

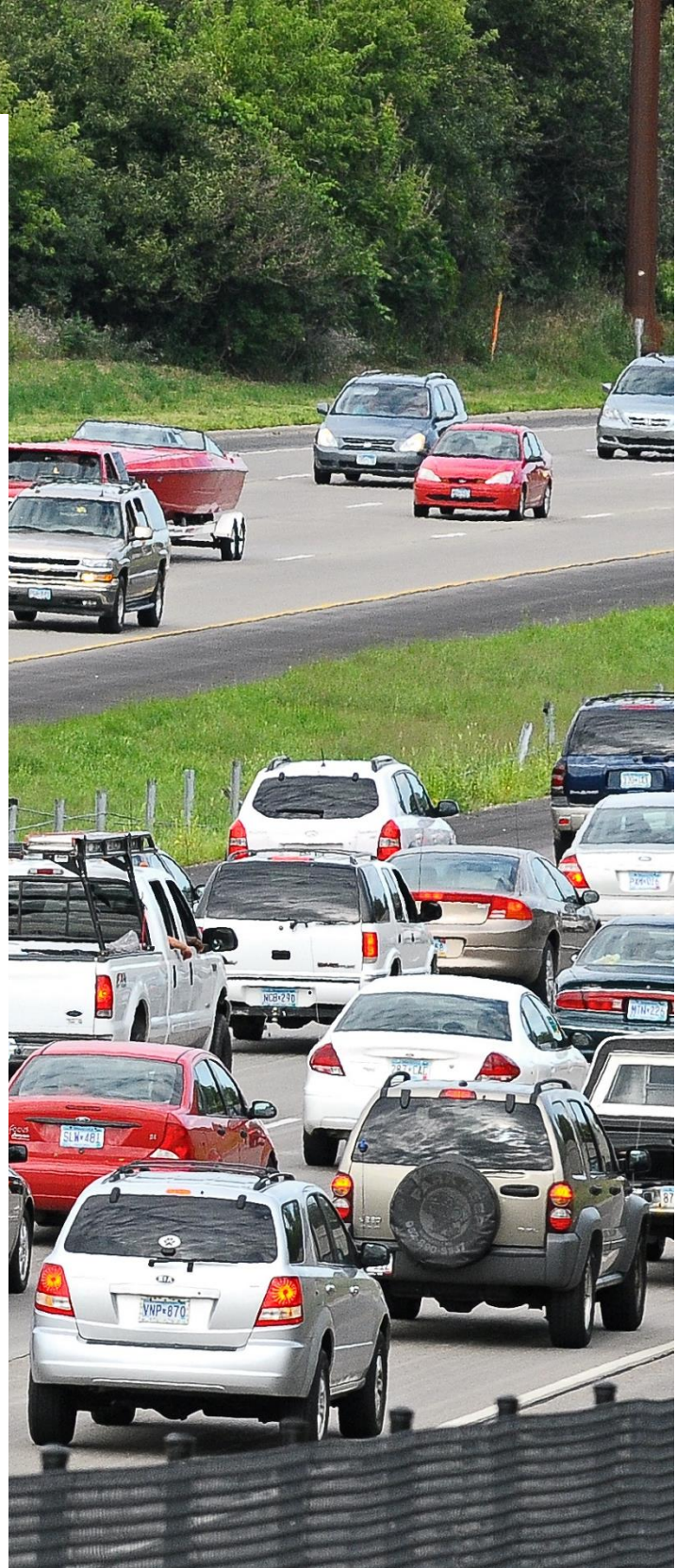
ESTABLISHING A FRAMEWORK FOR COMMUNICATING DEPARTMENT OF TRANSPORTATION (DOT) MAP UPDATES TO MAPPING COMPANIES

FINAL REPORT

January 2022

ENTERPRISE TRANSPORTATION POOLED
FUND STUDY TPF-5(359)

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Technical Report Documentation Page

1. Report No. ENT-2022-2	2. Government Accession No.	3. Recipients Catalog No.	
4. Title and Subtitle Establishing a Framework for Communicating Department of Transportation (DOT) Map Updates to Mapping Companies		5. Report Date January 2022	
		6. Performing Organization Code	
7. Author(s) Tina Roelofs and Linda Preisen		8. Performing Organization Report No.	
9. Performing Organization Name and Address Athey Creek Consultants 2097 County Road D, Suite C-100 Maplewood, MN 55109		10. Project/Task/Work Unit No.	
		11. Contract (C) or Grant (G) No. 2019-0045	
12. Sponsoring Organization Name and Address ENTERPRISE Pooled Fund Study TPF-5(359) Michigan DOT (Administering State) PO Box 30050 Lansing, MI 48909		13. Type of Report and Period Covered FINAL Report	
		14. Sponsoring Agency Code	
15. Supplementary Notes Final Report available at: https://enterprise.prog.org/wp-content/uploads/ENT-DOT-Map-Updates-to-Map-Companies-FR-Jan-2022.pdf			
16. Abstract The ENTERPRISE Pooled Fund Study conducted this project, <i>Establishing a Framework for Communicating Department of Transportation (DOT) Map Updates to Mapping Companies</i> , to develop a consistent communication approach for providing transportation agency map updates to mapping/navigation companies that utilize DOT generated data for various applications such as route guidance. To accomplish the project objective a survey was distributed to DOTs to document the process used by those agencies that have provided map updates to mapping/navigation companies. Interviews were then conducted with select mapping/navigation companies to document their process for receiving map updates from DOTs in order to make updates to their digital maps. A webinar was held with ENTERPRISE members, survey respondents, and mapping/navigation companies to gather additional input on the process. Based on the information gathered from the survey, webinar, and interviews a framework was developed to assist DOTs as they provide map updates to select mapping/navigation companies. The steps for a DOT to submit a map change follows a similar process however the details within the process may vary by each mapping/navigation company, therefore there was a separate framework developed for each company. Utilizing the framework developed in this project is a first step toward consistently submitting map updates to mapping/navigation companies, with future efforts that states may collectively consider for defining and standardizing the process nationally.			
17. Key Words ENTERPRISE, mapping updates, mapping companies		18. Distribution Statement No restrictions	
19. Security Class (this report) Unclassified	20. Security Class (this page) Unclassified	21. No. of Pages 47	22. Price

Acknowledgments

This *Establishing a Framework for Communicating Department of Transportation (DOT) Map Updates to Mapping Companies* report was prepared for the ENTERPRISE Transportation Pooled Fund TPF-5(359) program (<http://enterprise.prog.org/>). The primary purpose of ENTERPRISE is to use the pooled resources of its members from North America and the United States federal government to develop, evaluate, and deploy Intelligent Transportation Systems (ITS).

The cover page image is courtesy of the Minnesota Department of Transportation.

Project Champion

Sinclair Stolle from the Iowa Department of Transportation was the ENTERPRISE Project Champion for this effort. The Project Champion served as the overall lead for the project.

ENTERPRISE Members

The ENTERPRISE Board consists of a representative from each of the following member entities.

