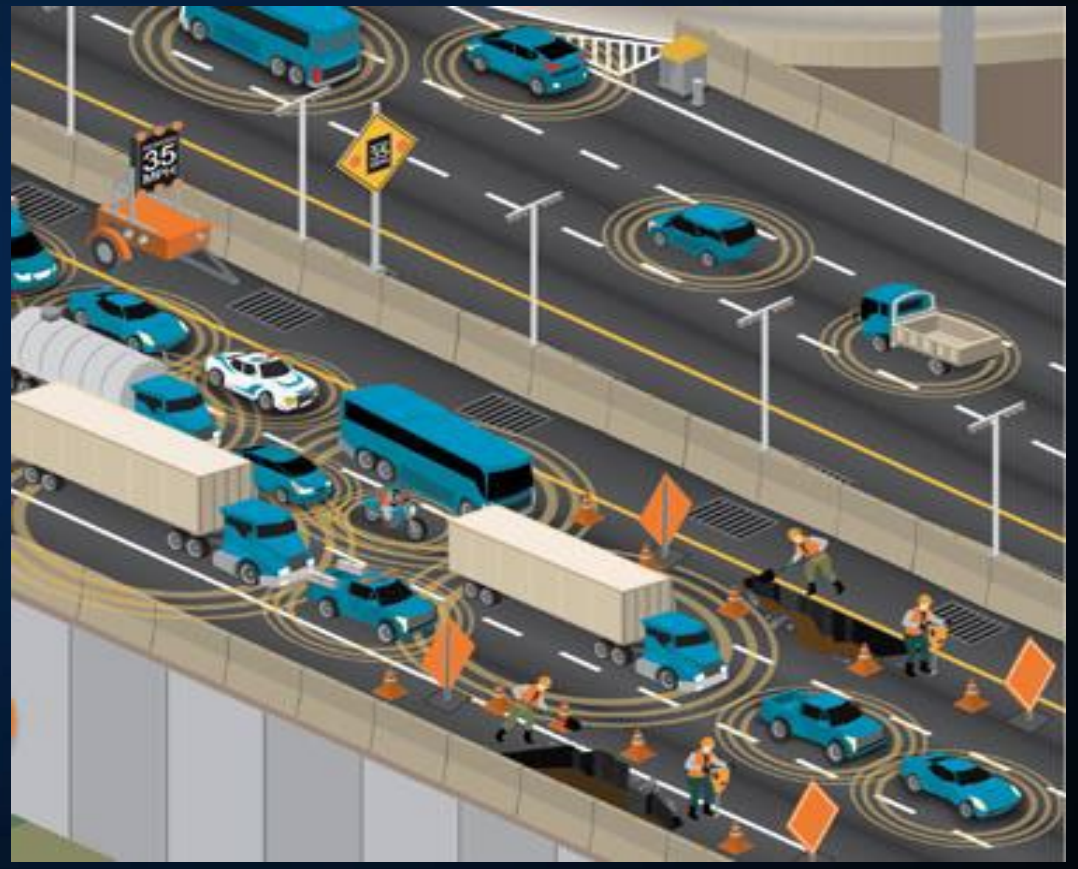
Tweet to ***MoDOT_StLouis*** today
"sewage drain not doing it's job"



Forward message to
MSDProject Clear

4. Connected Vehicle Data

- Source data
- Data providers
- Data elements
- Data frequency
- Common uses



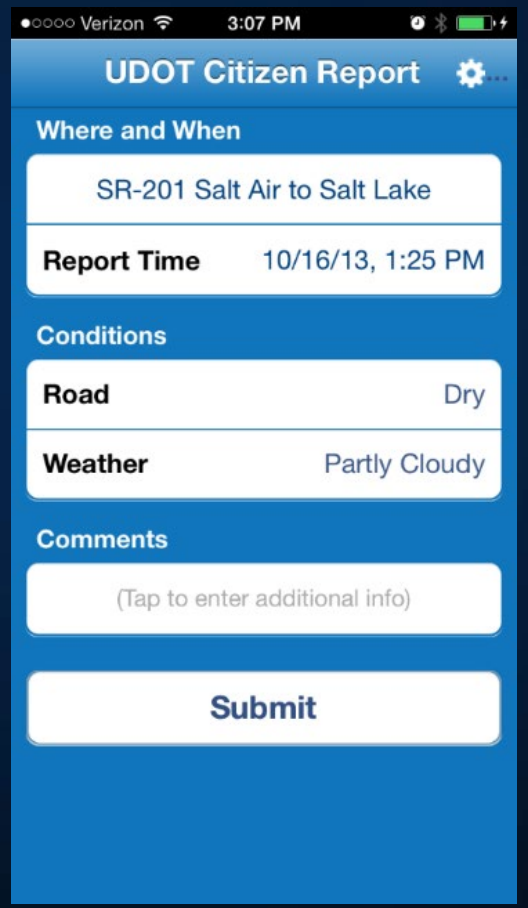
Source: U.S. Department of Transportation.

4. Connected Vehicle Data Characteristics

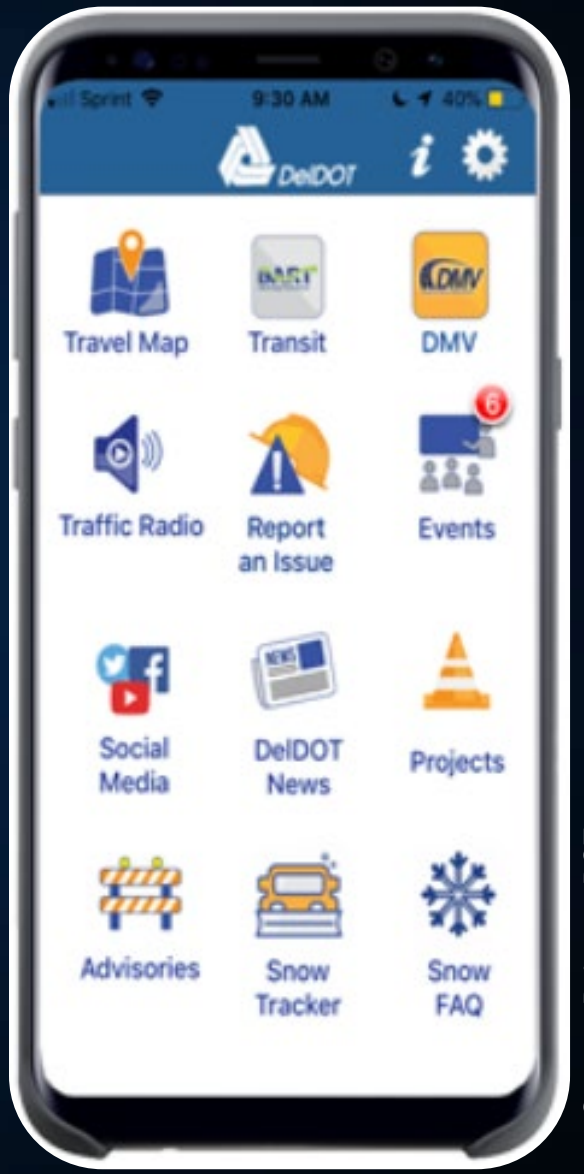
Characteristic	High-Level Descriptors
Source data	Onboard vehicle system among various major vehicle manufacturers.
Data providers	Wejo®, Ford Safety Insights™, Replica™
Data elements	Varies. Some currently offered data include "breadcrumb" location, hard braking, windshield wiper status, speed, and aggregate analytics.
Data frequency	University research and private entities mainly exploring archived or near-real-time use—either semidaily, daily, weekly, or monthly content.
Common uses	Safety studies, transportation planning, before and after studies.

5. 311 and 511 Apps

- Source data
- Data providers
- Data elements
- Data frequency
- Common uses



Source: Utah DOT.



Source: Delaware DOT.

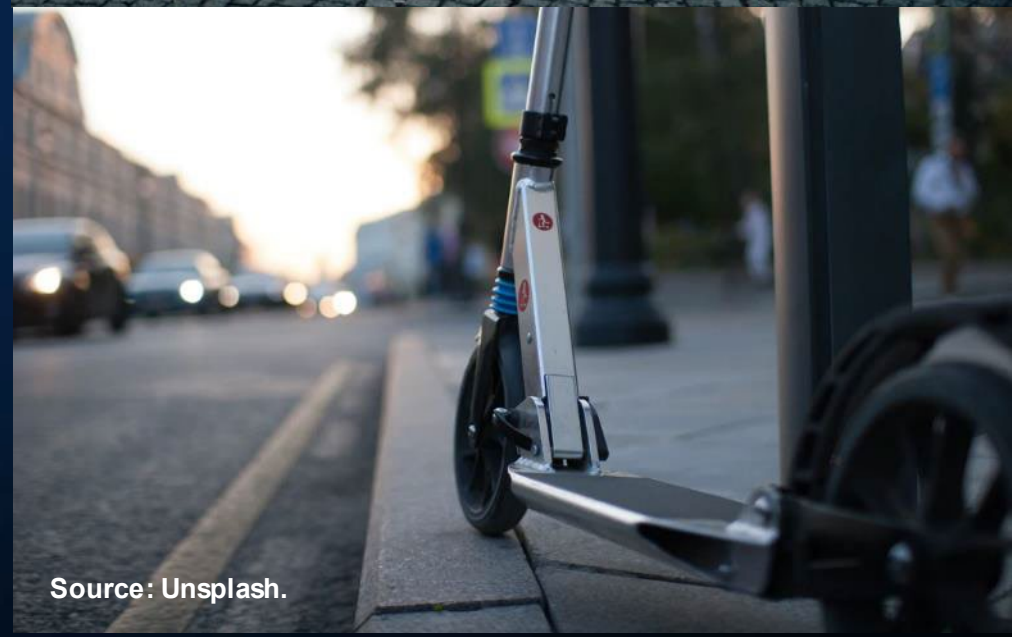
5. Mobile/Web 311 and 511 App Characteristics

Characteristic	High-Level Descriptors
Source data	Typically, active reports by public.
Data providers	CivicPlus/SeeClickFix®, PublicStuff®, CitySourced®, and FixMyStreet™ provide 311 service. Agency-specific providers also support 511 applications.
Data elements	Transportation-focused report types include crashes, abandoned vehicles, infrastructure repair needs (pothole, traffic signal, sign), and object on road.
Data frequency	A few reports per week to dozens or more per day.
Common uses	Traveler information, road weather management, maintenance of roads and signals.

6. Multimodal Data

- Source data
- Data providers
- Data elements
- Data frequency
- Common uses


Source: Unsplash.


Source: Unsplash.

