Transportation Disruption & Disaster Statistics (TDADS) STEERING COMMITTEE MEETING

May 16, 2019
Webcast and Audio Information

• This is a **virtual meeting** experience
  • **Please mute your line** until you are making a **comment** or asking a **question** (press *6 to mute/unmute individual phone lines)
  • Please do not place call “on hold” as your hold music will be heard by the group

• **This web meeting is being recorded**

• **Meeting materials will be available to participants after the web meeting**
Make Comments & Ask Questions

*We encourage EVERYONE to participate......*

**VERBALLY**
- Please give your name and agency before asking your question (at least the first time)
- Keep your line muted when not asking a question

**IN THE CHAT BOX**
- You may pose your questions using the chat box

**POLLING QUESTIONS**
- Periodically we will ask for your input through interactive polls
While you are not speaking....
Please confirm you are MUTED

For your phone line - press *6
&
Mute your computer

Thank You!
Welcome & Introductions

Denise Markow, PE, I-95 Corridor Coalition
# Agenda

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Today’s Speakers

Patricia Hendren, PhD
I-95 Corridor Coalition
Executive Director

Denise Markow, PE
I-95 Corridor Coalition
TSMO Director

Mark Franz, PhD
UMD CATT Lab
Lead Transportation Analyst

Ignacio Tous
UMD CATT Lab
Lead Data Scientist
Background & Objectives

Patricia Hendren, PhD, I-95 Corridor Coalition
Causes of Highway Congestion
“The Pie Chart”

- National statistic
- 14+ years old
- Largely modeled
- Still used extensively for BIG investment and spending decisions

- Bottlenecks: 40%
- Incidents: 25%
- Work Zones: 10%
- Bad Weather: 15%
- Special Events: 5%
- Poor Signal Timing: 5%
Getting to the root causes of congestion......

• One stat can’t represent everyone

• Many regional factors:
  Climate, demographics, policies, laws, infrastructure conditions, population density, technology, roadway design, etc.

• Wise decision-making demands current and regionally-relevant information.
The Bureau of Transportation Statistics selected the I-95 Corridor Coalition in partnership with the CATT Lab to create the TDADS Program. TDADS is envisioned as a national system that contains data, statistics, dashboards, tools and visualizations for use in the analysis and understanding of multimodal interstate and inter-regional transportation system disruptions.
1. Upgrade the ancient “pie chart”
   ✓ Across entire U.S.
   ✓ Using the nation’s best data

2. Evaluate regional factors

3. Create interactive, easily-accessible tool in the hands of decision makers

4. Expand analysis to other modes (e.g., Air and Rail)

5. Practitioner Steering Committee guide ALL work

“We need to build a new tool to determine causes of congestion”
TDADS - Project Objectives

✓ Develop and promote the use of an online tool for transportation analysts to access, analyze and visualize data for monitoring and evaluating transportation network disruptions and disasters

✓ Adjust operational strategies to focus on larger sources of disruptions

✓ Help the freight industry manage operations and reduce costs

✓ Compare neighboring state results to identify best management practices to share

✓ Make the case for TSMO through quantifying the benefits of reducing the effect of disruptions

✓ Provide federal guidance for informed national level decisions related to the performance of the transportation network

✓ Improve communication with the public, policy makers, the media, and other stakeholders
The Team

**Bureau of Transportation Statistics**
Ed Strocko

**Principal Investigator**
Dr. Patricia Hendren
Michael Pack

**CATT Lab Project Manager**
Dr. Mark Franz

**Coalition Project Manager**
Denise Markow

**System Performance Measure Experts**
Kaveh Farokhi Sadabadi
Denise Markow
Patricia Hendren
Mark Franz
Ignacio Tous

**Software Development and Big Data Analytics Experts**
Michael Pack
Nikola Ivanov
Michael VanDaniker
Drew Lund

**Data Info and Visualization Experts**
Jenny Lees
Michael VanDaniker
Michael Pack
Steering Committee Role:

Guide the development of TDADS to ensure the tool is useful to practitioners:

• Assess the terminology and the definitions that will form TDADS foundation (e.g. how do we best define disruptions?)

