

*Intelligent Transportation Systems Joint  
Program Office (ITS JPO) Professional  
Capacity Building (PCB) Webinar Series*

***Crowdsourcing for  
Operations Course***

May 16, 2023



U.S. Department of Transportation  
**Federal Highway Administration**



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# Today's Host and Presenters



Source: FHWA.

**Greg Jones, Host**  
Every Day Counts 6  
(EDC-6) Crowdsourcing  
Colead

FHWA Office of  
Operations and  
Resource Center



Source: FHWA.

**James Colyar, Presenter**  
EDC-6 Crowdsourcing Colead  
FHWA Office of Operations



Source: NCTCOG.

**Natalie Bettger, Presenter**  
Senior Program Manager  
North Central Texas Council  
of Governments (NCTCOG)

# Webinar Agenda

**1:10 p.m.** FHWA EDC-6 Crowdsourcing Innovation and Course

**1:15 p.m.** Introduction to Crowdsourcing Lesson

**1:35 p.m.** Applications of Crowdsourced Data Lesson

**2:00 p.m.** Question and Answer

Source: Unsplash.



# What Is Every Day Counts?

State-based model

Proven but underutilized  
innovations

2-year cycles



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

EDC-5 Crowdsourcing Innovation (January 2019–December 2020) continued as an EDC-6 Innovation (January 2021–December 2022), with focus on:

**Adding data sources and applications**

**Improving data management**



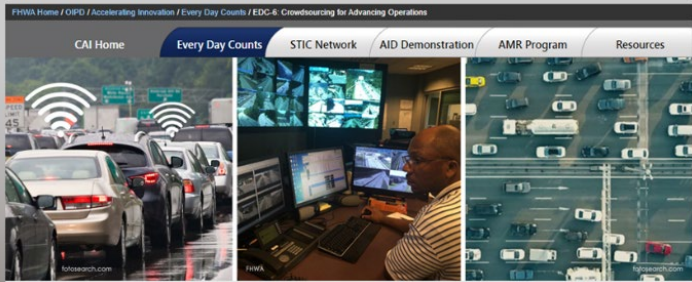
**Improving archived data usage**

**Sharing and integration of data**

Source: FHWA.

# EDC Crowdsourcing by the Numbers: January 2019 – December 2022

- 35+ States and many local agencies engaged
- 10+ workshops and peer exchanges
- 15+ conference and event presentations
- 20+ Adventures in Crowdsourcing webinars
- 20+ technical assistances or facilitations
- 12 crowdsourcing cohort sessions
- 10+ published articles and 5+ case studies
- Crowdsourcing Course-in-a-Box delivered to 3 regions



**Crowdsourcing for Advancing Operations**

**Crowdsourced data from multiple streams can be integrated and used in real time for improved operations.**

State and local transportation systems management and operations (TSMO) programs strive to optimize the use of existing roadway facilities through traveler information, incident management, road weather management, arterial management, and other strategies targeting the causes of congestion. TSMO programs require real-time, high-quality, and wide-ranging roadway information. However, gaps in geographic coverage, lags in information timeliness, and life-cycle costs for field equipment can limit agencies' ability to operate the system proactively.

Public agencies at all levels are increasing both their situational awareness and the quality and quantity of operations data using crowdsourcing, which enables staff to apply proactive strategies cost effectively and make better decisions that lead to safer and more reliable travel while protecting privacy and security of individual user data.

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**FHWA EDC-6 Crowdsourcing  
for Advancing Operation  
Resource Site**