6. Multimodal Data Characteristics

Characteristic	High-Level Descriptors
Source data	Active reports by public, passively collected by mobile app (e.g., bicycle, commercial vehicle, or transit app), smartphone, or device (e.g., dockless bicycle or scooters, or a dashboard camera).
Data providers	Examples: StreetLight Data™ and Nexar®
Data elements	Ridership, road user location and frequency, trip/route, financial statistics.
Data frequency	Varies by source.
Common uses	Long-term planning studies, micromobility policy development, alternate route planning, multimodal demand modeling.

Understand the Data Before Using It!

- Accuracy depends on “market penetration” of data generators.
- Data quality needs differ based on intended use.
- Some data are a “Black Box” and requires routine validation.
- **Crowdsourced data do not measure traffic volumes.**

Crowdsourced Data Cost

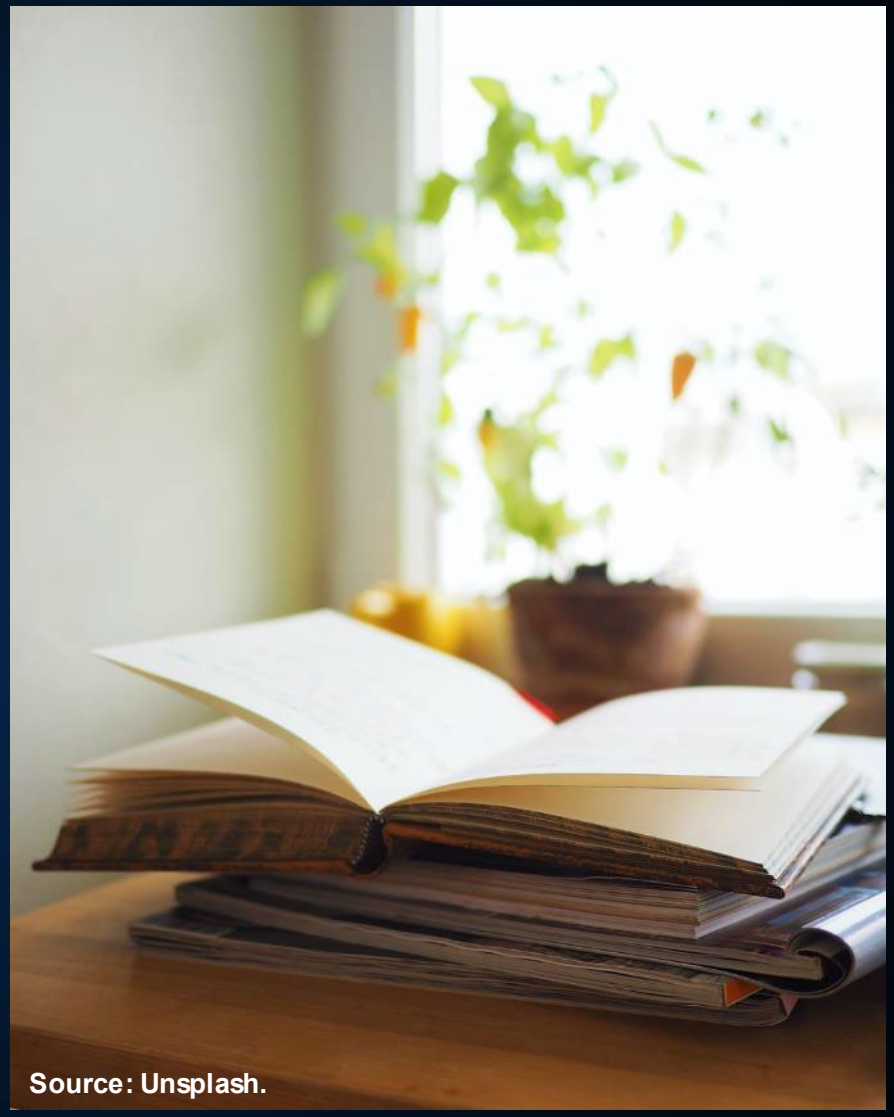
- Vehicle probe and connected vehicle data costs vary by coverage area, vendor, and data-sharing flexibility.
- Some navigation app data is free through an agreement (e.g., Waze® for Cities).
- Social media data can be monitored, but posting information comes with a cost.
- All data, including crowdsourced data, require investment of staff time and data management resources.
- Most data providers remove personally identifiable information prior to delivering data.

Source: Unsplash.

Knowledge Check No. 1

Which of the following data are considered crowdsourced data?

A. Vehicle probe data
B. Loop detector data
C. Navigation app data
D. Traffic signal data
E. A and C

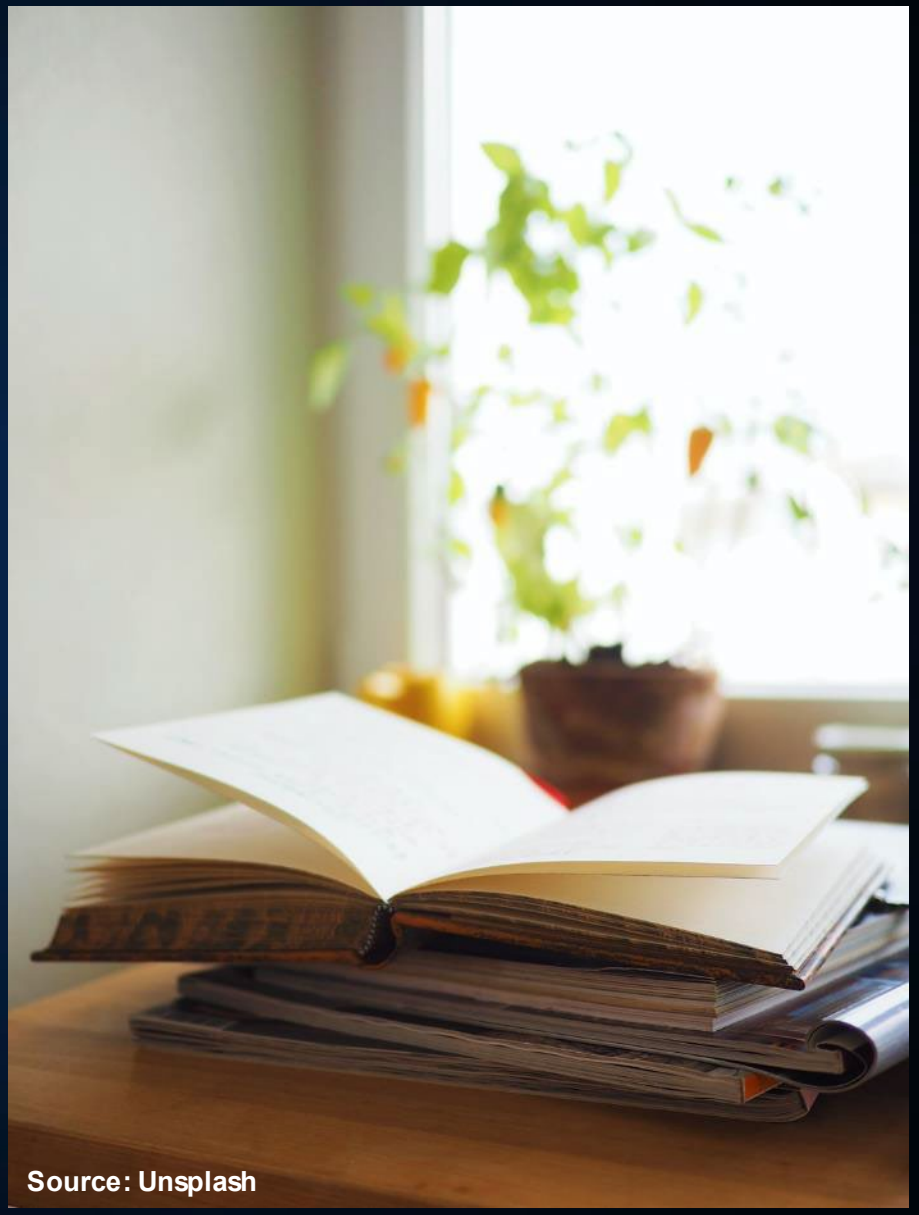


Source: Unsplash.

Knowledge Check No. 2

Which of the following data is not readily available through crowdsourcing?

A. Speed data
B. Traffic incident data
C. Path or route data
D. Traffic volume data


Source: Unsplash

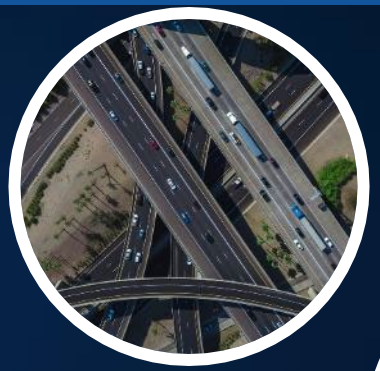
LESSON: Data Management
INSTRUCTOR: Chris Lambert, KYTC

Source: Unsplash.

Lesson Objectives

1. Understand the importance of data management for crowdsourced and broader agency data.

2. Identify how modern data management differs from traditional data management.



All photos source: Unsplash.

Data Management Challenges

- Internal resistance to data sharing
- Storage and processing policies
- Software policies
- Technical know how
- Resource constraints
- Demonstrate value

In 2020 the California Utility Agency, which collects ride-hailing data, reversed a 7-year policy that precluded sharing it with transportation agencies.

https://www.sfcityattorney.org/2020/03/13/cpuc-follows-san-franciscos-urging-to-make-uber-lyft-data-public/

“Big” Crowdsourced and Other Data Needs for Data Management

- Data volume, velocity, variety, and granularity are unprecedented.
- Ways agencies ***traditionally*** manage data will not work or not work well.
- Modern data management approaches offer greater data functionality and value.

Source: Unsplash.

Data Management Systems Are Evolving

Traditional Systems		Modern Systems
Well-defined, fixed, purposed	⇔	Flexible, self-adjusting
Centralized storage and processing	⇔	Distributed storage and processing
Coupled hardware and software	⇔	Decoupled hardware and software
Centralized data governance	⇔	Distributed data governance
Few access and use data	⇔	Many access and use data
Extract transform load (ETL)	⇔	Extract load transform (ELT)

Data Governance Evolution

- Governance is part of the overall management of data.
- Governance addresses topics of data ownership, processing, access, security, and other policy-setting efforts.
- Decentralized, coordinated governance offers flexibility and accountability needed for “big” crowdsourced data.

Source: Pixabay.

Example: How do Agencies Manage Data from a Free Navigation Application?