- Illinois Department of Transportation
- Iowa Department of Transportation
- Kansas Department of Transportation
- Michigan Department of Transportation
- Minnesota Department of Transportation
- Ontario Ministry of Transportation
- Pennsylvania Department of Transportation
- Texas Department of Transportation
- Wisconsin Department of Transportation

Project Input

ENTERPRISE would like to thank the many State DOTs that provided input to the project through a survey and project webinar. ENTERPRISE would also like to thank HERE Technologies, TomTom, and Waze that provided input through a phone interview and participation in the project webinar.

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1.0 Introduction

Many transportation agencies would like to provide map updates (e.g., road alignment changes, road closures, detour routes) to mapping/navigation companies (e.g., Waze, Google, Apple, TomTom, HERE Technologies), however the process for communicating this information is not consistent between the companies and often unknown to DOTs. The ENTERPRISE Pooled Fund Study conducted this project, *Establishing a Framework for Communicating Department of Transportation (DOT) Map Updates to Mapping Companies*, to develop

a consistent communication approach for providing transportation agency map updates to mapping/navigation companies that utilize DOT-generated data for various applications such as route guidance. Communicating these map updates aims to improve the accuracy of information disseminated through traveler information mechanisms (e.g., mobile applications and in-car navigation systems).

To accomplish the project objective a survey was distributed to DOTs to document the process used by those agencies that have provided map updates to mapping/navigation companies. Interviews were then conducted with select mapping/navigation companies to document their process for receiving map updates from DOTs to update their digital maps. A webinar was held with ENTERPRISE members, survey respondents, and mapping/navigation companies to gather additional input on the process. Based on the information gathered from the survey, webinar, and interviews a framework was developed to assist DOTs as they provide map updates to select mapping/navigation companies. See Figure 1. The steps for a DOT to submit a map change follow a similar process overall, however the details within each process may vary by each mapping/navigation company, therefore a separate framework was developed for each company.

Project Objective

To develop a consistent communication approach to provide DOT map updates to mapping/navigation companies.



Figure 1: Project Approach

This report includes the following sections:

- [2.0 Project Outreach](#) – Summarizes the DOT survey responses, highlights information gathered during interviews with select mapping/navigation companies, and summarizes the project webinar.
- [3.0 Framework for Communicating Map Updates to Mapping/Navigation Companies](#) – Outlines a separate process flow framework for DOTs to provide map updates to select mapping/navigation companies.
- [4.0 Project Highlights](#) – Provides a summary of the project and next steps to consider.
- [Appendix A](#) – DOT Survey Distribution List
- [Appendix B](#) – DOT Survey Results
- [Appendix C](#) – Mapping/Navigation Companies Interview Notes

2.0 Project Outreach

An online survey was distributed to DOTs, interviews were conducted with select mapping/navigation companies, and a project webinar was held to gather information to develop a process flow of information for submitting map updates to mapping/navigation companies.

2.1 DOT Survey

A survey was distributed on November 2, 2020, to a traveler information contact or mapping contact in each of the U.S. states as well as the Ministry of Transportation Ontario. See [Appendix A: DOT Survey Distribution List](#). Throughout the project the distribution list was updated as the project was informed of contact changes.

The purpose of the survey was to identify which transportation agencies have provided map updates to mapping/navigation companies and gather additional details on the process. Survey questions included:

- Which mapping/navigation company have you provided updates to?
- What type of information did you submit to the mapping/navigation company?
- When was the last time you submitted an update?
- What format was the information in that you provided to the mapping/navigation company?
- Approximately how long did it take for the changes to go live?
- Do you have any guidance (e.g., policy, procedure) on providing map updates to a mapping/navigation company?
- Please provide any additional information related to providing updates to mapping/navigation companies.

Twenty-three (23) responses were received. This included twenty-one (21) responses from agencies that have provided map updates to mapping/navigation companies and two (2) responses from agencies that have not provided map updates to mapping/navigation companies. See Figure 2.

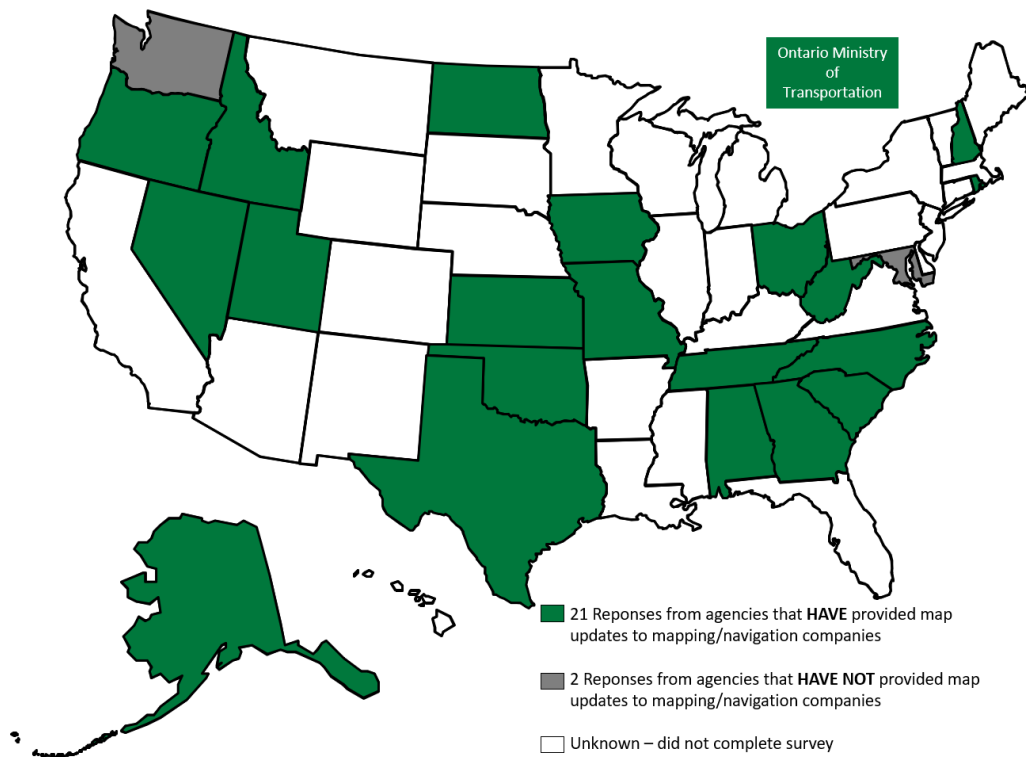


Figure 2: DOT Survey Respondents

The mapping/navigation companies that survey respondents most commonly provided updates to included Waze (21 responses), Google (16 responses), HERE Technologies (9 responses), TomTom (9 responses), and Apple (8 responses). See Table 1.

Table 1 – Survey responses: Which mapping/navigation company have you provided updates to?

Survey Options	Responses
Waze	21 responses
Google	16 responses
HERE Technologies	9 responses
TomTom	9 responses
Apple	8 responses
Garmin	3 responses
Bing	2 responses
MapQuest	1 response
Continental Mapping	0 responses
OnStar	0 responses
Other	<ul style="list-style-type: none"> • 511 event data (1 response) • INRIX (1 response) • StreetLight (1 response) • Metropia (1 response)

The type of information submitted by survey respondents to mapping/navigation companies included road closures (17 responses), road name changes (12 responses), road alignment changes (12 responses), and detour routes (8 responses). Some other types of information included speed limit changes, speed limit reduction for work zones, roadwork events, crashes/incidents, new roads, new highway details, updates on HOV/HOT lanes, road number change, and system change. See Table 2.