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

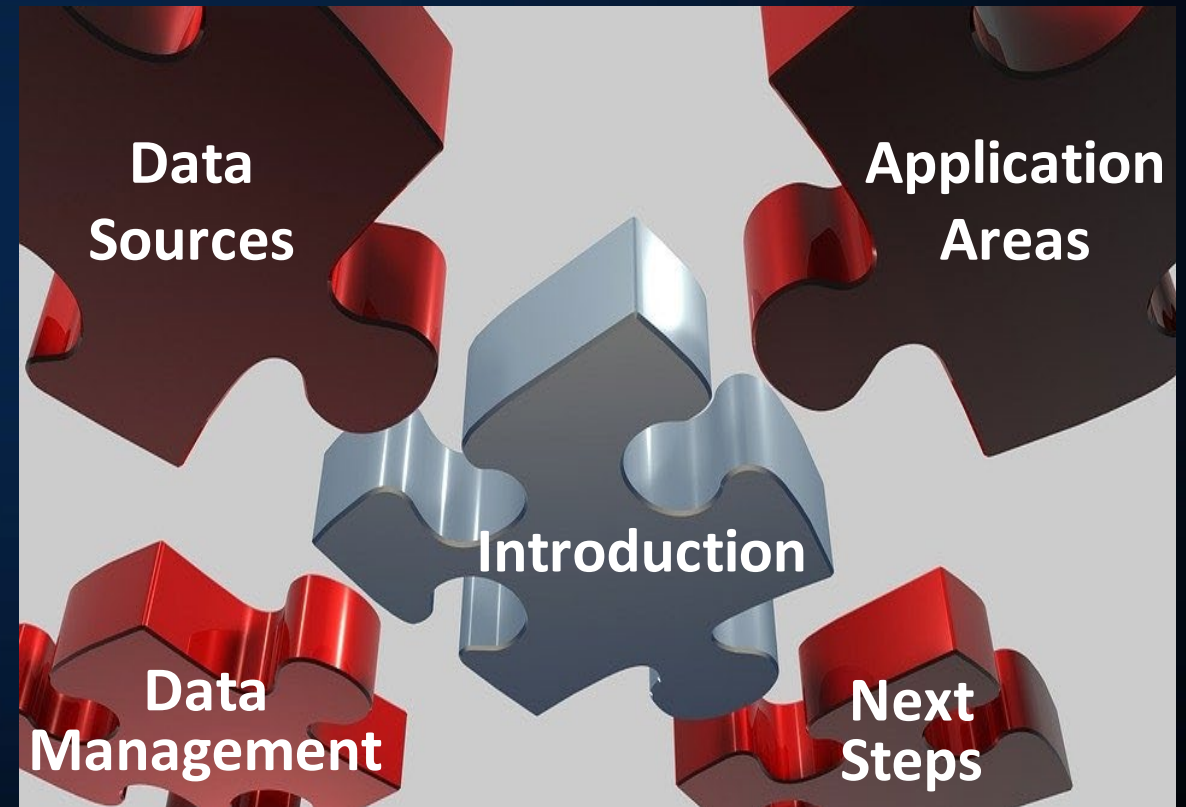


Source: Pixabay.



# Course Is Modular by Design

- **5 Lessons:** Introduction, Data Sources, Application Areas, Data Management, and Next Steps
- **6 Application Modules:** traffic incident management, traveler information, arterial management, work zone management, road weather management, and emergency management



*Source: Adapted from 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 policy makers, local elected officials, administrators, or other leaders.**

# Whom Is the Course Targeting?

## Sample Job Titles

- Traffic engineer
- Maintenance manager
- Safety specialist
- Transportation systems and management (TSMO) manager
- Mobility engineer
- Intelligent transportation systems engineer
- TMC manager
- Performance manager
- Innovation manager
- Safety engineer
- Freeway operations manager
- Planner
- Traffic signal system manager
- Researcher
- Data steward



Source: Pixabay.

# LESSON: INTRODUCTION



# Introductions

- Please enter your name, agency, and title in the chat window.
- Please state a problem your agency faces to which crowdsourced data might offer a solution.



Hello  
my name is

Source: FHWA.

# Lesson Objectives

1. Describe crowdsourcing in general and for TSMO
2. Understand the benefits from crowdsourcing for TSMO

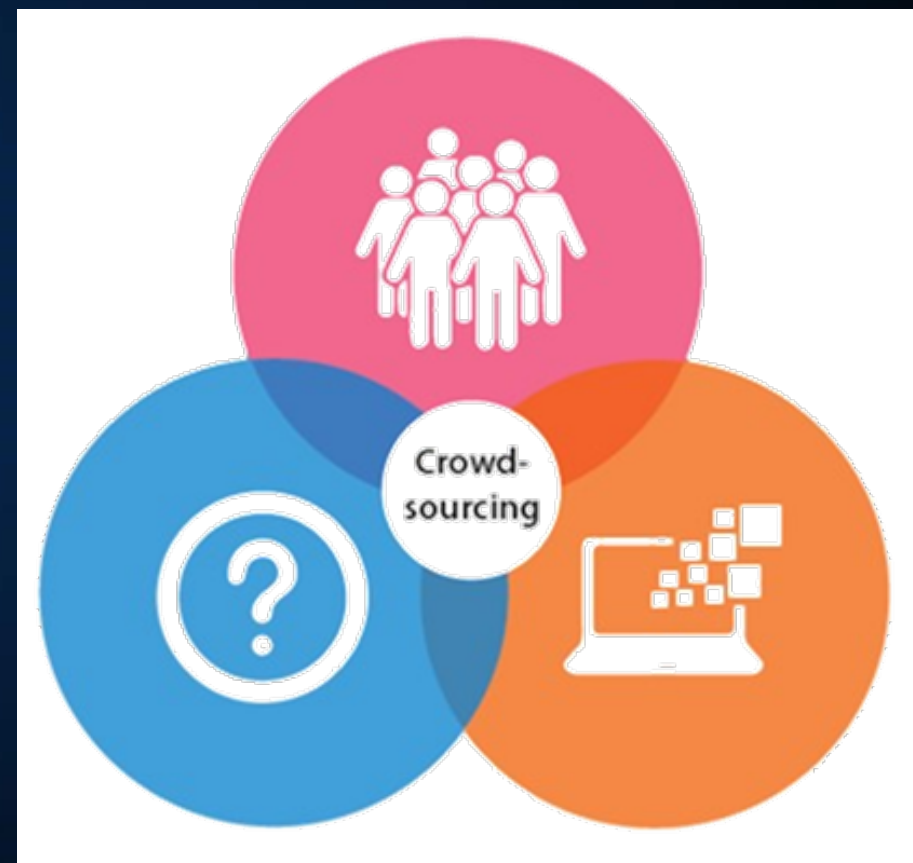


Source: Unsplash

All photos source: Unsplash.