Stored	In-house Hadoop™ or Cloud, structured query language (SQL) or another database, third-party stored, or not stored
Filtered	Filtering for crashes, by reliability score, by number of reports
Validated	Mostly qualitative; some quantitative validation
Challenges	Duplicate reports, integration with advanced traffic management system (ATMS) and 511 platforms, real-time analytics, long-term storage, attribution

Trends in Data Management

- Data aggregation and storage
- Quality controls
- Data reproducibility
- Outsourcing
- Customization
- Third-party data and tools use

Source: Pixabay.

Data Management at KYTC ITS Team

Presentation by Chris Lambert

Webinar | June 20, 2023

TEAM KENTUCKY®
TRANSPORTATION CABINET

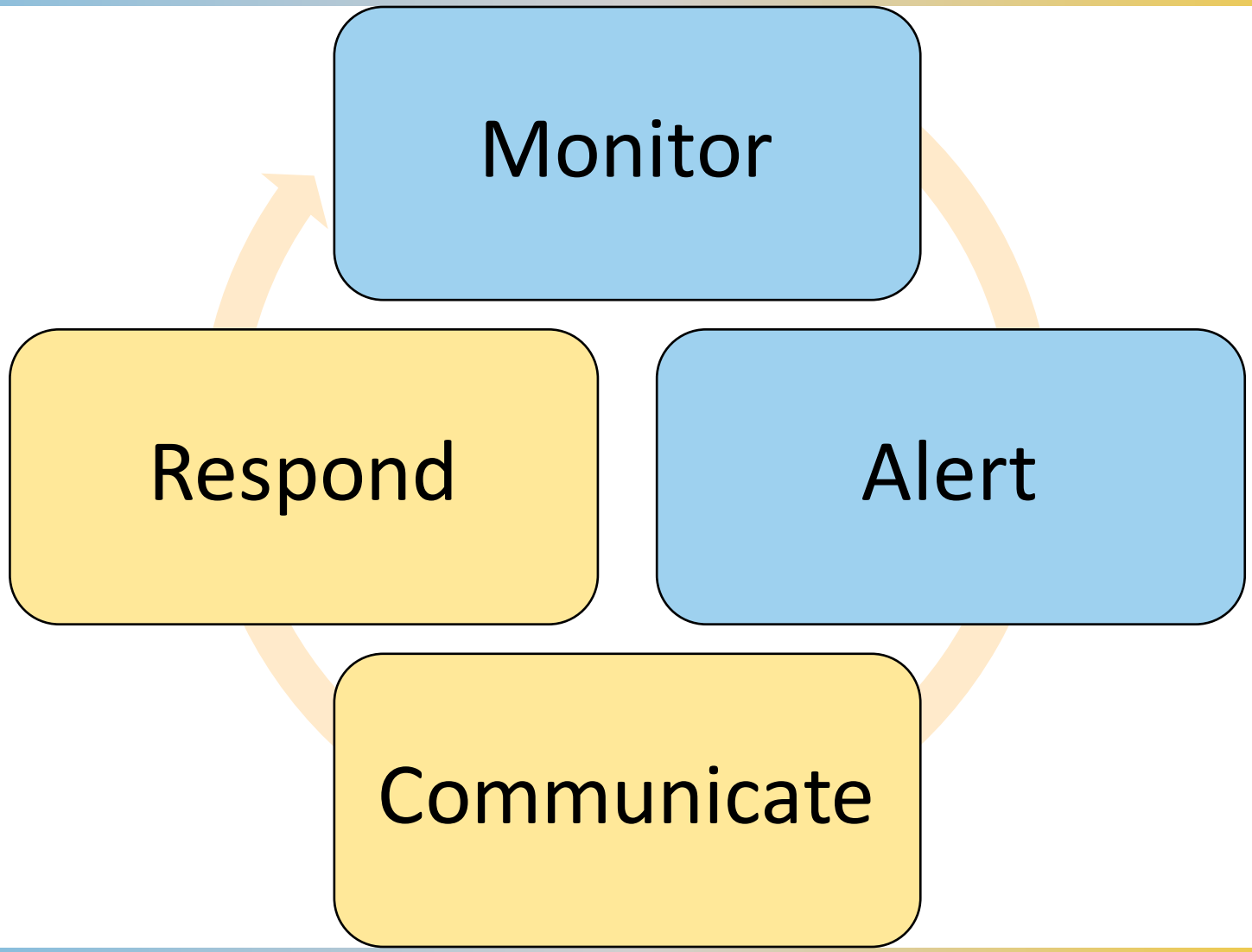
Vision

Striving to be national leaders in transportation who provide transportation infrastructure and services for the 21st century that deliver new economic opportunities for all Kentuckians.

Mission

To provide a safe, efficient, environmentally sound and fiscally responsible transportation system that delivers economic opportunity and enhances the quality of life in Kentucky.

General Purpose



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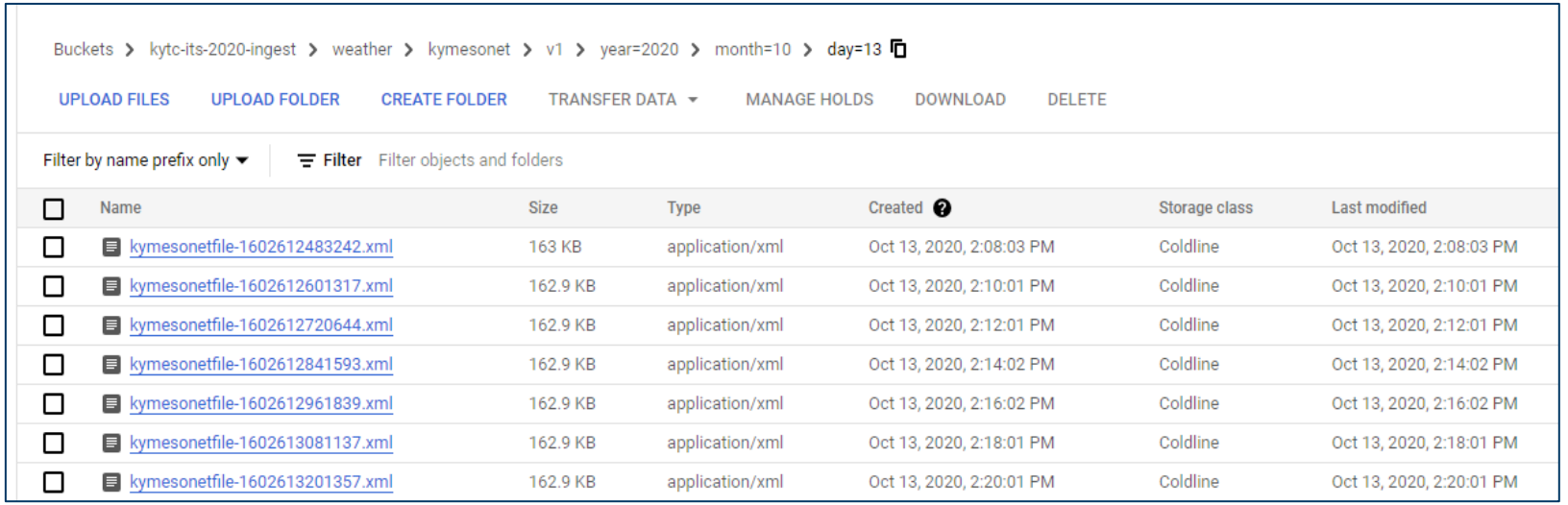
Data Sources

- **HERE Traffic Speeds**
- **HERE Incidents**
- **Waze Jams**
- **Waze Traffic Viewer**
- **Waze Incidents**
- **iCone Traffic Speeds**
- **Twitter**
- KYMesonet
- **CoCoRahs**
- NWS Doppler Radar
- NWS Forecasts
- **Statewide TMC Reports**
- **Metro TMC Reports**
- Snowplows
- Roadway Weather Stations
- County SNIC Activity Reports
- Dynamic Message Signs
- Truck Parking
- Permitted Work Zones
- AASHTOWare SiteManager

Raw Data

- **Stored as Native File Format:** JSON, XML, CSV, DBF, etc.
- **Raw Data Folder Structure:** ***../type/provider/version/year/month/day***
  - Type of Data
  - Provider
  - Version of API
  - Year
  - Month
  - Day



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kymesonetfile-1602612601317.xml	162.9 KB	application/xml	Oct 13, 2020, 2:10:01 PM	Coldline	Oct 13, 2020, 2:10:01 PM
kymesonetfile-1602612720644.xml	162.9 KB	application/xml	Oct 13, 2020, 2:12:01 PM	Coldline	Oct 13, 2020, 2:12:01 PM
kymesonetfile-1602612841593.xml	162.9 KB	application/xml	Oct 13, 2020, 2:14:02 PM	Coldline	Oct 13, 2020, 2:14:02 PM
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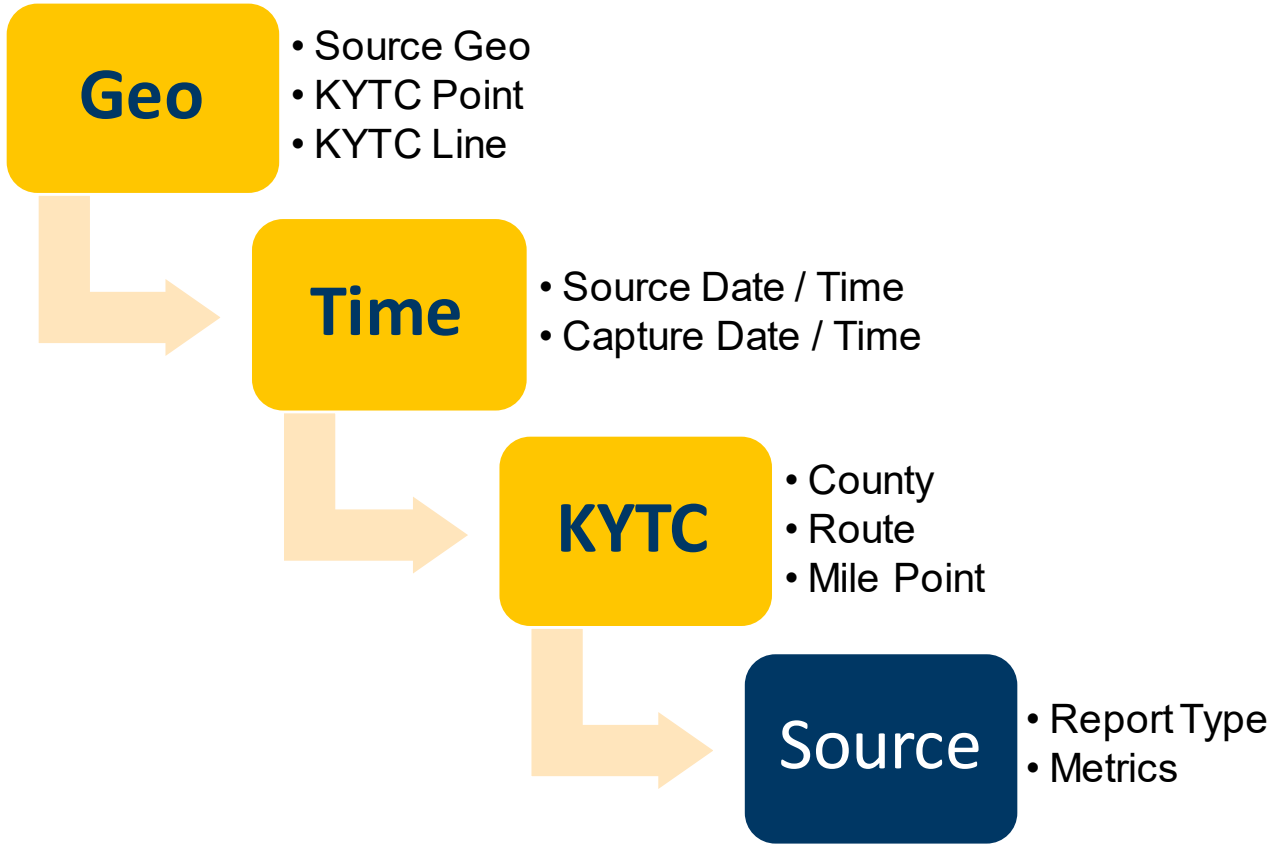
Processed Data