Table 2 – Survey responses: What type of information did you submit to the mapping/navigation company?

Survey Options	Responses
Road closure	17 responses
Road alignment change	12 responses
Road name change	12 responses
Detour route	8 responses
Other	<ul style="list-style-type: none"> • API (1 response) • Waze (1 response) • 511 events (1 response) • Crashes/incidents (1 response) • Roadwork events (1 response) • Planned closure/construction (1 response) • New roads (1 response) • New highway details (1 response) • Updates on HOV/HOT lanes (1 response) • Speed limit changes (1 response) • Speed limit reduction for work zones (1 response) • Road number change (1 response) • System change (1 response)

Fourteen (14) respondents noted that they have submitted an update in the last 6 months to a mapping/navigation company. See Table 3. Some agencies noted that updates are continuous through an XML or API feed, while others update annually.

Table 3 – Survey responses: When was the last time you submitted an update?

Survey Options	Responses
0 to 6 months	14 responses
6 to 12 months	2 responses
It's been over a year	0 responses
Other	<ul style="list-style-type: none"> • Continuous (e.g., API) (4 responses) • Annually (1 response)

The format of how the information for a change was provided varied. Twelve (12) respondents indicated the change was made through a manual edit. See Table 4.

Table 4 – Survey responses: What format was the information in that you provided to the mapping/ navigation company?

Options	Responses
Manual edit	12 responses
.shp file	5 responses
Spreadsheet	1 response
Other	<ul style="list-style-type: none"> • Data feed (e.g., XML, API) (3 responses) • KML (2 responses) • Automatic data sharing from traveler information system using their email Distribution List (1 response) • Highway plan sheets (1 response) • Maps (1 response) • Paper map edits on road atlas (1 response) • PDF (2 responses) • Email (2 responses) • Twitter (1 response)

The duration varies for how long it takes for a change to go live once it is provided to the mapping/navigation company. This is dependent on the change requested and varies by company.

There were only a couple DOTs that have some guidance on providing map updates to a mapping/ navigation company.

Agencies that have not provided map updates to mapping/navigation companies that participated in the survey noted that they would like to provide updates if there was an easy way to do it.

[Appendix B -DOT Survey Results](#) includes complete survey results.

2.2 Mapping/Navigation Company Interviews

Based on the mapping/navigation companies identified through the survey and ENTERPRISE members’ input, a brief online search was conducted to identify which companies to contact for an interview.

Select companies were identified for interviews based on the highest number of survey responses indicating which companies DOTs sent map updates to. It was also based on an understanding that some of the companies utilize other companies' base maps. For example, TomTom provides the base map for Bing. Therefore, it was determined to contact TomTom since they are the source map for Bing.

Interviews were conducted with three companies: HERE Technologies, TomTom, and Waze.

A list of questions was developed to guide the interviews. The following bullets highlight information documented during the interviews. A complete summary of notes from each interview is included in [Appendix C](#).

- Authoritative source program
 - HERE Technologies, TomTom, and Waze all provide a mechanism for a DOT to become an authoritative source. A request for a map update from an authoritative source is different from a request from the general public because the mapping/navigation company has validated a contact person as a trusted information source which typically reduces delay in implementing a map change request.
- Type of information
 - Permanent and temporary road change requests from DOTs are accepted by HERE Technologies, TomTom, and Waze. However, the process to submit the request may be different due to the urgency associated with the request. For example, an update for a temporary road change is typically needed more quickly.
- Format of information
 - Manual and automated formats of map changes from a DOT are accepted by the companies interviewed for this project. The required or preferred file format may differ between companies for manual change requests.
- Method for receiving updates
 - An automated format (e.g., API, data feed) is the preferred method for providing map updates. A direct edit is also desired by mapping companies that provide an online map editing tool.
- Challenges
 - There are challenges with mapping/navigation companies obtaining updates. For example, if there is a new road alignment, it is desired to receive the data early enough to have it in place on the map when the new alignment goes live in the field.
 - Mapping companies would also like to have the location reference coordinates (lat/long) rather than mile marker references in order to be more universal.
- DOT APIs and Mapping Contacts
 - HERE Technologies, TomTom, and Waze indicated an interest in a central location of APIs provided by DOTs and a list of mapping and traveler information contacts at each DOT.

2.3 Webinar

On July 20, 2021, a webinar was held to share the project survey results described in Section 2.1 and review a draft of the framework for providing map updates to mapping companies provided in [Section 3.0](#). In addition, presentations were provided by HERE Technologies, TomTom, and Waze. Invitees included ENTERPRISE Board members and survey participants. Approximately 45 individuals attended the webinar from 25 different agencies.

There were a variety of comments received during or following the webinar and edits were incorporated into the framework per comments received. A few key comments gathered included:

- A constant email address for submitting map change requests to the mapping/navigation companies is preferred, for consistency as personnel change. For example, requests sent to a generic email address may be forwarded to an individual, however individual email addresses are subject to change with personnel turnover.

- It is desired to establish a standardized data format that would eliminate the need to provide data in several formats based on the provider. The [Work Zone Data Exchange \(WZDx\)](#) is an example of an effort focused on standardizing a data format. The [WZDx specification](#) enables infrastructure owners and operators to make harmonized work zone data available for third party use.
- A central location to host and maintain documentation (e.g., DOT traveler/mapping contact information list, DOT APIs) is desired by both the DOTs and mapping/navigation companies.
- An understanding of what base map is used by each mapping/navigation provider would be useful. For example, TomTom provides the base map for Bing.

3.0 Framework for Communicating Map Updates to Mapping/Navigation Companies

This section includes a framework for DOTs to use when considering submitting an update to the following mapping/navigation companies. The framework includes a series of process steps, first defined generically in a five-step approach, then expanded and customized for several mapping/navigation companies. Click on the company below to view each customized framework.

- [HERE Technologies](#)
- [TomTom](#)
- [Waze](#)
- [TrafficCast](#)
- [Bing](#)
- [Google](#)
- [Apple](#)
- [MapQuest](#)
- [INRIX](#)

The frameworks for HERE Technologies, TomTom, and Waze were generated using information gathered during interviews. The frameworks for TrafficCast, Bing, Google, Apple, MapQuest, and INRIX were generated using responses to the survey conducted for this project (See Section 2.0) and information gathered through an online review. Apple communicated that they are developing a process using the framework from this project as they build their approach. This approach which will be shared with ENTERPRISE when available.