# What Is Crowdsourcing?

Addressing a need or problem by enlisting the services of a large number of people via technology



Source: FHWA.

**Lifelines: 50:50 Phone a Friend Ask the Audience**



Source: Idea SV, El Salvador Milionario.

**How often is the ask-the-audience lifeline correct in the game show “Who Wants to Be a Millionaire”?**

**A: 95% of the time**

**B: 50% of the time**

**C: 30% of the time**

**D: 75% of the time**



# Crowdsourcing Is Everywhere

- Airbnb
- Best Buy
- [Citizenscience.gov](https://www.citizenscience.gov/) (GSA)
- Department of Defense
- Facebook
- Federal Bureau of Investigation
- General Electric
- Google
- Harley-Davidson
- Kraft Foods
- Lego
- Mattel
- McDonald's
- Microsoft
- NASA
- Netflix
- New York City
- Procter & Gamble
- Starbucks
- Wikipedia



Source: FHWA.

# Transportation Systems Management and Operations

- Optimize existing facilities
- Move people and goods
- Target causes of congestion
- Built on a foundation of monitoring current conditions



Source: Unsplash.

Source: Pixabay.

# Transportation Systems Management and Operations Needs



Source: Unsplash.

- Monitoring the roadway network
- Detecting problems more quickly
- Providing better information for road users
- Making planning, operational, and maintenance decisions with data
- Improving safety and reliability



# Real-Time Monitoring Limitations

- Gaps in geographic coverage
- Timeliness of information
- Jurisdictional stovepipes
- Cost to deploy and maintain equipment



Source: FHWA.

*Crowdsourced data overcome the limitations of traditional ITS infrastructure-based traffic monitoring.*



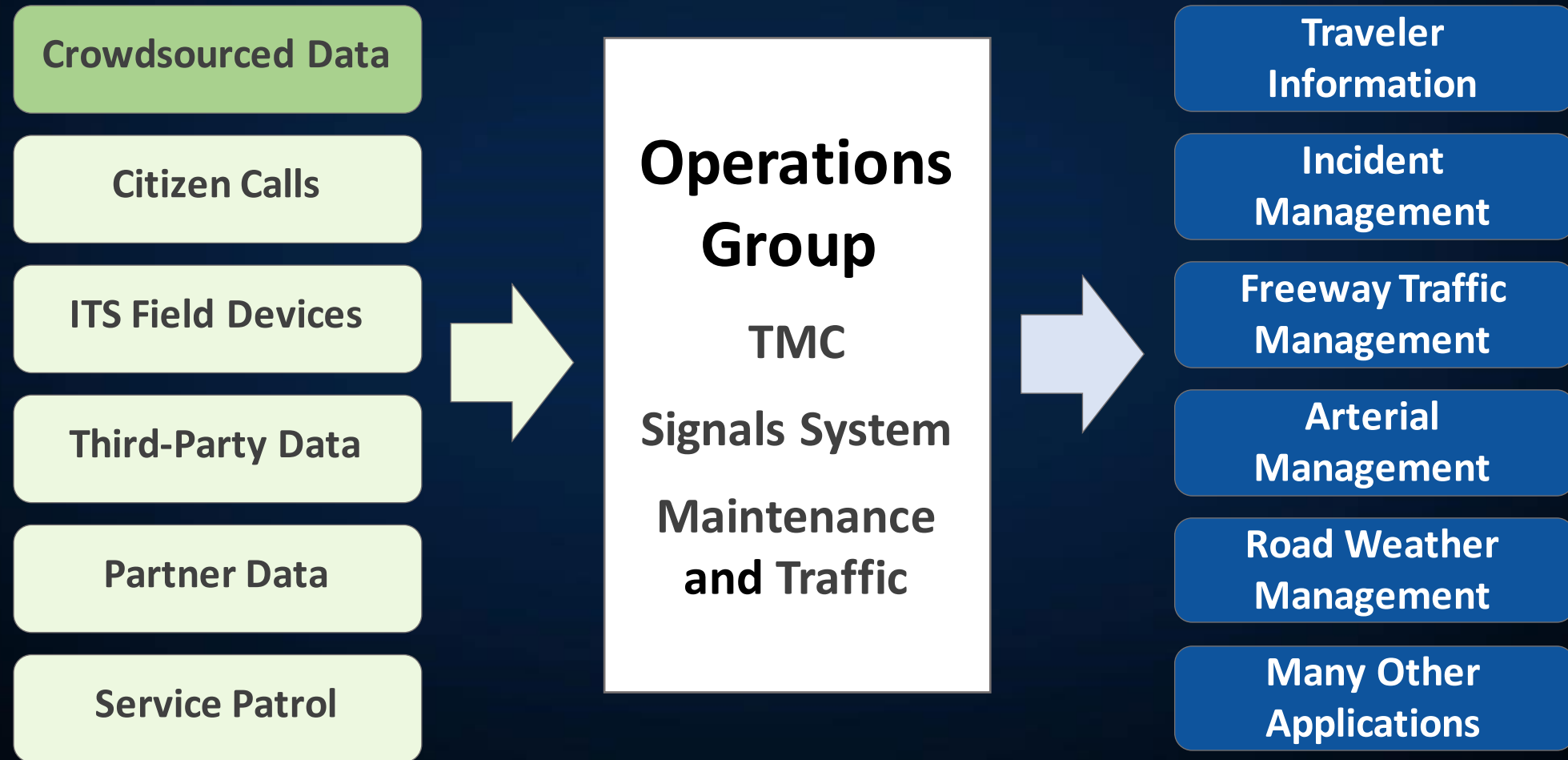
# Types of Crowdsourced Data for Transportation Operations