Date & Time	District 7	Fayette	I-75	MP 115	Crash	10 Thumbs Up
Date & Time	District 7	Fayette	I-75	MP 115	Speed	25 MPH

On-Premise Architecture

Advantage:

- Free compute*
- Fixed cost
- Works with traditional procurement processes

Disadvantages:

- High upfront cost of servers
- Replacement of servers
- Maintenance of server OS, etc.
- More technical for end-users
- Limited visualization tools
- Limited sharing behind firewall
- Difficulty scaling

Cloud Architecture

Advantage:

- Inexpensive storage
- More scalable
- No maintenance
- More end-user friendly
- More visualization options
- More flexibility for sharing

Disadvantages:

- Expensive compute
- Variability in cost, required different procurement process
- Keep an eye on changes in service provider terms

Cloud Costs Depend on Use Case

- KYTC ITS, Real-Time Data: ~$20k/month
  - 110TB of Raw and Processed Data
  - Storage (data lake, cold storage) = 6%
  - Pub/Sub (messaging middleware) = 40%
  - SQL (storage + usage) = 48%

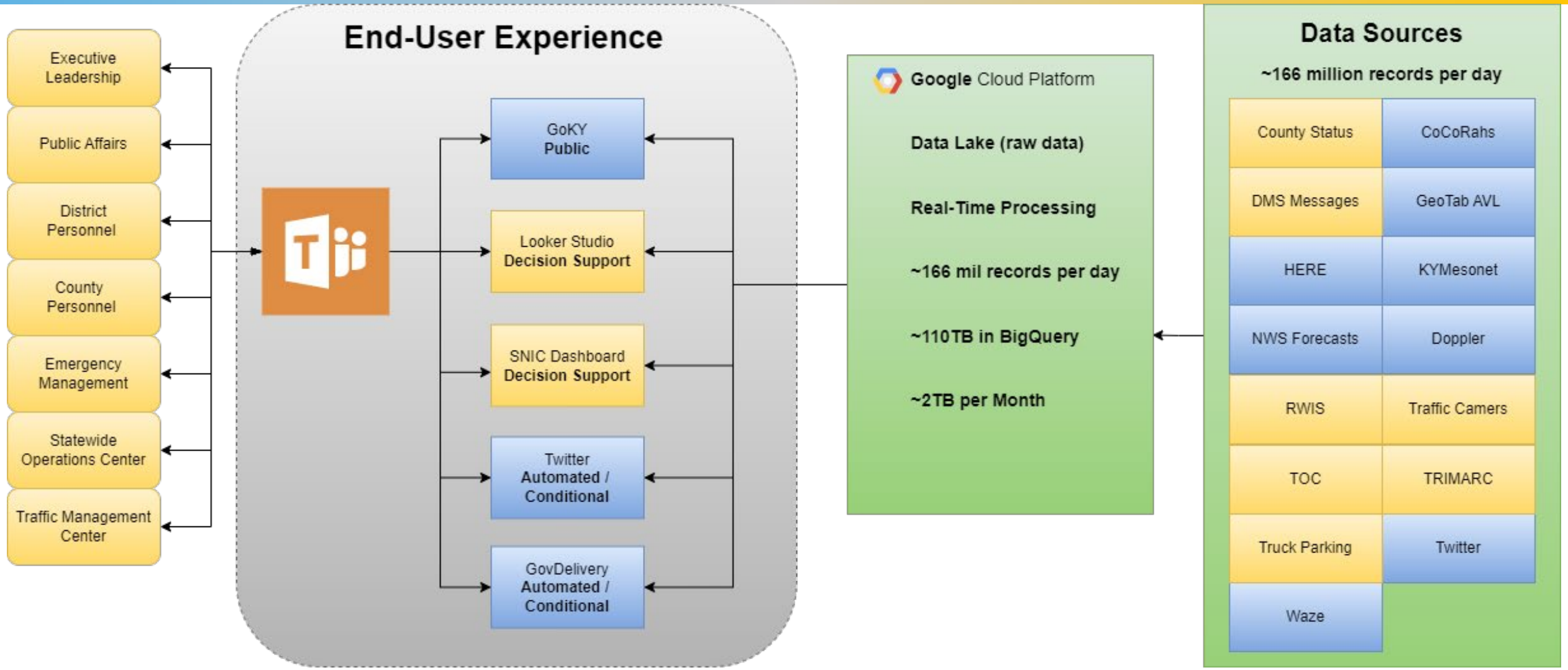
- KYTC Photolog / LiDAR: ~$46k/month
  - 100TB NetApp, Hot Storage = 41%
  - 300TB Cloud Storage = 40%
  - Windows VMs = 14%
  - SQL = 1%

Visualization and Analytics

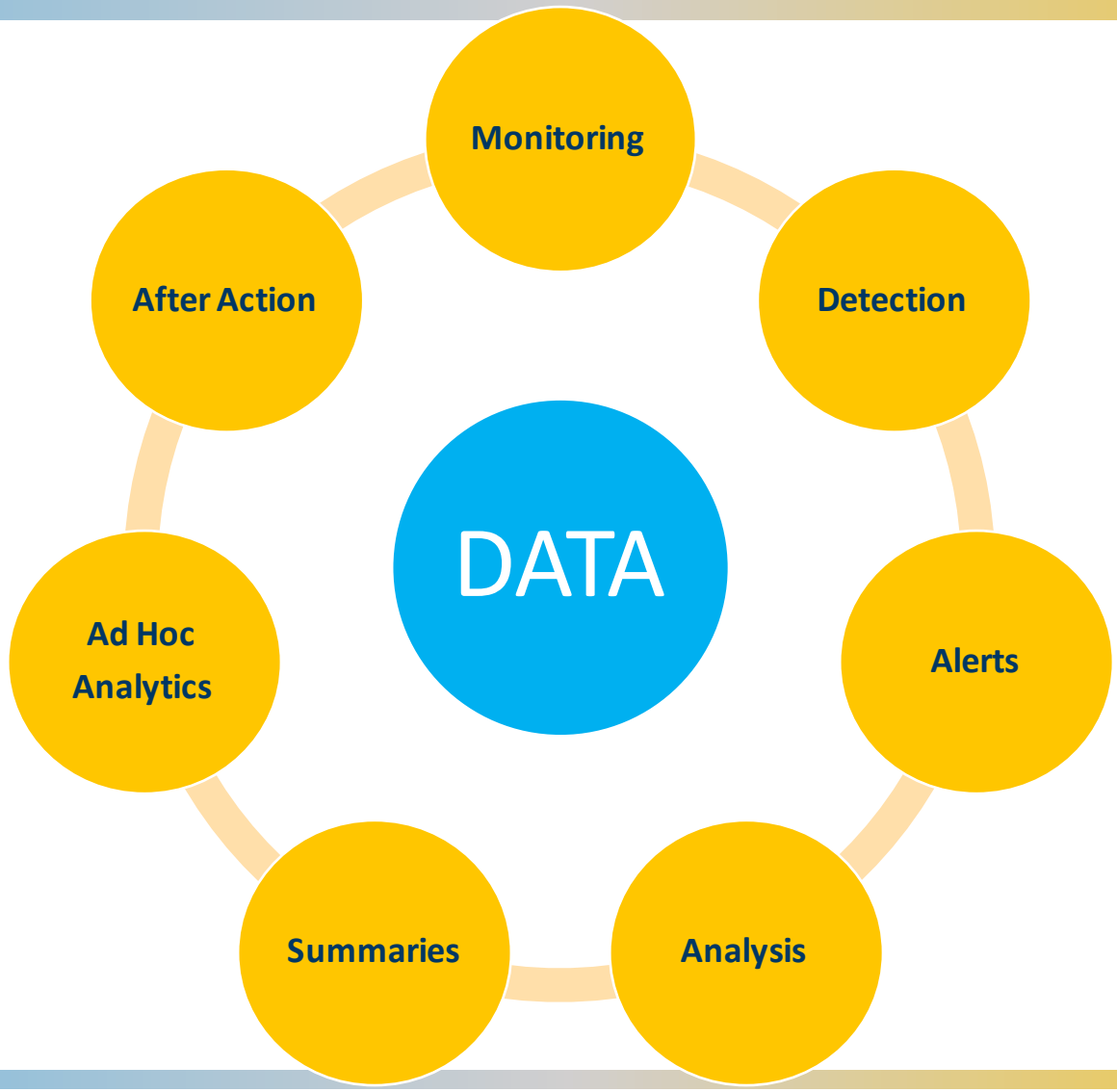
Our Current Tool Set:

- **Kibana & Elasticsearch** by Elastic.co, “elegant and lightning fast”
- **PowerBI** by Microsoft, “user friendly”
- **Looker Studio** by Google, “free, web-based”
- **UrbanSDK** by UrbanSDK, “data science and analytics”