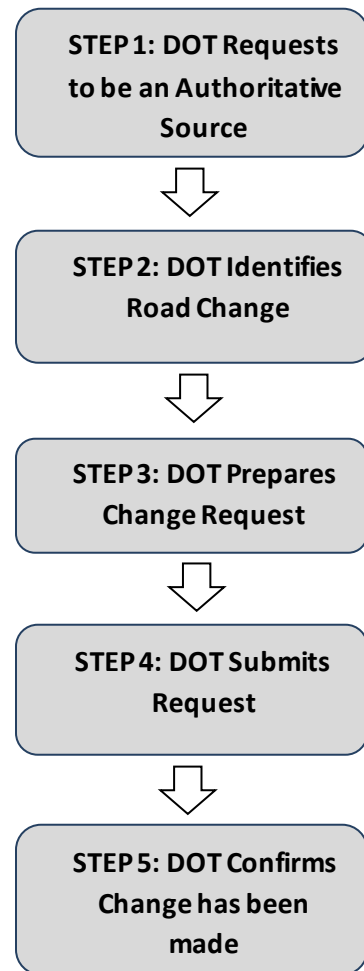


Figure 3: Steps for a DOT to submit updates to a mapping/navigation company

The framework for submitting a map change request for each company typically follows five steps. See Figure 3.

Step 1: DOT Requests to be an Authoritative Source

Transportation agencies are encouraged to become an authoritative source for providing map updates. This reduces the delay in implementing a map change request, as the mapping/navigation companies have validated the agency or an individual user as a trusted information source. An authoritative source is differentiated from updates provided from the general public which may go through additional review

prior to updating. HERE Technologies, TomTom, and Waze all provide a mechanism for becoming an authoritative source. It is unknown if there is process to become an authoritative source from TrafficCast, Bing, Google, Apple, MapQuest, or INRIX.

Step 2: DOT Identifies Map Update

There are different types of road changes that transportation agencies may submit to a mapping/navigation company. These can include temporary or permanent road changes. Temporary road changes may include road closures, posted detour routes, roadwork events, speed limit changes for work zones, lane closures, planned construction, planned closures, and seasonal truck restrictions. Permanent road changes may include road alignment changes, road name or number changes, system changes (e.g., state route to local route), new roads, permanent road closures, updates on HOV/HOT lanes, speed limit changes, truck weight restrictions, and height/clearance restrictions.

The process for submitting a temporary road change may be different than a permanent road change request as a temporary request needs a quicker update response by a mapping/navigation company. Other change requests can include errors (e.g., missing roads, wrong information) on the map.

Step 3: DOT Prepares Change Request

Preparing a change request by a DOT can be a manual or automated process. An automated process utilizes an API or other type of data feed provided by the DOT by which a mapping/navigation company can access information to populate their map with any changes. DOTs may also choose or need to use a manual process to submit a change request. This process can include submitting a file (e.g., .shp) with the change or making a direct edit utilizing an online map editing tool provided by the mapping/navigation company.

Step 4: DOT Submits Request

The process for submitting a map change request varies. The request could be made through email, direct edit in a map editing tool, or through an automated process (e.g., API).

Step 5: DOT Confirms Change has been Made

To confirm a change has been made DOT staff can often view the mapping/navigation company's live map.

The five steps for DOTs to provide a map change request to a mapping/navigation company for HERE Technologies, TomTom, Waze, TrafficCast, Bing, Google, Apple, MapQuest, and INRIX are provided in Figures 4-12. It is important to note that while the overall process follows the five steps noted above, the details for each step may be different for each mapping/navigation company; therefore, a separate flow of information is shown for each company. Table 5 included in the following section (Section 4.0) provides the framework information from Figures 4-12 in an alternate table format.