- Vehicle probe
- Navigation app
- Social media
- Connected vehicle
- 311 and 511 apps
- Multimodal probe data



Source: Pixabay.

# Integrating Crowdsourced Data



Source: FHWA.



### Traffic Incident Management



Source: FHWA.

### Traffic Studies



Source: Pixabay.

### Road Weather Management



Source: Pixabay.

### Traveler Information



Source: Pixabay.

### Performance Management



Source: Pixabay.

### Arterial Management



Source: Unsplash.



## Freeway Management



Source: FHWA.

## Work Zone Management



Source: Unsplash.

## Road and ITS Maintenance



Source: Pixabay.

## Project Prioritization



Source: Unsplash.

## Emergency Management



Source: FHWA.

## Other Applications?



Source: Pixabay.



# Why Crowdsourcing for Operations?

✓ Improve Operations



Source: FHWA.

✓ Increase Safety and Reliability



Source: FHWA.

✓ Save Cost

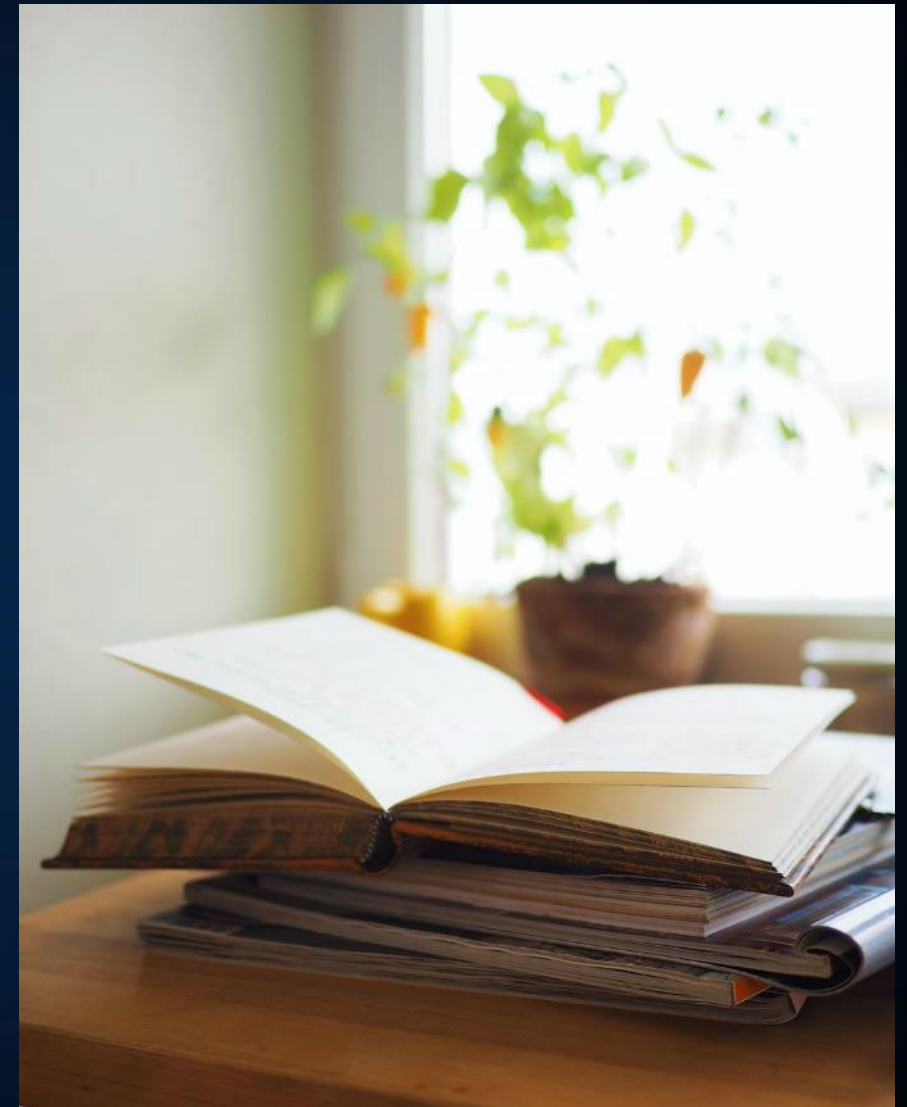


Source: Pixabay.

# Knowledge Check No. 1

What are the benefits from crowdsourcing for transportation operations?