Combine People & Data



General Use Cases



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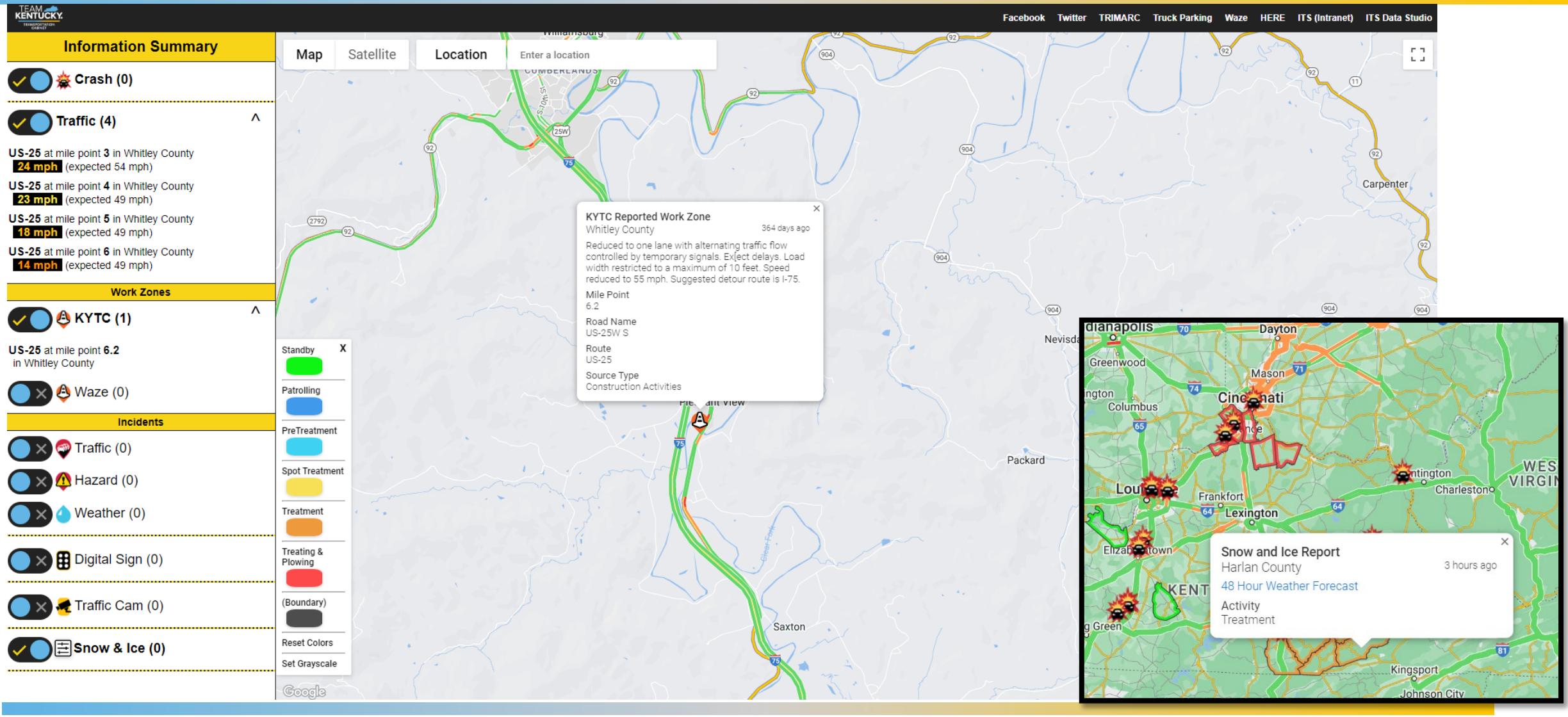
Monitoring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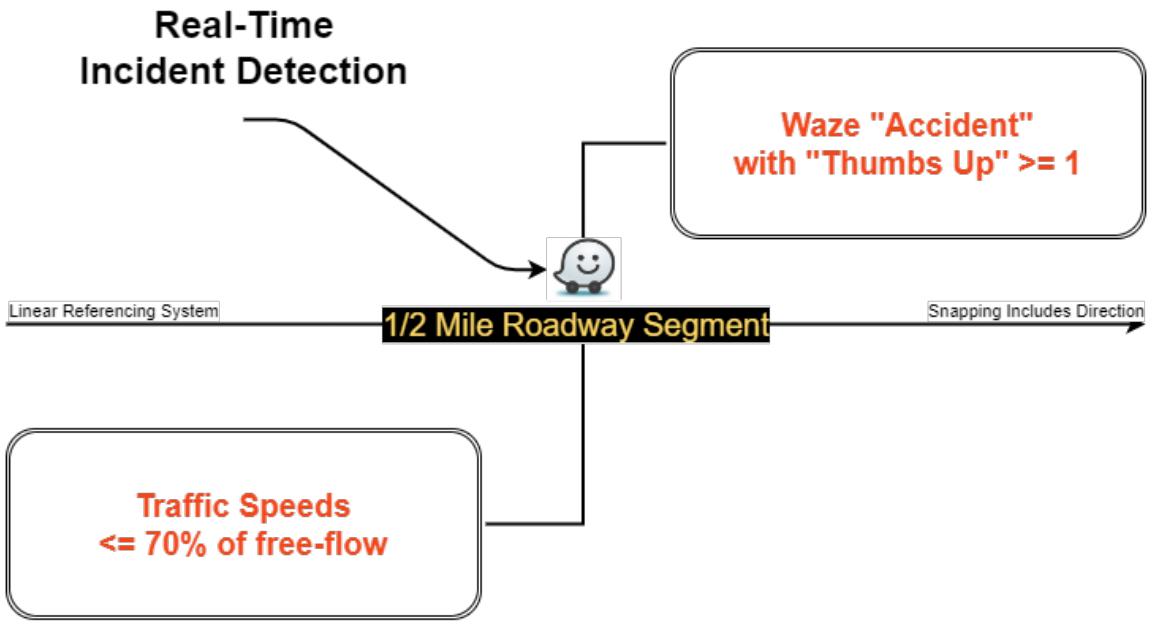
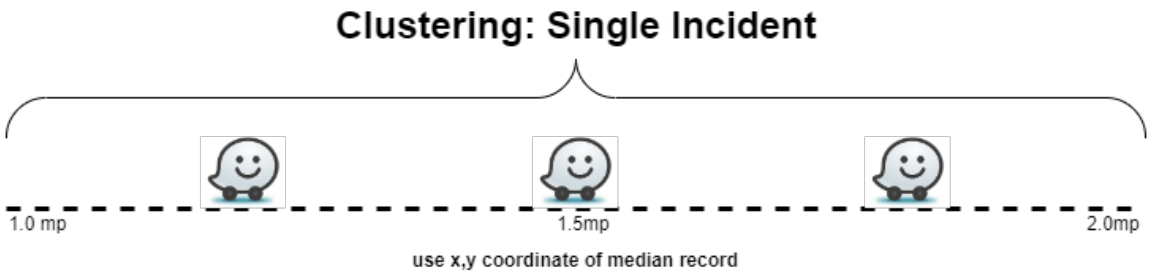
ITS (Intranet)
ITS Data Studio
Information Summary
Crash (0)
Traffic (4)
US-25 at mile point 3 in Whitley County
24 mph (expected 54 mph)
US-25 at mile point 4 in Whitley County
23 mph (expected 49 mph)
US-25 at mile point 5 in Whitley County
18 mph (expected 49 mph)
US-25 at mile point 6 in Whitley County
14 mph (expected 49 mph)
Work Zones
KYTC (1)
US-25 at mile point 6.2
in Whitley County
Waze (0)
Incidents
Traffic (0)
Hazard (0)
Weather (0)
Digital Sign (0)
Traffic Cam (0)
Snow & Ice (0)
Map
Satellite
Location
Enter a location
KYTC Reported Work Zone
Whitley County
364 days ago
Reduced to one lane with alternating traffic flow controlled by temporary signals. Expect delays. Load width restricted to a maximum of 10 feet. Speed reduced to 55 mph. Suggested detour route is I-75.
Mile Point
6.2
Road Name
US-25W S
Route
US-25
Source Type
Construction Activities
Standby
Patrolling
PreTreatment
Spot Treatment
Treatment
Treating & Plowing
(Boundary)
Reset Colors
Set Grayscale
Carpenter
Packard
Saxton
Google
Snow and Ice Report
Harlan County
3 hours ago
48 Hour Weather Forecast
Activity
Treatment
Cincinnati
Columbus
Dayton
Mason
Frankfort
Lexington
Charleston
Kingsport
Johnson City

Detection


Real-Time
Incident Detection
Waze "Accident"
with "Thumbs Up" >= 1
Linear Referencing System
1/2 Mile Roadway Segment
Snapping Includes Direction
Traffic Speeds
<= 70% of free-flow


Clustering: Single Incident
1.0 mp
1.5mp
2.0mp
use x,y coordinate of median record

Alerts

Close [ITS] I-265 in Jefferson County Work Zone Incident Report

Kentucky Transportation Cabinet (Do Not Reply)
To: Lambert, Chris C (KYTC)
Mon 2023-03-20 5:23 PM

DISTRICT 5							
County	Route	Road Name	Work Zone Begin Milepoint	Reference Milepoint	Work Zone End Milepoint	Current Avg Speed	Reference Information
Jefferson	I-265	I-265	25.0	26.0	27.0	9.0	GoKY | Google Maps | Waze | Here WeGo | NWS Detailed Forecast

Please check here for the most up-to-date information.
The data contained in this alert is current at time of sending and may be subject to change.

Crash Reported in Work Zone

Work Zone averages 25mph or less for 10min or more.

