Using Text Messaging to Locate and Verify Incidents Outside of Traffic Management System Coverage Areas

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Speaker's Notes (1/15)

This presentation aims to raise awareness of text messaging solutions that transportation management agencies may use to identify and verify incidents outside their monitoring areas.

Presentation Outline

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1. Challenges with transportation management systems (TMSs) using different methods to verify incidents.	3–4
2. Direct Text Messaging with Travelers overview and how it can help.	5–8
3. Agency practices and lessons learned.	9–11
4. Resources.	12–14

Speaker's Notes (2/15)

None.

Issues Faced by Departments of Transportation (DOTs) in Locating Incidents Outside TMS Coverage Areas

- Public-safety access point (PSAP) and TMC operators cannot quickly and accurately locate incidents or stranded motorists outside of TMS coverage areas.
- Monitoring capabilities are unavailable (e.g., cameras and detection):
  - Intelligent transportation system (ITS) devices are costly to install and require ongoing operations and maintenance.
  - Incident locations and details are difficult to verify.
- Stranded motorists may not know their location:
  - Operators may need to train callers on how to determine their location.
  - Location uncertainty adds time to incident response.
- Cellular connectivity in rural areas is unreliable, resulting in dropped calls.

Speaker's Notes (3/15)

Outside areas where tools such as cameras and vehicle detection are available, operators may be challenged in quickly locating (and verifying) traffic incidents. While most incidents get reported rather quickly, others may go undetected, particularly if they occur in more rural areas or have minimal impact to traffic flow. For example, vehicles that run off the roadway may be difficult to see by passing motorists. Furthermore, callers that report incidents, or those that are stranded, may be unaware of their surroundings, particularly out-of-state motorists who are driving in a new area and cannot recall the last road sign. Therefore, the lack of operator tools and driver unfamiliarly to their present locations results in the inability to quickly and accurately locate incidents and stranded motorists. Adding to these difficulties are issues inherent to rural locations such as poor cellular connectivity which can result in dropped calls.

State of the Practice for Locating Incidents

Existing methods used to locate incidents include:

- Field reports received through calls to a 911 center/PSAP.
- Mobile applications:
  - Citizen reporting.
  - Social media platforms.
- Caller references to mile markers.
- Unmanned aircraft systems.
- Automatic crash notification.
- Advanced automatic crash notification.

Speaker's Notes (4/15)

Outside TMC monitoring areas, operators may not have the ability to locate incidents. To date, most TMCs use or rely on the following methods:

- **Driver reports initiated through calls to 911/PSAP services** is a common method in which incidents get reported. While these calls occur quickly, the TMC is not always immediately notified of the incident, particularly if the TMC and PSAP reside in separate facilities and their systems do not share information. In these instances, the 911 center acts as another link in the information reporting chain, which delays information reaching the TMC. Similar to drivers and motorists, law enforcement and DOT field staff can also make field reports if they observe an incident. However, given the relatively few law enforcement and DOT personnel in the field, it is not likely that these personnel will be present at the incident location at the precise time it occurs. Therefore, it is assumed that for most incidents the law enforcement officer or DOT employee must first drive up to the incident scene or queue. This also assumes that there will be a delay from the time the incident occurs and the time the law enforcement officer or DOT employee will report the incident.
- Besides 911, motorists may use **Citizen reporting** applications like WAZE or social media platforms like Facebook and Twitter. Its becoming more common that TMCs monitor citizen reporting applications and social media feeds to gain better situational awareness of events occurring on the transportation network. However, as with driver reports via 911/PSAP, primarily larger scale events are the ones that are reported most often. This leaves the potential for minor events to avoid detection. Additionally, while citizen reports may increase validity of an incident occurrence, it does not provide TMCs the ability to verify incident details (e.g., location, type of incident) since the TMC is limited in their ability to communicate directly with motorists making reports.
- **Location mile markers** are signs typically installed at consistent intervals that facilitate communication between the PSAP and traveler in pinpointing their exact location. In urban areas, the intervals can be as short as 1/10 mile. However, in rural areas location mile markers may not exist, or the signs can be spaced at greater distances. If located outside the view of a motorist's location, or if the motorist is unfamiliar with the sign's appearance and cannot quickly locate it, the benefits of these signs may be minimized.
- Many agencies are now using **unmanned aircraft systems (UAS)** or drones for several traffic incident management applications. These systems are typically equipped with cameras and can be flown over a traffic crash scene to capture images using high-definition digital cameras. While drones can serve as an extension of a TMC's fixed point camera coverage, their potential impact to quickly detect incidents is limited. However, and depending on how they are deployed, drones can be beneficial for verifying incidents and ascertaining incident details once they are reported. This is particularly true when access to the incident scene is limited or when events occur well off the interstate or highway right of way.
- **Automatic crash notification (ACN) and advanced automatic crash notification (AACN)** are vehicle-equipped tools that alert a telematics provider when a vehicle is involved in a collision, or an airbag is deployed. As the more sophisticated model, AACN can predict the severity of the crash and injuries, thereby enabling operators to dispatch the appropriate incident and emergency responders more quickly. As the initial notifications are sent to private service providers, technology must be advanced to coordinate with and share information to alert TMCs.