• Identify and prioritize the causes of disruption that will be used to build the tool

• Provide feedback on preliminary results
  • Assess the feasibility of expanding TDADS to a multimodal tool
  • Advance the use of TDADS in the transportation field
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<th>Invited Steering Committee Members</th>
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<tr>
<td>AASHTO</td>
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<td>Alabama DOT</td>
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<tr>
<td>Arkansas DOT</td>
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<tr>
<td>Baltimore Metropolitan Council</td>
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<tr>
<td>Birmingham MPO (AL)</td>
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<tr>
<td>California</td>
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<tr>
<td>California DOT</td>
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<tr>
<td>City of Charlotte, NC</td>
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<tr>
<td>Connecticut DOT</td>
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<tr>
<td>Connecticut Metropolitan COG</td>
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<tr>
<td>Delaware DOT</td>
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<tr>
<td>District DOT</td>
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Overview and Preliminary Results & Interface Designs

Mark Franz, PhD, University of Maryland CATT Laboratory
# TDADS Framework

<table>
<thead>
<tr>
<th>Recommended Terminology</th>
<th>Potential Data Sources</th>
<th>Definition</th>
<th>Details</th>
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<tr>
<td><strong>Disruption</strong></td>
<td>• Probe data</td>
<td>A sustained interruption in the flow of traffic that results in travel delay.</td>
<td>• Time and location of an event that causes a speed drop of at least 60% of the reference speed that is sustained for at least 5 minutes. This location is the head of a traffic queue.</td>
</tr>
<tr>
<td><strong>Recurrent Disruption</strong></td>
<td>• Probe data</td>
<td>A predictable and regular pattern of interruption in traffic flow that results in travel delay.</td>
<td>• Disruption pattern that is predictable in both space and time and is observed on a regular basis</td>
</tr>
<tr>
<td><strong>Incidents</strong></td>
<td>• DOT data • FARS • Waze • CAD</td>
<td>Interruption in traffic flow caused by an unplanned in-road or roadside obstruction that results in travel delay.</td>
<td>• Disabled vehicle • Crash/Incident • Emergency roadwork • Road obstruction</td>
</tr>
<tr>
<td><strong>Bad Weather</strong></td>
<td>• NWS Radar</td>
<td>Interruption in traffic flow caused by inclement weather conditions.</td>
<td>• Rain • Snow • Visibility reduced (fog)</td>
</tr>
<tr>
<td><strong>Work Zones</strong></td>
<td>• State or Agency provided • Waze</td>
<td>Interruption in traffic flow caused by a planned construction or maintenance project/activity.</td>
<td>• Planned work zones</td>
</tr>
<tr>
<td><strong>Special Events</strong></td>
<td>• Holidays &amp; Travel Days</td>
<td>Interruption in traffic flow caused by a scheduled occasion.</td>
<td>• Before, on or after major holidays</td>
</tr>
<tr>
<td><strong>Poor Signal Timing</strong></td>
<td>• DOT asset management records/maps</td>
<td>Interruption in traffic flow caused by improperly timed traffic signals.</td>
<td>• Delay incurred at signalized intersections</td>
</tr>
<tr>
<td><strong>Unclassified Disruption</strong></td>
<td>• Probe data</td>
<td>Interruption in traffic flow with no discernable cause.</td>
<td>• TBD</td>
</tr>
</tbody>
</table>

*Note that the inclusion of the “Poor Signal Timing” category is under evaluation*
Poll Question #1 - Sources of Disruption

Do you agree with the proposed six sources of disruption to define our national pie chart?

___ Yes
___ No
___ Not Sure
Poll Question #2 – Additional Details for Sources of Disruption

Of the sources of disruption, which category would it be beneficial to have additional details or breakdown, \textit{in the future}?