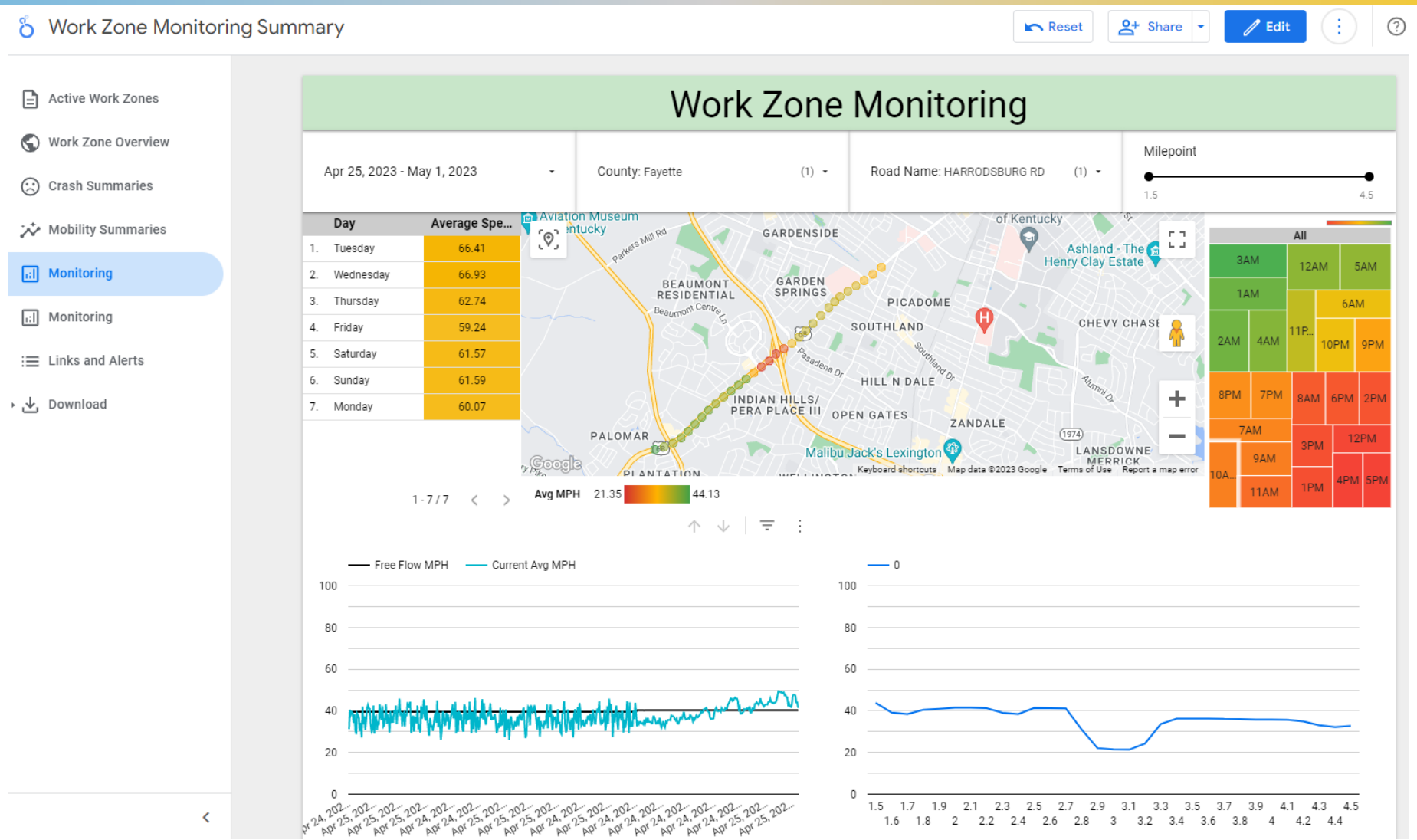
Close [ITS] Work Zone Interstate Speed Summary

Kentucky Transportation Cabinet (Do Not Reply)
To: Lambert, Chris C (KYTC)
Wed 2023-03-22 2:50 PM

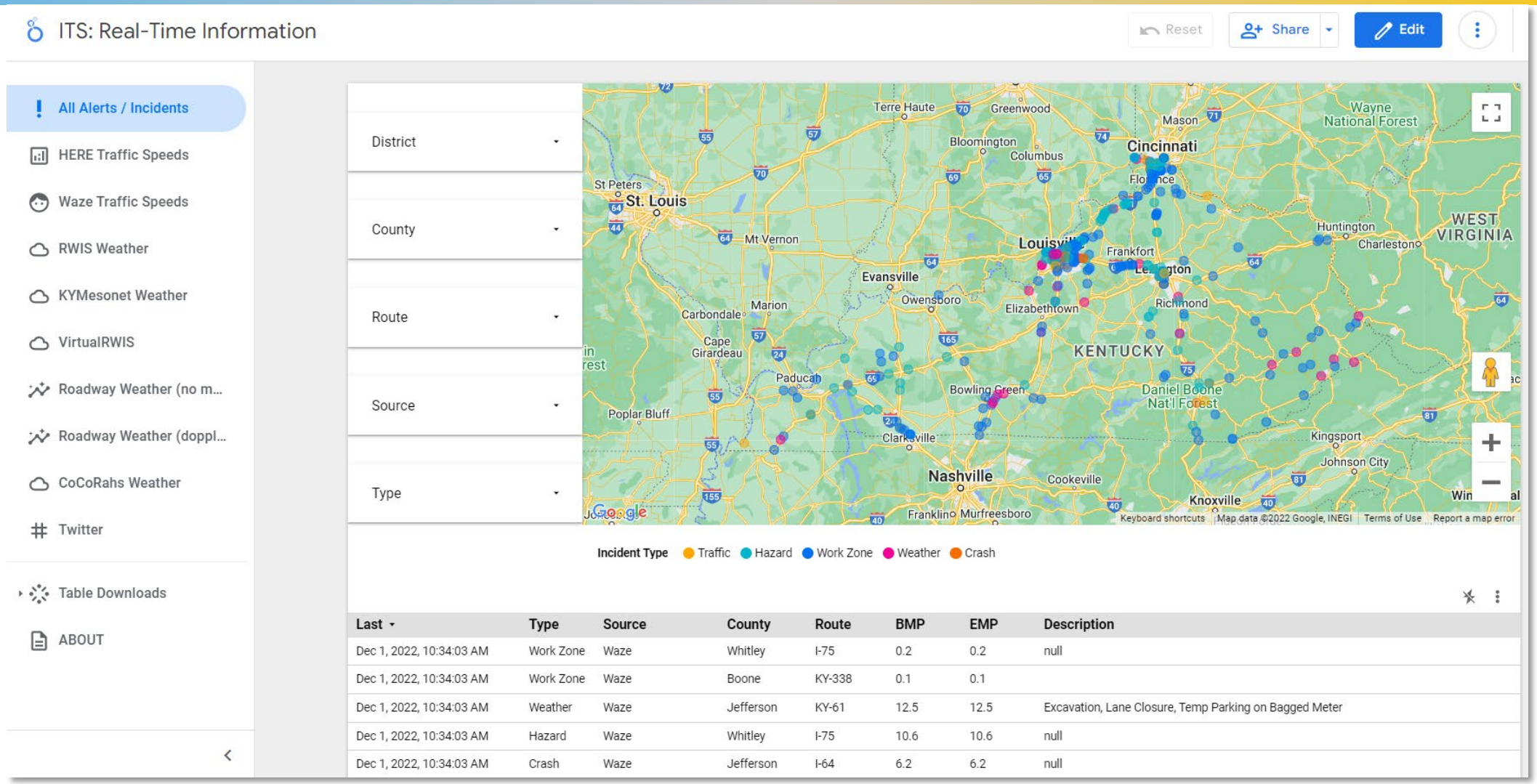
District 5							
County	Route	Road Name	Begin Milepoint	Reference Milepoint	End Milepoint	Current Avg Speed	Reference Information
Oldham	I-71	I-71	12.0	11.6	14.0	14.1	GoKY | Google Maps | Waze | Here WeGo | NWS Detailed Forecast

Please check here for the most up-to-date information.
The data contained in this alert is current at time of sending and may be subject to change.

Analysis

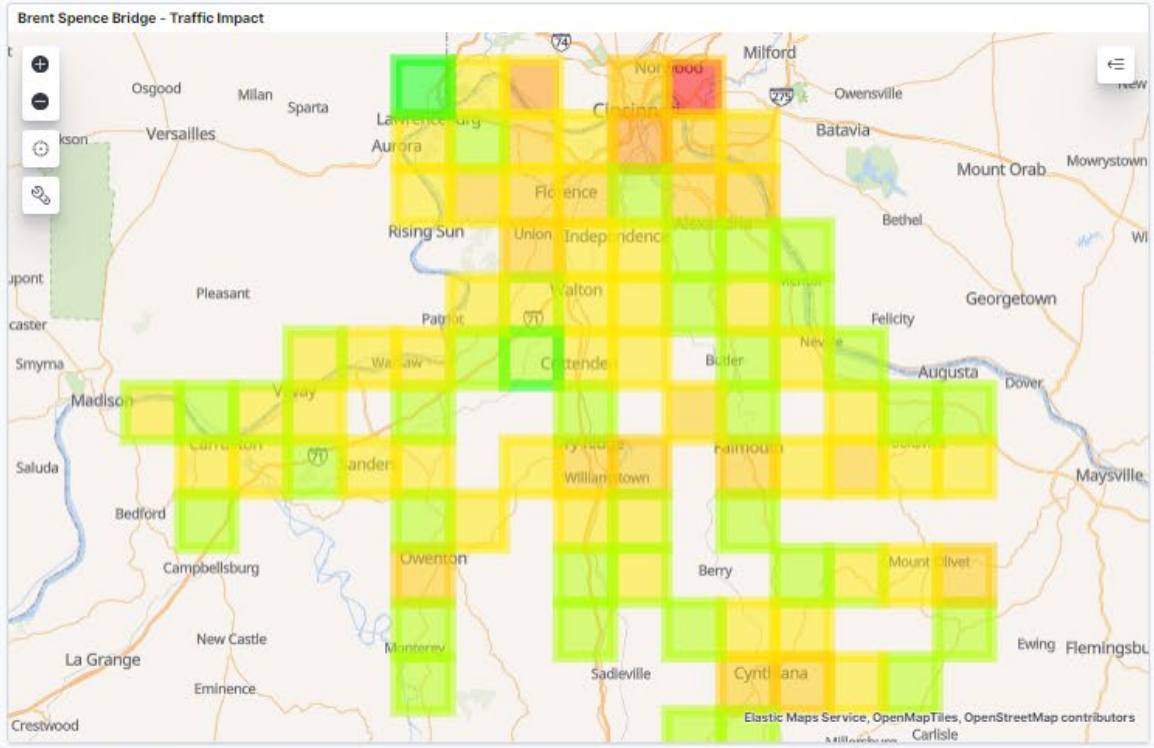

Work Zone Monitoring Summary
Reset
Share
Edit
Active Work Zones
Work Zone Overview
Crash Summaries
Mobility Summaries
Monitoring
Monitoring
Links and Alerts
Download
Work Zone Monitoring
Apr 25, 2023 - May 1, 2023
County: Fayette (1)
Road Name: HARRODSBURG RD (1)
Milepoint
1.5
4.5
Day
Average Spe...
1. Tuesday 66.41
2. Wednesday 66.93
3. Thursday 62.74
4. Friday 59.24
5. Saturday 61.57
6. Sunday 61.59
7. Monday 60.07
1 - 7 / 7
Avg MPH 21.35 44.13
GARDENSIDE
BEAUMONT RESIDENTIAL
GARDEN SPRINGS
PICADOME
SOUTHLAND
CHEVY CHASE
HILL N DALE
INDIAN HILLS/ PERA PLACE III
OPEN GATES
ZANDALE
PALOMAR
LANSDOWNE
Ashland - The Henry Clay Estate
Malibu Jack's Lexington
Keyboard shortcuts
Map data ©2023 Google
Terms of Use
Report a map error
All
Free Flow MPH
Current Avg MPH
0