Direct Text Messaging with Travelers

- Software platforms work concurrently with a TMS (or 911) computer-aided dispatch (CAD) or call-taking software:
  - Software must be purchased.
  - Software consists of a toolbar that “floats” on top of the CAD/call-taking interface.
  - Toolbar remains idle until clicked.
- PSAP/TMC operators use the toolbar to type in an inbound caller’s telephone number to send a text requesting the caller’s permission to access their smartphone.
- Inbound callers click on a link within the text to provide permission to access data from their smartphone, including:
  - GPS coordinates (plotted on the CAD map).
  - Speed.
  - Camera images and video (including live video).
  - Closest estimate building address.
- Smartphone information can be saved and shared with responders to improve incident response.

Speaker's Notes (5/15)

Traveler direct text messaging is a software that consists of a toolbar that floats (lies upon) a TMC's or PSAP's existing CAD or calling-taking software.

The software must be purchased. The toolbar remains visible but idle until the operator clicks on it. It is designed to be unobtrusive until the operator needs it. When the operator receives a call, they can enter the caller's phone number into the toolbar. Once they enter the number, the software sends the caller a text message requesting permission to access their smart phone. The message contains a link that the caller can click on to provide permission. Once the caller provides permission, their location will be instantly displayed on a map. Depending on the vendor and software used, the operator may have access to other types of information from the caller's phone including, GPS coordinates, speed, cameras images/video. The software may also determine the closest building address. Information obtained from the phone can be saved and shared with other emergency responders.

Benefits: Direct Text Messaging with Travelers

- Reduces time to locate incidents.
- Provides images and video quickly with consent from the motorist:
  - Assists in location/direction of travel.
  - Improves the dispatch of required resources.
- Enables caller to click a link via text instead of downloading an app—depending on the specific solution.
- Reduces risks from dropped calls since operators can remain connected with the caller through text messaging.
- Requires minimal time for deployment-with only a 2-mo installation period.
- Leverages traveler-owned smartphone devices, reducing agency need to implement point-based technologies.

Speaker's Notes (6/15)

There are several benefits to traveler direct messaging:

1. First, there is the ability to instantly locate a caller (once permission is granted). The operator will not have to ask the caller for their location or teach them on how to determine their location. These actions, while brief, add time to determine the incident location and initiate a response.
2. Operators may also have access to the caller's phone camera which can provide valuable details about the incident. Based on images and video the operator can quickly access what resources may be needed and collect other details to help incident response. Some solutions also allow for the images and video to be saved and/or shared with others via a simple link. In some instances, images and video from multiple caller's can be saved giving a better overall assessment of the situation.
3. Vendors indicate that their solutions use low amount of data and can be used in areas with poor cellular network connectivity. Even if calls get dropped, some messaging platforms allow the operators to retain the ability to exchange texts with the caller.
4. Lastly, messaging platforms can be procured and implemented within a matter of a few months (maybe even less). This will be less than the time to implement, install, configure, test and operate new field equipment.

Desired Outcomes

Direct text messaging with travelers enhances an agency's TMS capabilities:

- Identifies incidents more quickly.
- Provides medical treatment to injured motorists more quickly.
- Reduces the duration that incidents impact travel and restores normal operations more quickly.
- Reduces operator workload and effort.
- Reduces capital, operations, and maintenance costs associated with new ITS field devices.

Speaker's Notes (7/15)

Some of the desired outcomes of traveler direct text messaging include:

- Helps operators identify incidents more quickly. For example, the time to locate stranded motorists may be reduced from upwards of 20 minutes to just 30 seconds.
- It also help provide medical treatment to injured motorists more quickly. Images and video from callers' smartphones can quickly enhance understanding of the incident and its impacts.
- It can reduce the duration that incidents impact travel, restoring normal operation more quickly.
- It can also reduce operator workload and effort, particularly if the caller isn't aware of his/her location.
- And it can off-set DOT field device costs by leveraging smartphones that motorists already own and operate at the incident scene. This can also reduce on-going operations and maintenance costs that would be associated with new field devices.