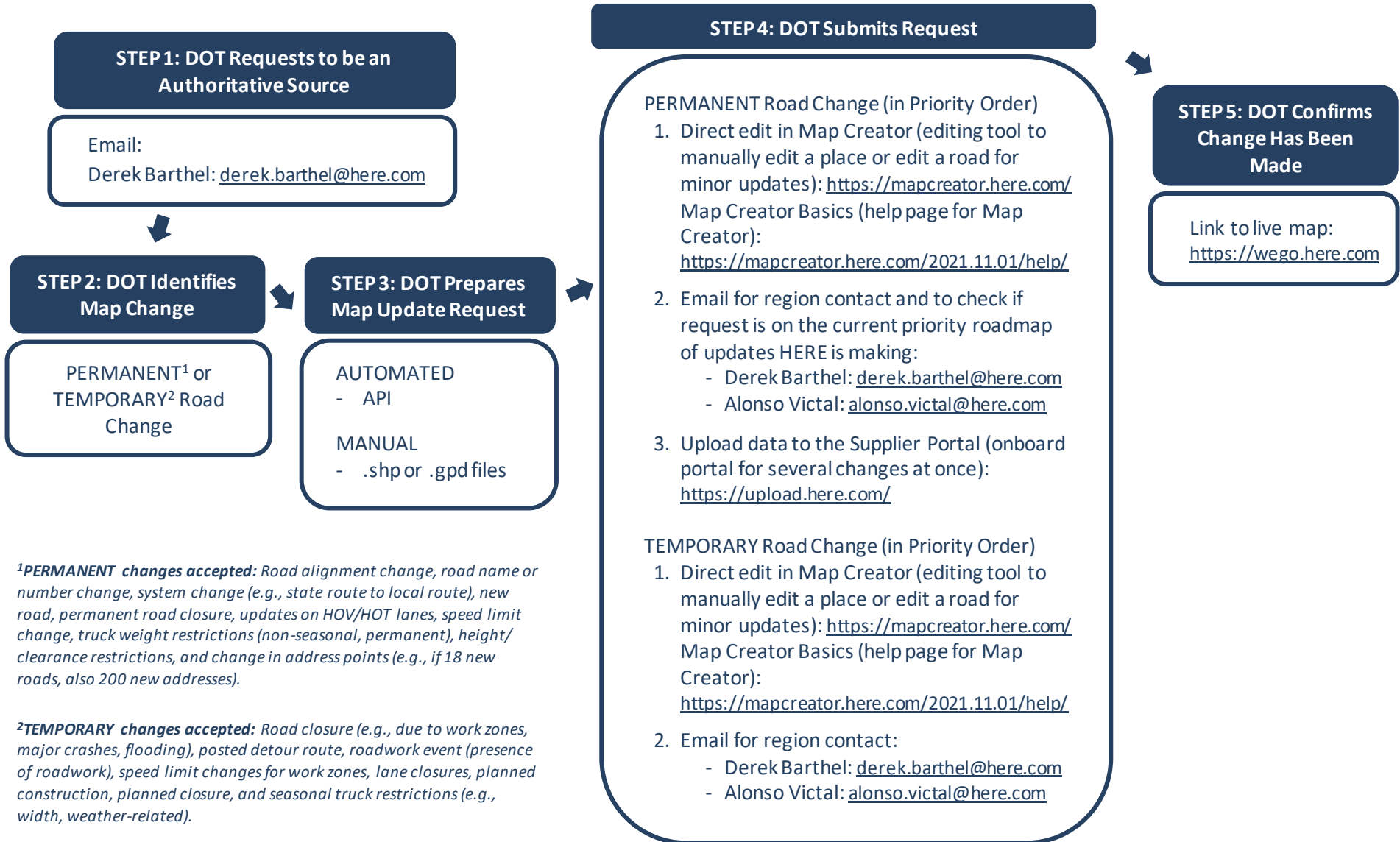


Figure 4: Framework for DOTs to provide map updates to HERE Technologies

TomTom

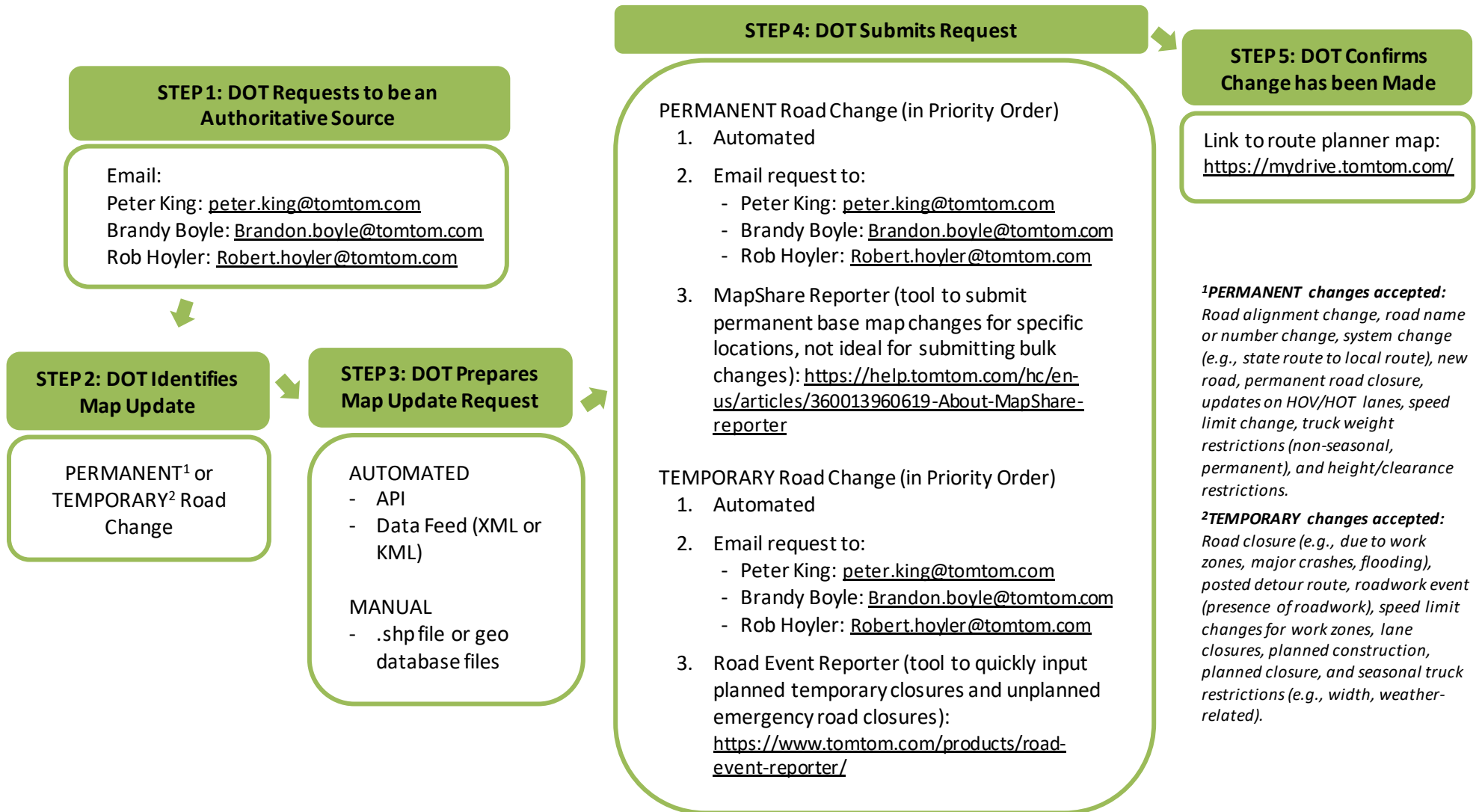


Figure 5: Framework for DOTs to provide map updates to TomTom

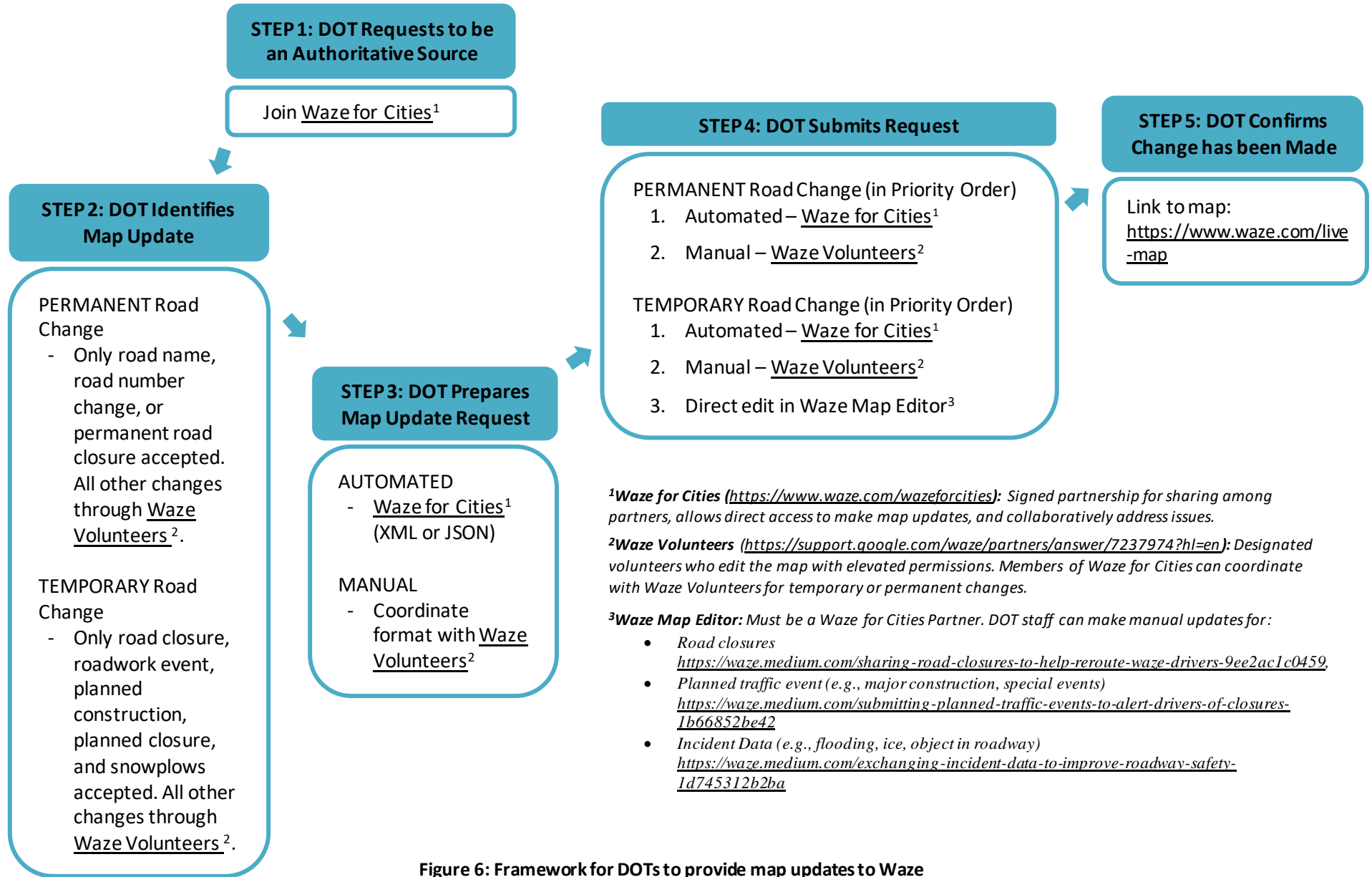


Figure 6: Framework for DOTs to provide map updates to Waze

TrafficCast (acquired by Iteris in 2020)