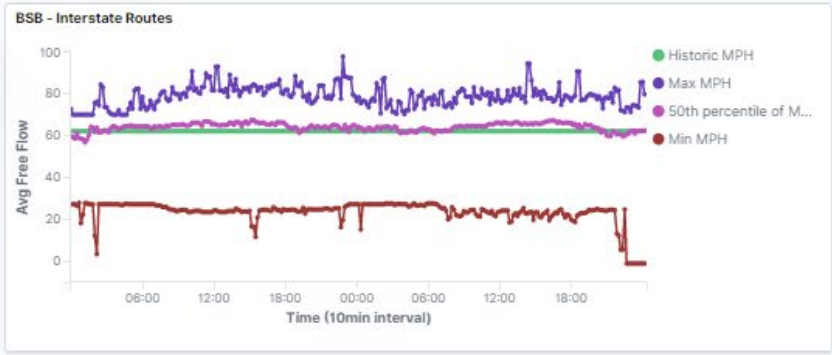
Summaries

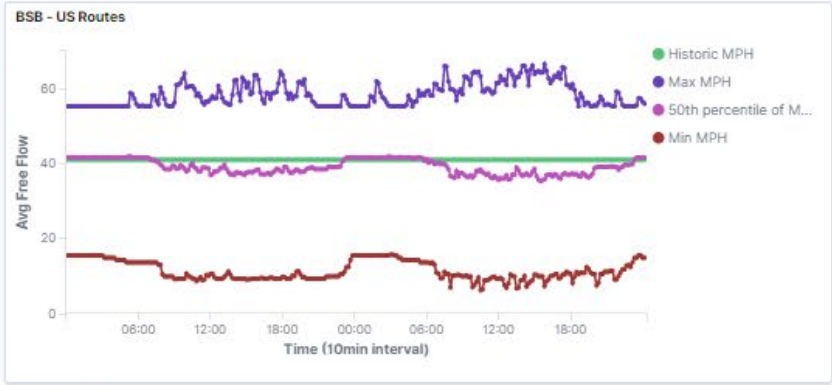


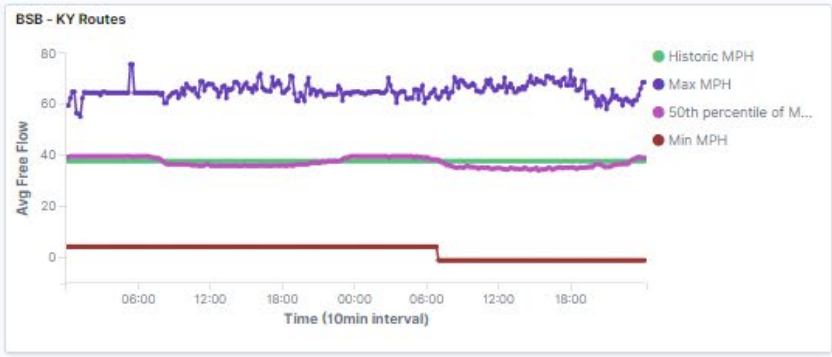
Last	Type	Source	County	Route	BMP	EMP	Description
Dec 1, 2022, 10:34:03 AM	Work Zone	Waze	Whitley	I-75	0.2	0.2	null
Dec 1, 2022, 10:34:03 AM	Work Zone	Waze	Boone	KY-338	0.1	0.1	
Dec 1, 2022, 10:34:03 AM	Weather	Waze	Jefferson	KY-61	12.5	12.5	Excavation, Lane Closure, Temp Parking on Bagged Meter
Dec 1, 2022, 10:34:03 AM	Hazard	Waze	Whitley	I-75	10.6	10.6	null
Dec 1, 2022, 10:34:03 AM	Crash	Waze	Jefferson	I-64	6.2	6.2	null

Ad Hoc Analysis

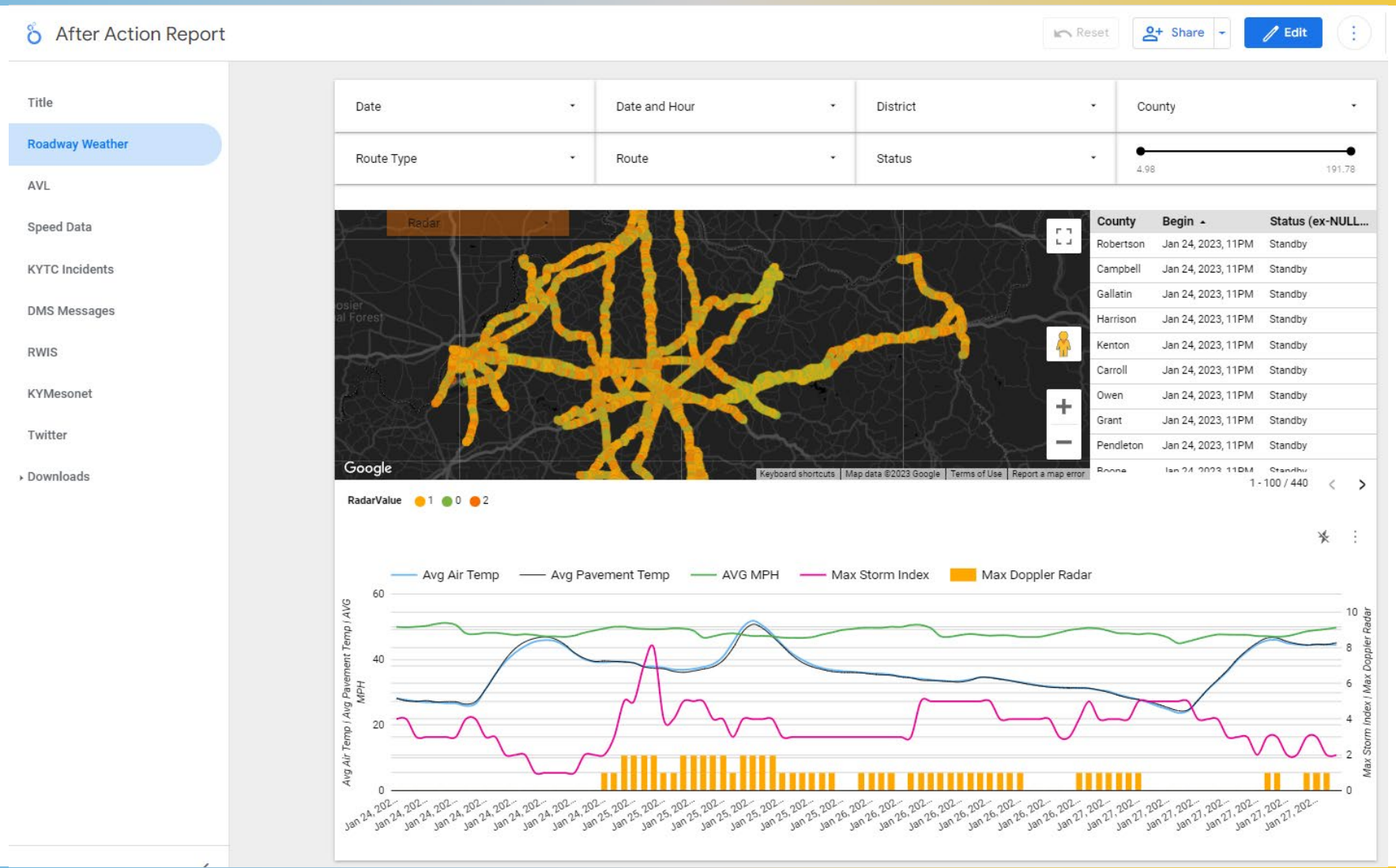








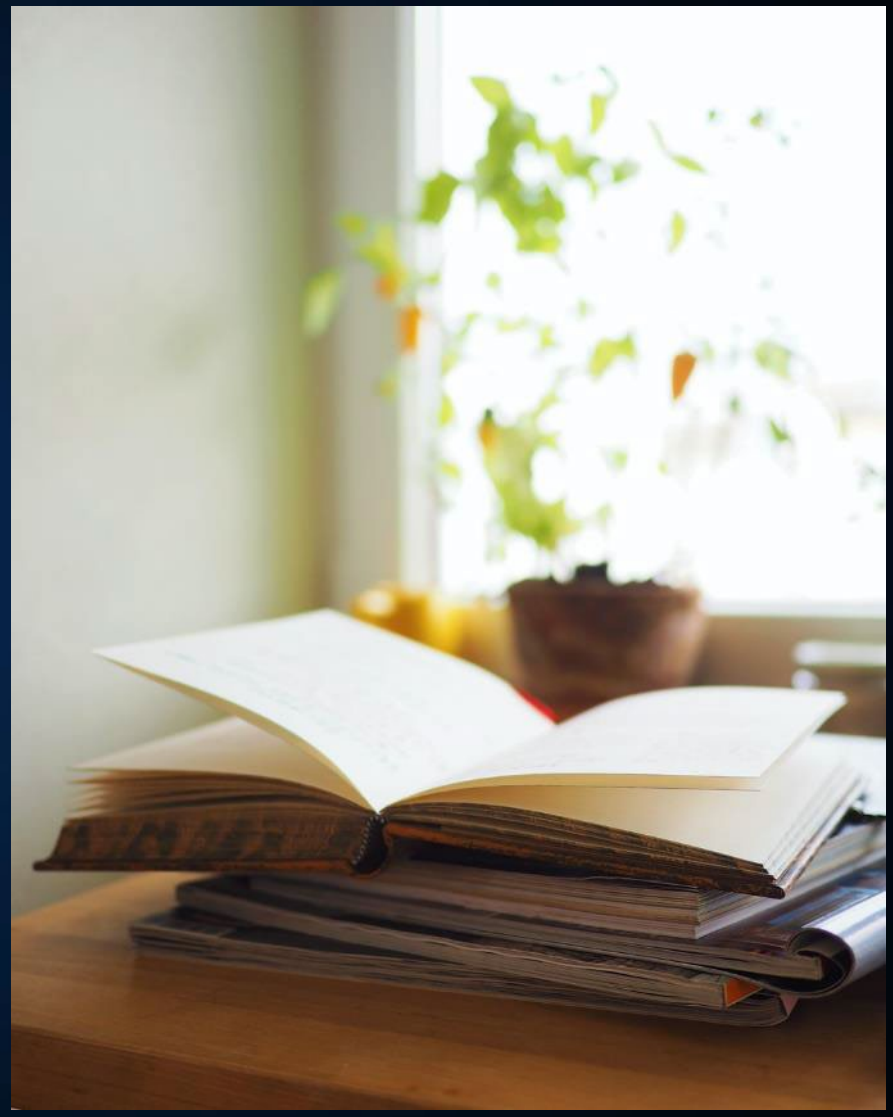
After Action



Knowledge Check No. 1

Why is data management important for crowdsourced and broader agency data?