- A. Increase travel reliability
- B. Improve traffic safety
- C. Save cost
- D. All of the above

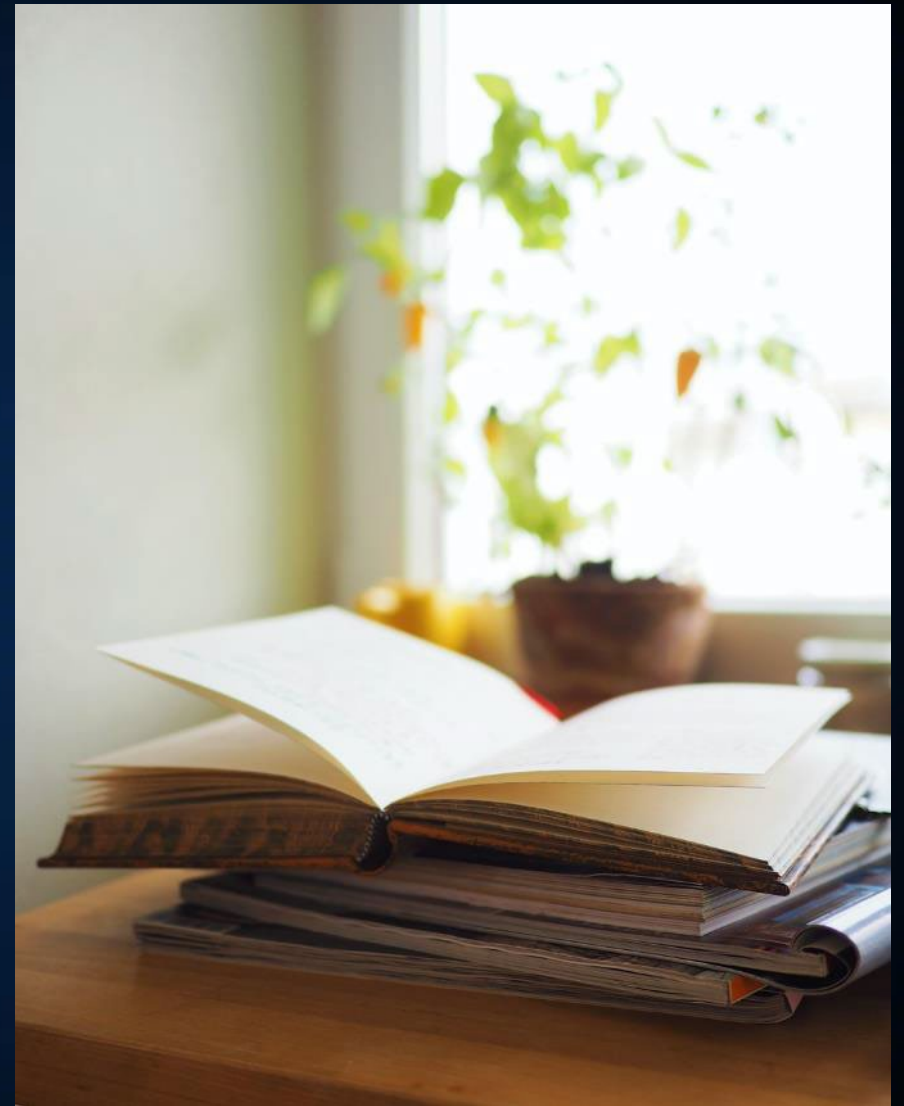


Source: Unsplash.

# Knowledge Check No. 2

Which of the following are benefits of using crowdsourcing data for transportation operations?

- A. Fewer gaps in geographic coverage
- B. Better timeliness of information
- C. Less cost to install and maintain equipment
- D. Fewer jurisdictional stovepipes
- E. All of the above**



Source: Unsplash.





Source: Pixabay.

# LESSON 3: APPLICATION AREAS



# Lesson Objectives

1. Become familiar with State and local uses of crowdsourced data
2. Understand that the same data can support multiple uses



All photos source: Unsplash.

# Many Applications for Operations

- Agencies typically begin with one source of crowdsourced data for a key need.
- They quickly find the “one source” has many reuses!
- And they find even greater value in integrating different data for real-time and archived uses.



Source (vertical): Unsplash.

Source (vertical): Pixabay.

Source (vertical): Pixabay.

# Crowdsourcing in Dallas, Texas

North Central Texas Council of Governments (NCTCOG)

**Natalie Bettger**

Senior Program Manager

Congestion Management and System Operation

North Central Texas Council of Governments

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# NCTCOG 911 Department

**Goal:** NCTCOG 911 needed to identify crashes early for emergency response.

**Action:** Waze integration into forty-two 911 centers.

**Outcome:** Quicker notification of crashes, quicker response to crashes to save lives.

- 80% of the time, crashes reported to Public Safety Answering Point (PSAPs) 10 minutes earlier than WAZE, on average.
- Remaining 20% of crashes were reported to WAZE first, 9 minutes before PSAPs, on average.