- [ ] Recurrent Disruption
- [ ] Incidents
- [ ] Bad Weather
- [ ] Work Zones
- [ ] Special Events
- [ ] Poor Signal Timing
Defining Disruption

High Level Approach to Quantifying Disruptions

1. Detect Disruption
2. Is it Recurrent Disruption?
   - Yes: Is the Disruption Pattern Abnormal?
     - Yes: Spatial Correlation of Potential Causes of Disruption
       - Incidents
       - Weather
       - Work Zones
       - Special Events
       - Poor Signal Timing
     - No: Determine Cause(s) of the Disruption
   - No: Determine Cause(s) of the Disruption
3. Determine Cause(s) of the Disruption
4. Account for Multiple Causes and Unknown Causes
5. Quantify User Hours of Delay for Disruption by Cause
Recurring vs. Non-recurring

Recurrent Disruption

Non-Recurrent Disruption
Quantifying Disruption: User Delay Cost (UDC)

- Convert delay to a dollar value
- Inputs/Assumptions:
  - Travel time delay
  - Traffic volume
  - Commercial vehicle percentage
  - Value of time passenger vehicles
  - Value of time commercial vehicles
- Assign UDC from each disruption to a disruption category
- Pie/Bar chart based on total UDC in each category
Preliminary Results: I-495 Outer Loop at Georgia Ave. March 2018

<table>
<thead>
<tr>
<th>Cause of Disruption</th>
<th>UDC</th>
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<tbody>
<tr>
<td>Bad Weather</td>
<td>0.0%</td>
</tr>
<tr>
<td>Incidents</td>
<td>3.7%</td>
</tr>
<tr>
<td>Multiple Causes</td>
<td>0.0%</td>
</tr>
<tr>
<td>Recurrent Disruption</td>
<td>78.5%</td>
</tr>
<tr>
<td>Special Events</td>
<td>4.2%</td>
</tr>
<tr>
<td>Unclassified Disruption</td>
<td>13.6%</td>
</tr>
<tr>
<td>Work Zones</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Total UDC: $2,574,615
Preliminary Results: I-495 Outer Loop at Georgia Ave. March 2018
Sources of Disruption **Nation Wide 2018**

Total UDC = $1.34B

- **Bad Weather**
- **Recurrent**
- **Incidents**
- **Special Events**
- **Work Zones**
- **Poor Signal Timing**

**Alabama**
Total UDC = $24.1M

- **Bad Weather**
- **Incidents**
- **Recurrent**
- **Special Event**
- **Work Zones**
- **Poor Signal Timing**

**Alaska**
Total UDC = $2.4M

- **Bad Weather**
- **Incidents**
- **Recurrent**
- **Special Event**
- **Work Zones**
- **Poor Signal Timing**

**Arizona**
Total UDC = $32.6M

- **Bad Weather**
- **Incidents**
- **Recurrent**
- **Special Event**
- **Work Zones**
- **Poor Signal Timing**

**Arkansas**
Total UDC = $11.7M

- **Bad Weather**
- **Incidents**
- **Recurrent**
- **Special Event**
- **Work Zones**
- **Poor Signal Timing**
Conceptual Interface Design

Sources of Disruption Nation Wide 2018

Disruption Sources 2018

Total UDC = $1.34B

State Causes of Disruption

Search for a specific state’s disruption sources for 2018.

State Name:

Disruption by Month

Special Events
Congestion by Month (National)
Poll Question #3 - Sources of Disruption

What visualization of the TDADS results is the most useful for your organization?

___ Pie Charts Only
___ Bar Graphs Only
___ Pie Charts & Bar Graphs
___ Other
Wrap Up

Denise Markow, PE, I-95 Corridor Coalition
In Summary: Understanding the Problem

It is critical that transportation agencies understand the underlying causes of disruptions in order:

✓ To target the correct strategies to mitigate resulting delays
✓ To gain clarity about the role of recurring versus non-recurring delay
✓ To have the ability to assess the effectiveness of the applied strategies

And there will be challenges for creating a comprehensive tool

• Base Line of non-disrupted performance must be established
• Data Limitations – not all disruptions are reported consistently
• Quality Control – new data feeds will need to be used such as NWS or WAZE
Questions?
In Closing…

Thank you for joining today

For Additional Information, please contact:

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dmarkow@i95coalition.org