A. Keeps data organized and usable
B. Keeps data safe and accessible
C. Keeps data indefinitely
D. A and B

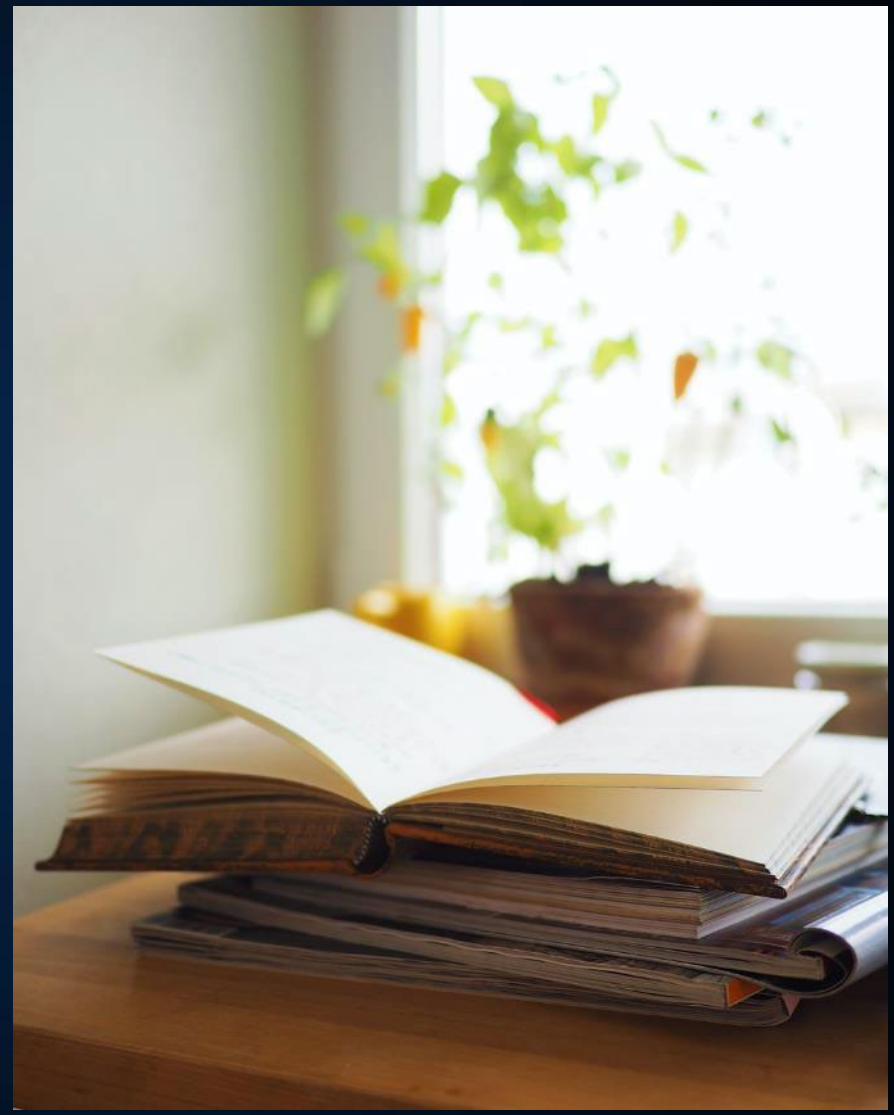


Source: Unsplash.

Knowledge Check No. 2

Which of the following are characteristic of modern data management?

A. Distributed storage and processing
B. Decoupled hardware/software
C. Many access and use the data
D. All the above



Source: Unsplash.

What is Your Agency's State of Practice Regarding Modern Data Management?

1 – nonexistent

2 – exploration

3 – some demonstrations

4 – practiced by some groups

5 – institutionalized (or nearly institutionalized)

6 – Not sure

TEAM KENTUCKY
TRANSPORTATION CABINET

@KYTC

@kytc120

@KYtransportation

@KYtransportation

transportation.ky.gov

Chris.Lambert@ky.gov

@ChrisLambertKY

Source: Pixabay.

Question, Answer, and Discussion

Crowdsourced Data Resources

- **Adventures in Crowdsourcing** webinar on Validating Crowdsourced Data
- **Lake County Free Travel Time Poller:** Free GitHub Code for Waze® Connected Cities partners to send email alerts for defined road segments that become "congested."
- **The Eastern Transportation Coalition Coalition Vehicle Probe Project:** INRIX®, HERE®, and TomTom® resource guides and validation reports.

FHWA EDC-6 Crowdsourcing for Advancing Operation Resource Site (bit.ly/CS4Ops)

Source: FHWA.

Data Management Resources

Adventures in Crowdsourcing webinars with data management content:

- *Data Management and Governance*
- *New Destinations with FHWA EDC-6 Innovation:* Modern Data Management

National Cooperative Highway Research Program Report 952 *Guidebook for Managing Data from Emerging Technologies for Transportation*

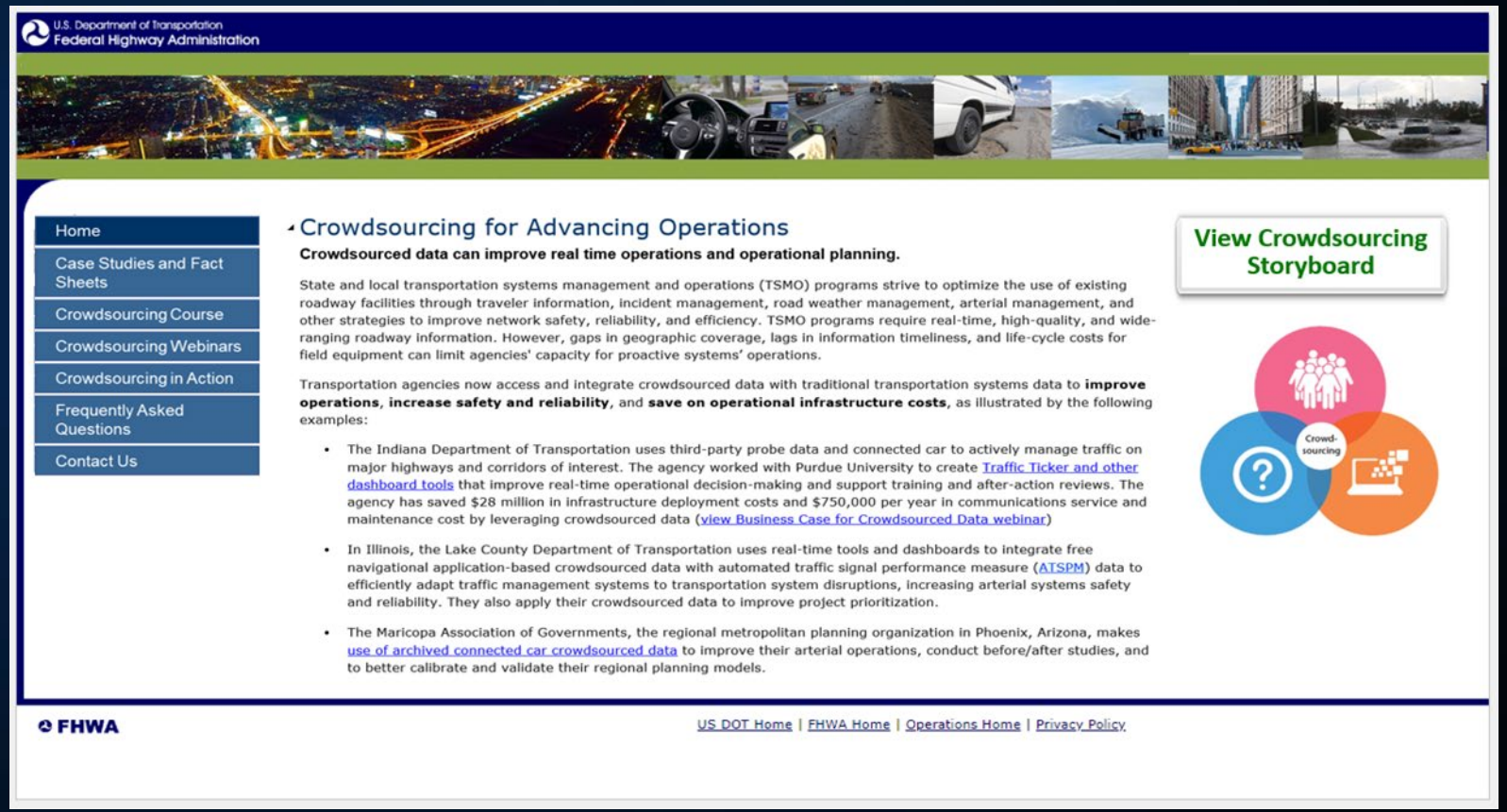
FHWA Data Business Plan Report

FHWA EDC-6 Crowdsourcing for Advancing Operation Resource Site (bit.ly/CS4Ops)

Source: FHWA.

Crowdsourcing Beyond Round Six of the Every Day Counts (EDC) Program

- New web presence
- Continue course delivery
- Continue technical support
- Continue free access to the EDC-6 Adventures in Crowdsourcing webinar series hosted by the National Operations Center of Excellence



Source: FHWA.

Concept website in development and intended for FHWA Office of Operations.

Thank you.

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U.S. Department of Transportation
Federal Highway Administration

Upcoming T3 Webinars

Webinar	Date	Time
Crowdsourcing for Advancing Operations: Traveler Information and Traffic Incident Management	Tuesday, July 18, 2023	1:00 P.M. - 2:30 P.M. ET
Crowdsourcing for Advancing Operations: Road Weather and Arterial Management	Tuesday, August 15, 2023	1:00 P.M. - 2:30 P.M. ET
Crowdsourcing for Advancing Operations: Emergency and Work Zone Management and Next Steps	Tuesday, September 19, 2023	1:00 P.M. - 2:30 P.M. ET

Register: https://www.pcb.its.dot.gov/t3_webinars.aspx

To access the recording and past T3 webinars, visit:
https://www.pcb.its.dot.gov/t3_archives.aspx

Feedback

- A link to a feedback questionnaire is provided in the chat pod. Please take a few minutes to fill it out – we value your input

- To receive notifications of upcoming events, send an email to T3@dot.gov with "Add to mailing list" in the subject line

Thank you!

INTELLIGENT TRANSPORTATION SYSTEMS
PROFESSIONAL CAPACITY BUILDING