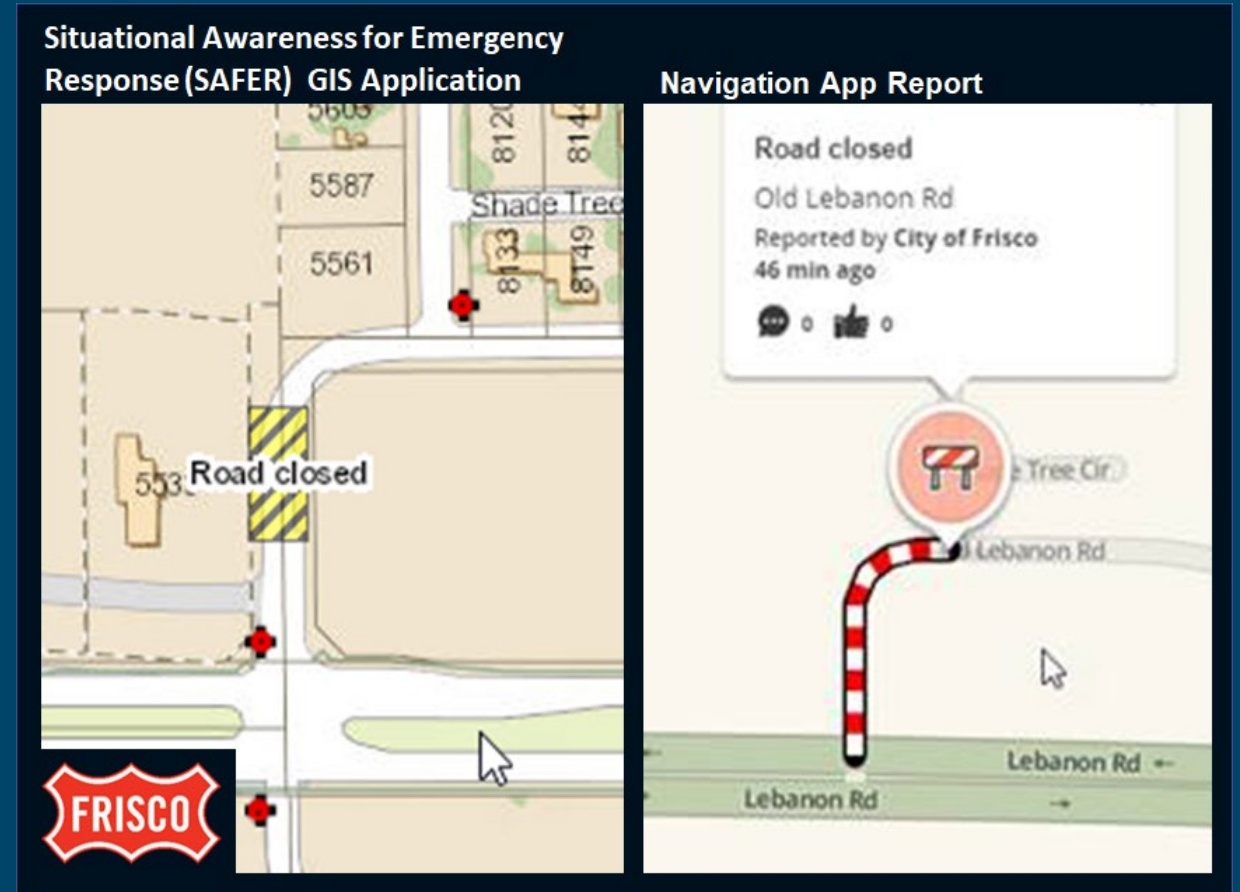


# City of Frisco, Situational Awareness for Emergency Response (SAFER) Platform

**Goal:** Help public safety dispatchers provide accurate information to the responder community and road users.

**Action:** SAFER interfaces with Waze to share information multiple incident response communities.

**Outcome:** Quicker incident detection and response, and more timely and precise traveler information.



# NCTCOG Traffic Signal Performance

**Goal:** Evaluate performance of and better manage all 7,000 traffic signals within the NCTCOG region.

**Action:** Purchase platform and data to analyze performance.

**Outcomes:** Identify non-performing signals, and whether additional capacity is needed.  
*(Intended)*

Quickly identify malfunctioning traffic signal equipment,  
Asses whether signal timing or coordination is needed.




# Example: District Department of Transportation Crowdsources Pothole Detection

The District Department of Transportation (Washington, DC) launched a Potholepalooza campaign using social media.

- 11,000 potholes identified via crowdsourcing (e.g., 311 calls) and conventional, city employees' reports in 3-months
- 10,000 potholes reported by its 650,000 Waze™ users in a month



DDOT DC  @DDOTDC · Mar 30, 2015

Another [#potholepalooza](#) factoid, the total Waze pothole-related reports are 10,202. You are rocking this. Keep them coming. 

Source: District DOT.