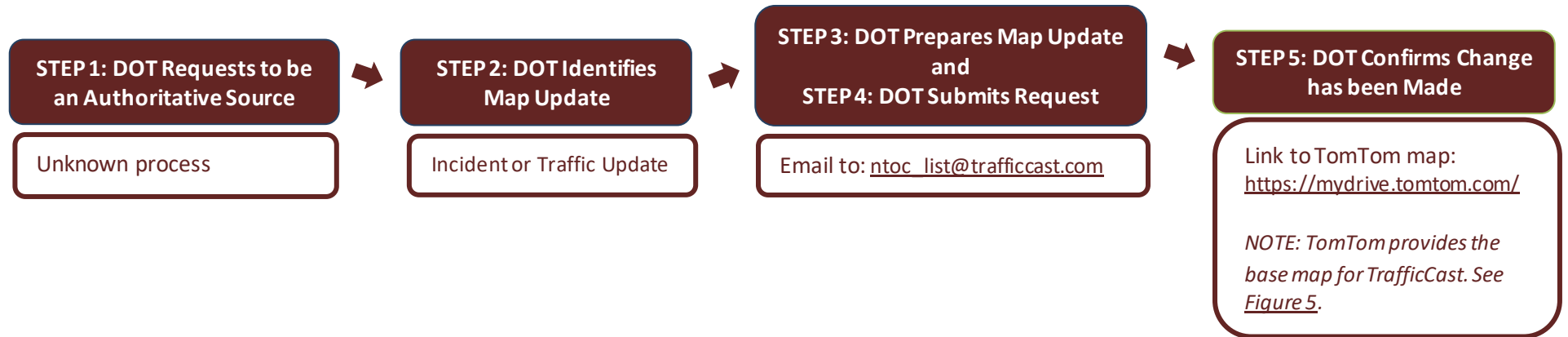


Figure 7: Framework for DOTs to provide map updates to TrafficCast

Bing

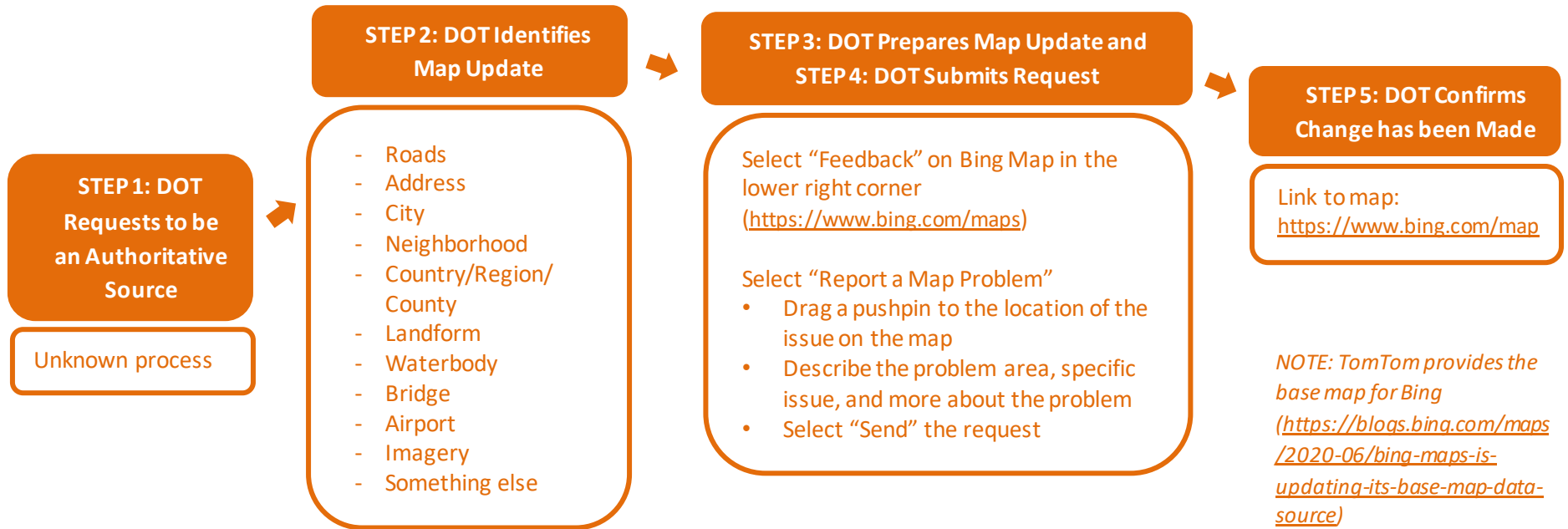


Figure 8: Framework for DOTs to provide map updates to Bing

Google

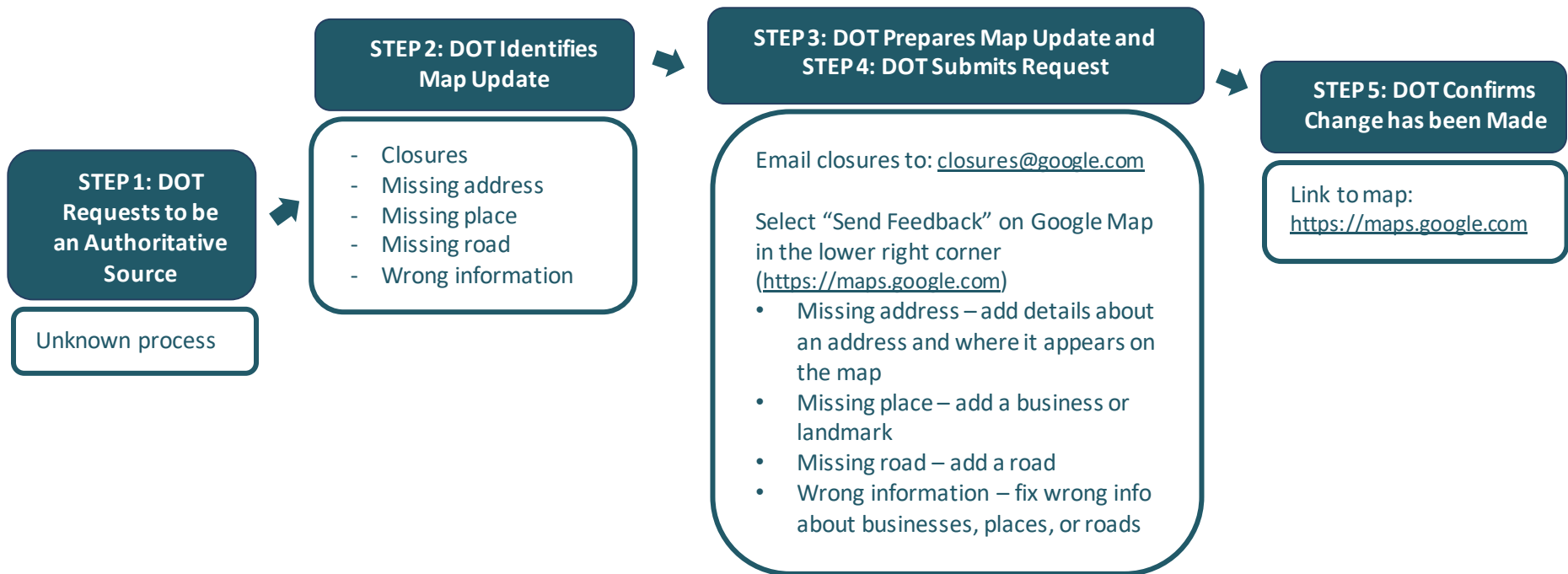


Figure 9: Framework for DOTs to provide map updates to Google

Apple

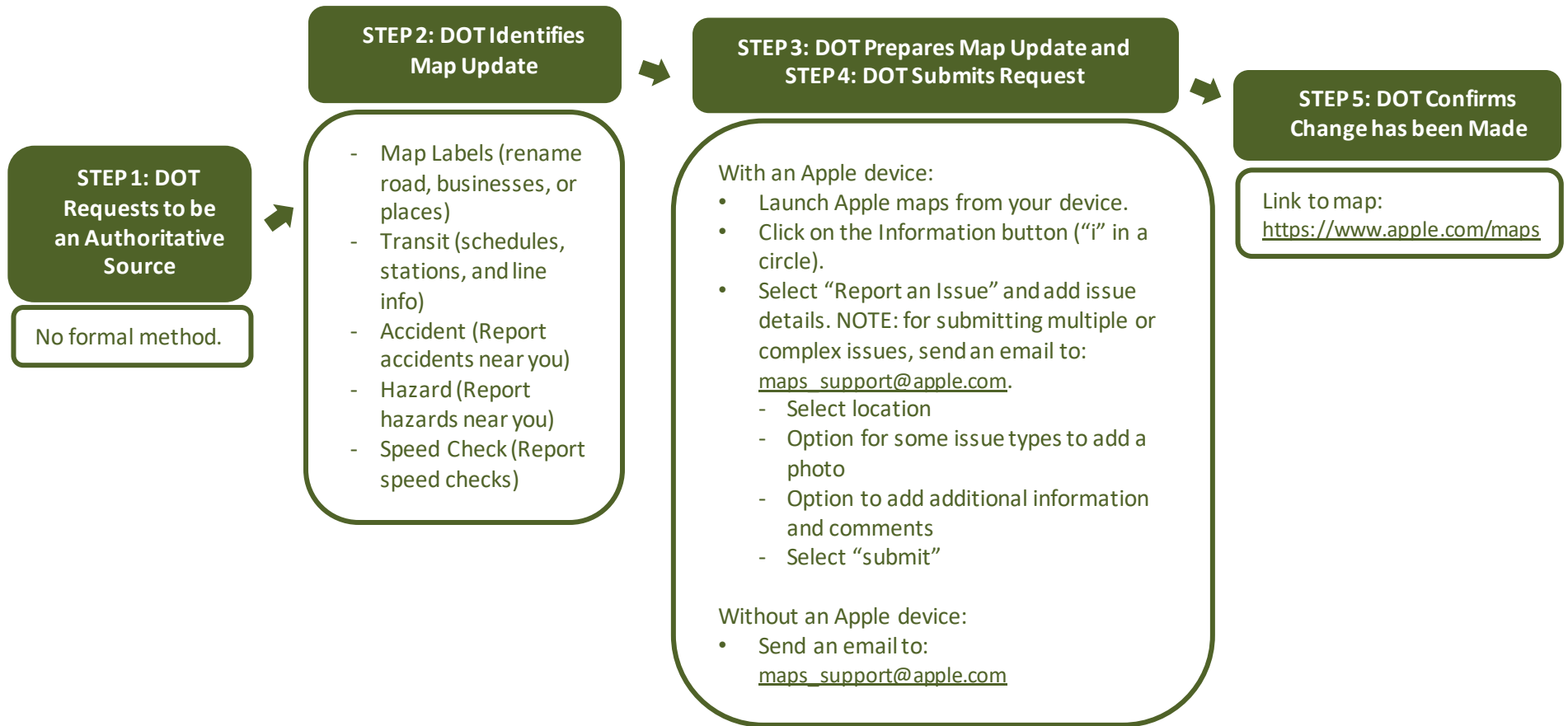


Figure 10: Framework for DOTs to provide map updates to Apple

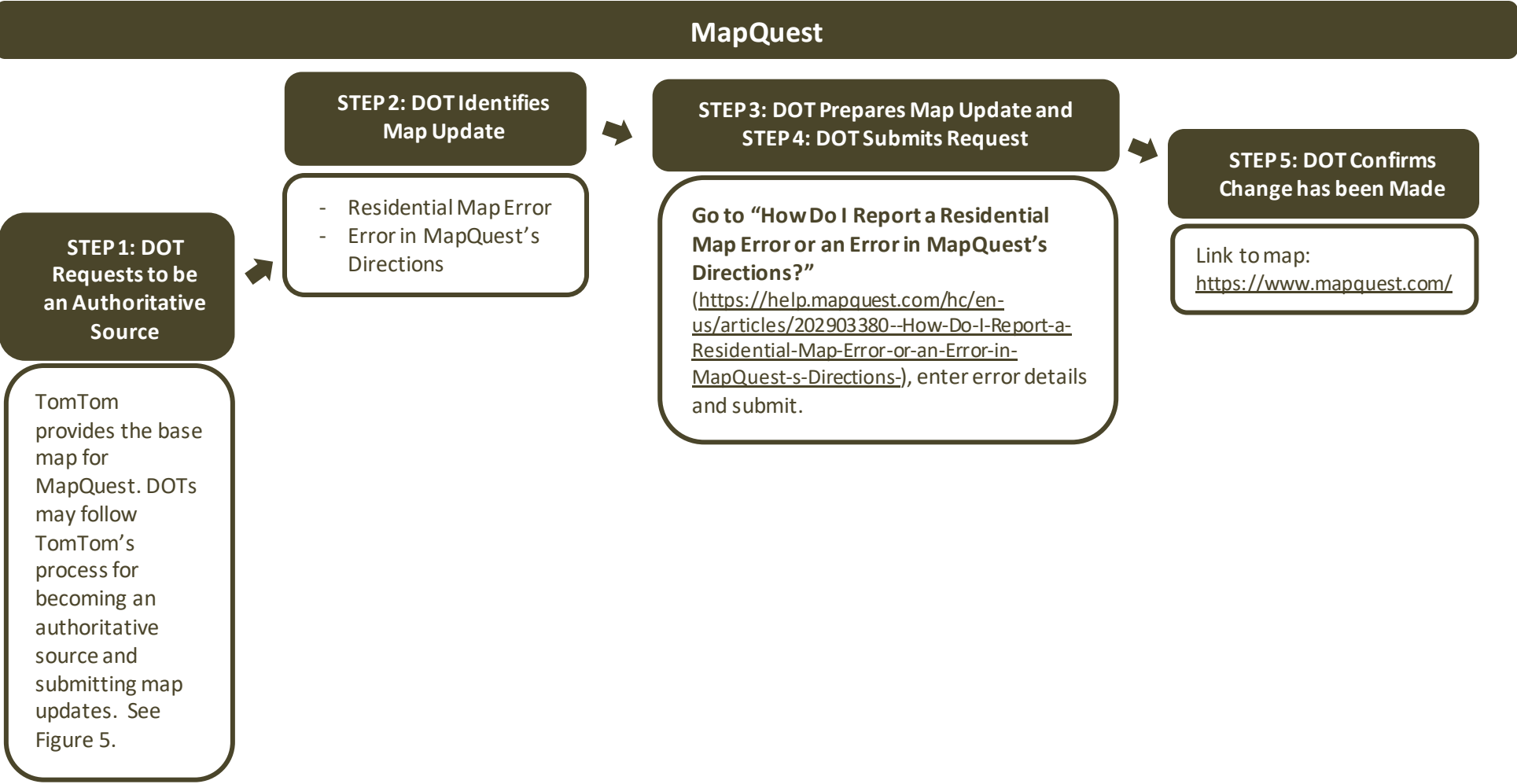


Figure 11: Framework for DOTs to provide map updates to MapQuest

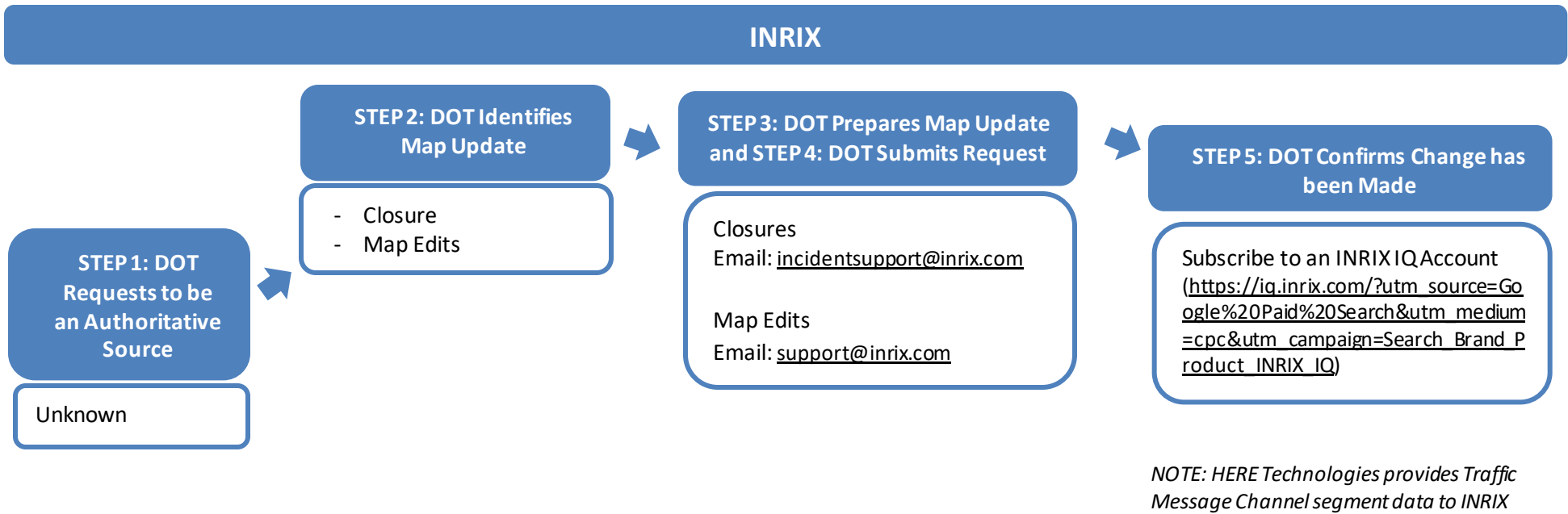


Figure 12: Framework for DOTs to provide map updates to INRIX

NOTE: Table 5 included in the following section (Section 4.0) provides the framework information from Figures 4-12 in an alternate table format.

4.0 Project Highlights

Following are key highlights noted as a consistent communication approach to provide DOT map updates to mapping/navigation companies was developed.

- There are many mapping/navigation companies that DOTs may choose to send map updates to. This project focused on HERE Technologies, TomTom, Waze, TraffiCast, Bing, Google, Apple, MapQuest, and INRIX.
- Due to the outreach efforts of this project, Apple was influenced to start developing a process for DOTs to provide mapping updates.
- The base map used by a mapping/navigation provider is important, as to reduce the process for submitting a map change. For example, TomTom provides the base map for Bing. Therefore, a map change should only need to be submitted to TomTom, not both TomTom and Bing.