Key Issues: Direct Text Messaging with Travelers

- Requires that the caller provide the operator permission to remotely access their phone:
  - Request is generated by the user, so generally not an issue.
  - Images or video captured and saved on DOT servers will require changes to their polices.
- Requires that the TMC accept calls from travelers.
  - Delay in reporting the location information to the TMC can occur when 911 centers relay incident information to TMCs that do not take calls.
- Requires driver action to quickly locate an incident. Not ideal for:
  - Incidents where drivers lose consciousness or are otherwise not able to call or accept permissions.
  - Incidents where vehicles come to rest in areas that are not easily viewed by other motorists.

Speaker's Notes (8/15)

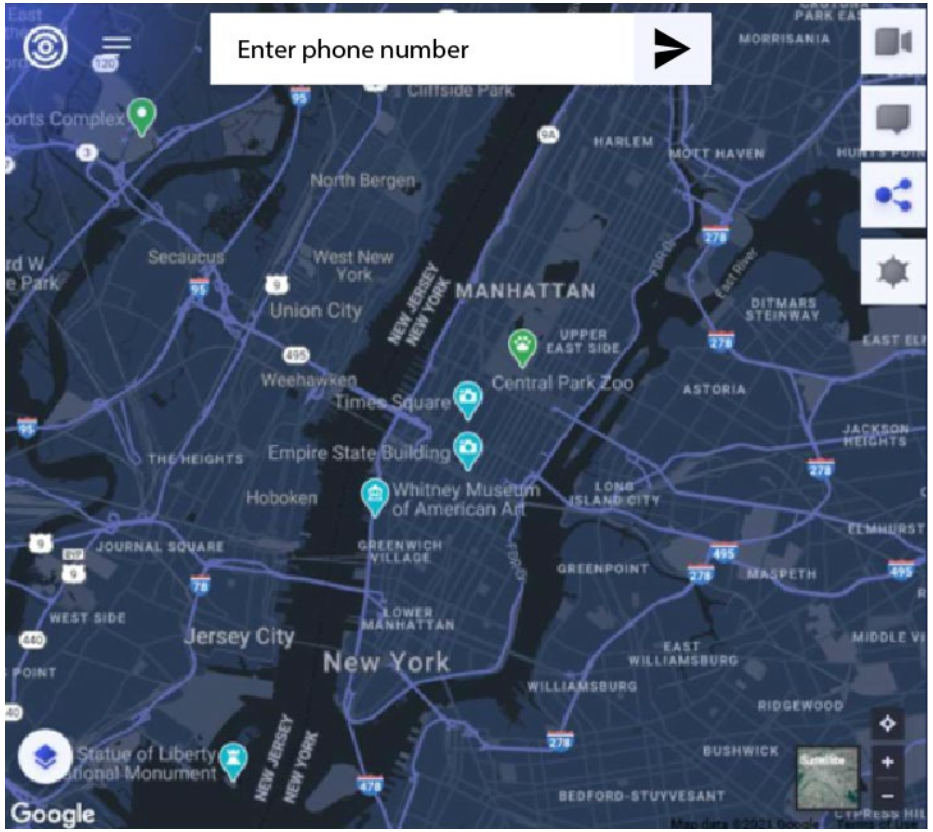
Some of the key issues surrounding traveler direct instant messaging include:

1. The caller's location can be pinpointed leveraging the caller's smartphone. While software may be needed (or features integrated within an app) the cost of these improvements may be much less than the capital, operation and maintenance costs associated with point specific detection technologies. This can effectively shift costs off the public agency by leveraging technologies that already exist at the incident location.
2. In order for traveler direct text messaging to effectively reduce incident detection times, the caller must accept permissions or download an app. On occasions when the caller doesn't accept permissions, the operator will not be able to automatically determine the caller's location. However, research indicates that most callers are willing to give permission when requested.
3. Some of the available solutions allow access to the caller's phone to obtain not only their location, but also to view images and video recorded by their smart device. Since images can contain sensitive information, agencies may need to review their internal data retention policies to determine if they can save this information to their servers and what impacts may result. This includes the ability to share this information with other incident responders.
4. Another issue with some messaging solutions, is that some are predicated on the ability to take public calls. If the TMC does not have a call taking platform, the solution may be more appropriate for 911/PSAP centers who likely do.
5. Lastly, messaging solutions require action on the caller's part. Either to call or download an app. Therefore, it may not be helpful for single vehicle incidents where drivers depart the roadway and may not have the ability to call or access the app.

Current Practices: Direct Text Messaging with Travelers (1 of 2)

Georgia DOT:

- Carbyne software works in parallel with the existing call-handling platform to locate the caller. (1)
- Dispatchers use the caller's phone number to text a link to their cellphone.
- Caller accepts permissions in the text to allow access to phone location, camera images, and video.
- Results of pilot program revealed a 17-min decrease in response times. Also observed reductions in incident clearance times and improved customer service.
- Georgia DOT formally incorporated the solution into its incident management process based on the pilot results.



Original map © Google® Maps™.(2) Carbyne user interface screenshot. © Carbyne.