# Kansas City Scout Crowdsourced Pothole Report Tool

- Automated pull of potholes from Waze shared with maintenance
- Field-evaluated reports
- Expanding its use beyond Kansas City's boundaries
- Improvements in operations and safety

**Crowdsourced Pothole Reports**

**98% Accurate**

**in the Kansas City, Bi-State Metro Area**

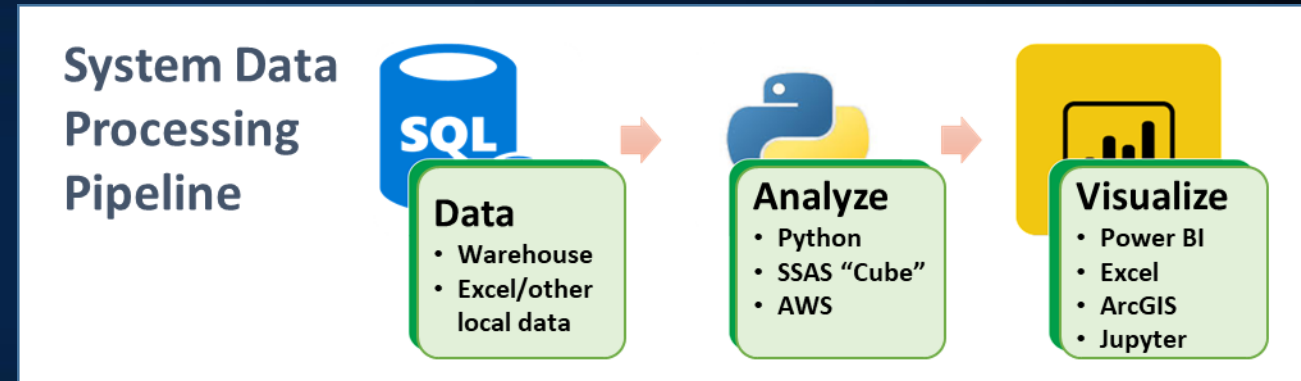


Image: Pexels.com/Kam Pratt, Data Source: Kansas City Scout.



# Example: Ohio DOT Uses Vehicle Probe Data for Nine Different Applications!

Collects 27,000 center-lane miles of interstate, U.S., and State route probe data. The agency applies the data for real-time and archived uses.



AWS = Amazon Web Services; SQL = Structured Query Language; SSAS = SQL Server Analysis Services. Source: Ohio Department of Transportation.

Traffic Incident Management

Traffic Studies

Work Zone Management

Traveler Information

Project Prioritization

Road Weather Management

Freeway Management

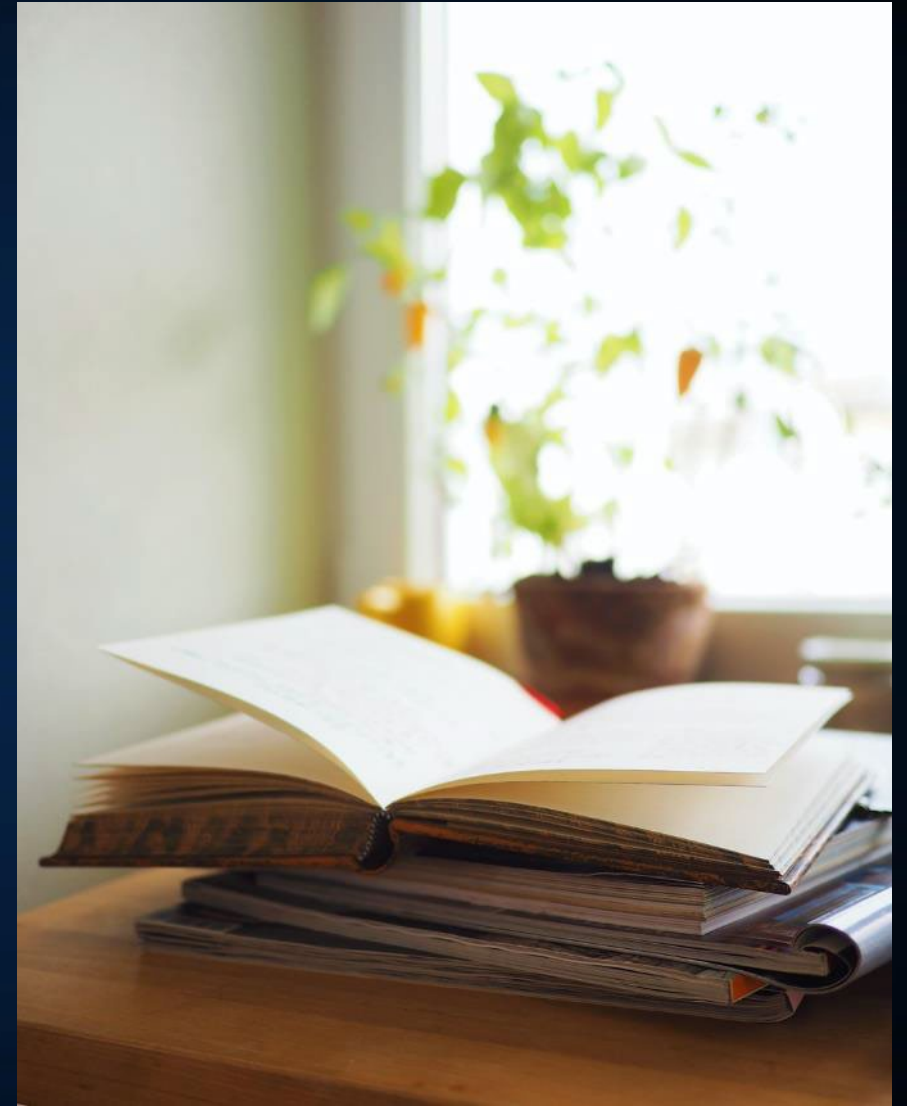
Performance Management

Arterial Management

# Knowledge Check

Ohio DOT uses vehicle probe data for how many applications?

- A. One use
- B. Five uses
- C. Nine, that we know of
- D. The agency does not use vehicle probe data.



Source: Unsplash.



Source: Pixabay.

# *Question, Answer, and Discussion*



# Application Example Resources

- **Adventures in Crowdsourcing Webinar:** Business Case for Crowdsourced Data
- **Crowdsourcing Case Studies:** City of Louisville, Indiana DOT, Lake County, IL, Kentucky Transportation Cabinet, and Utah DOT
- **Crowdsourcing Applications Table:** Lists and describes public agency applications of crowdsourcing to improve transportation systems management and operations

FHWA Home / OIPD / Accelerating Innovation / Every Day Counts / EDC-6: Crowdsourcing for Advancing Operations

CAI Home Every Day Counts STIC Network AID Demonstration AMR Program Resources

**Crowdsourcing for Advancing Operations**

Crowdsourced data from multiple streams can be integrated and used in real time for improved operations.

State and local transportation systems management and operations (TSMO) programs strive to optimize the use of existing roadway facilities through traveler information, incident management, road weather management, arterial management, and other strategies targeting the causes of congestion. TSMO programs require real-time, high-quality, and wide-ranging roadway information. However, gaps in geographic coverage, lags in information timeliness, and life-cycle costs for field equipment can limit agencies' ability to operate the system proactively.

Public agencies at all levels are increasing both their situational awareness and the quality and quantity of operations data using crowdsourcing, which enables staff to apply proactive strategies cost effectively and make better decisions that lead to safer and more reliable travel while protecting privacy and security of individual user data.

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

Source: FHWA.

# Crowdsourcing Beyond EDC-6

- 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

U.S. Department of Transportation  
Federal Highway Administration

## CROWDSOURCING FOR ADVANCING TRANSPORTATION OPERATIONS

OFFICE OF OPERATIONS | 21<sup>ST</sup> CENTURY OPERATIONS USING 21<sup>ST</sup> CENTURY TECHNOLOGIES

- Home
- Case Studies and Fact Sheets
- Crowdsourcing Course
- Crowdsourcing Webinars
- Crowdsourcing in Action
- Frequently Asked Questions
- Contact Us

### ◀ Crowdsourcing for Advancing Operations

**Crowdsourced data can improve real time operations and operational planning.**

State and local transportation systems management and operations (TSMO) programs strive to optimize the use of existing roadway facilities through traveler information, incident management, road weather management, arterial management, and other strategies to improve network safety, reliability, and efficiency. TSMO programs require real-time, high-quality, and wide-ranging roadway information. However, gaps in geographic coverage, lags in information timeliness, and life-cycle costs for field equipment can limit agencies' capacity for proactive systems' operations.

Transportation agencies now access and integrate crowdsourced data with traditional transportation systems data to **improve operations, increase safety and reliability, and save on operational infrastructure costs**, as illustrated by the following examples:

- The Indiana Department of Transportation uses third-party probe data and connected car to actively manage traffic on major highways and corridors of interest. The agency worked with Purdue University to create [Traffic Ticker and other dashboard tools](#) that improve real-time operational decision-making and support training and after-action reviews. The agency has saved \$28 million in infrastructure deployment costs and \$750,000 per year in communications service and maintenance cost by leveraging crowdsourced data ([view Business Case for Crowdsourced Data webinar](#))
- In Illinois, the Lake County Department of Transportation uses real-time tools and dashboards to integrate free navigational application-based crowdsourced data with automated traffic signal performance measure ([ATSPM](#)) data to efficiently adapt traffic management systems to transportation system disruptions, increasing arterial systems safety and reliability. They also apply their crowdsourced data to improve project prioritization.
- The Maricopa Association of Governments, the regional metropolitan planning organization in Phoenix, Arizona, makes [use of archived connected car crowdsourced data](#) to improve their arterial operations, conduct before/after studies, and to better calibrate and validate their regional planning models.

[View Crowdsourcing Storyboard](#)

**FHWA** | [US DOT Home](#) | [FHWA Home](#) | [Operations Home](#) | [Privacy Policy](#)

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

# Thank you.

Be sure to join the **next course webinar** on **Tuesday, June 20, 2023, at 1 p.m. ET** to learn about crowdsourcing data sources and management.

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# Upcoming T3 Webinars

Webinar	Date	Time
Crowdsourcing for Advancing Operations: Data Sources and Management	Tuesday, June 20, 2023	1:00 P.M. - 2:30 P.M. ET
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](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](https://www.pcb.its.dot.gov/t3_archives.aspx)



- 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](mailto:T3@dot.gov) with “Add to mailing list” in the subject line

**Thank you!**