Speaker's Notes (9/15)

Georgia DOT and the New Jersey Turnpike have unique, but similar text messaging solutions.

Georgia DOT's technology uses an exchange of text messages with a caller to locate their cell phone. When a caller contacts 511, the TMC operator sends a text to caller's cell phone. With one touch, the caller can accept permissions using their phone, which then allows the TMC to accurately determine the phone's location. The operator receives the phone location coordinate data and it is plotted visually on a map within the software interface. TMC operators can use location data to further confirm the incident (e.g., identify direction of travel/lane) if within video coverage area or contact motorist as needed. Once the incident location is adequately identified, operators can dispatch or coordinate with emergency responders as appropriate for the incident. The technology relies upon the motorist agreeing to allow their location to be identified from their smartphone and shared with the TMC.

GDOT observed a 17-minute decrease in response times when they initially piloted the technology. Based on those results, they formally incorporated the solution into their incident management processes.

Current Practices: Direct Text Messaging with Travelers (2 of 2)

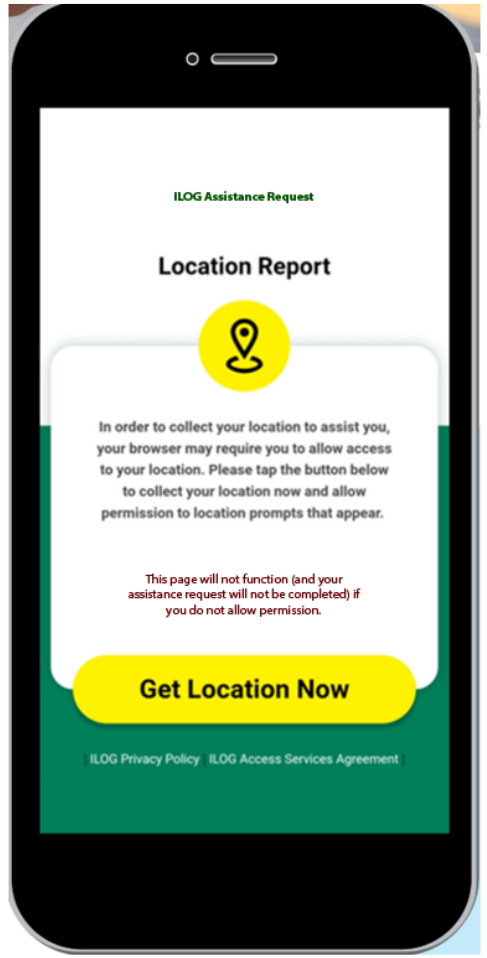
- New Jersey Turnpike Authority:
  - Direct text messaging with travelers implemented as part of SafeTripNJ.[3]
  - Feature included within an app that a motorist downloads.
  - User must open the app to enable the feature for the global positioning system coordinates to be shared.
  - User clicks for assistance, and their location is pinpointed.
  - Vendor offers additional add-on features similar to those GDOT uses.
- The Authority views the service favorably.

Speaker's Notes (10/15)

The New Jersey Turnpike Authority has deployed a feature within their SafeTripNJ app that allows a caller to request assistance. The caller has to open the app to enable it to send their GPS coordinates. Once the caller clicks on the button for roadside assistance, their location in pinpointed on a map that the operator can view. The authority views the app favorably.

Lessons Learned: Direct Text Messaging with Travelers

- Cost-effective solution compared to deploying additional field devices.
- Vendor solutions may exist to improve information/data exchange between 911/PSAP and TMC.
- Proper sensitive information storage will be required.



Speaker's Notes (11/15)

Most of the lessons learned tie back to the benefits of the system. However, there are some additional lessons learned which include:

1) Again, travel direct messaging may be best for centers that have call taking platforms. Some vendors offer multiple software solutions that can bridge the communication gaps between center-to-center communications. For example, a TMC without call taking capabilities may still benefit from partnering with a 911 center where calls flow into the 911 center. These software platforms can allow for improved exchanges of information by automating or streamline processes.
2) While a caller's phone may capture images and video, the vendor's solution is often cloud based and therefore, if images or video are saved or shared using the vendor's solutions these images and video will be stored in the cloud. This may bypass vendor data retention policies.

Available Resources

- TET Coalition (The Eastern Transportation Coalition) Travel Information Web Roundtable (Georgia GDOT presentation, slide 18).(4)
- GDOT AASHTO Project Nomination Form.(5)

Speaker's Notes (12/15)

Here are some resources with links where additional information can be found.

Additional Information on Other TMS Practices

- TMS Portal.(6)
- TMC PFS website.(7)

Speaker's Notes (13/15)

And here are two links to additional information on other TMS practices.

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Speaker's Notes (14/15)

None.

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Speaker's Notes (15/15)

None.