- There are typically five steps that DOTs follow when submitting a map change request to a mapping/navigation company. It is important to note that while the overall process for each mapping/navigation company follows the five steps, the details for each step may be different for each mapping/navigation company. Table 5 provides the steps for each mapping/navigation company in a table format.
 - Step 1: DOT Request to be an Authoritative Source – An authoritative source is differentiated from updates provided from the general public which may go through additional review prior to updating.
 - Step 2: DOT Identified Road Change – Road changes can include temporary (e.g., detour route) or permanent (e.g., road alignment change). Other change requests can include errors (e.g., missing road) on the map.
 - Step 3: DOT Prepared Change Request – Change requests can be automated (e.g., API) or manual (e.g., submit a .shp file, direct edit utilizing an online map editing tool).
 - Step 4: DOT Submits Request – Request can be made through email, direct edit in a map editing tool, or through an automated process (e.g., API).
 - Step 5: DOT Confirms Change has been Made – Confirmation of change can be made by viewing the mapping/navigation company live map.
- An automated format (e.g., API, data feed) is the preferred method by mapping/navigation companies for providing map updates. A direct edit is also desired by mapping companies that provide an online map editing tool.
- Mapping/navigation companies desire to receive map change early enough to have in place on the map prior to for example when a new alignment goes live in the field.

An automated format (e.g., API, data feed) is the preferred method by mapping/navigation companies for providing map updates.

- DOTs would prefer a standardized data format and process that would eliminate the need to provide map changes in different formats and to multiple providers.
- One key discussion during the project webinar was considering a central location to house the information developed in this project. It was also suggested to create a list of APIs provided by each DOT to include at this central location. As part of another ENTERPRISE project, [Traveler Information Collaboration](#), the American Association of State Highway and Transportation Officials (AASHTO) has included an activity to create a traveler information community of practice within AASHTO's Committee on Transportation System Operations (CTSO). As this community of practice moves forward the efforts from this project should be considered.

DOTs would prefer a standard format and process that would eliminate the need to provide map changes in different formats and to multiple providers.

Currently, the process for DOTs to submit a map update is different for each mapping/navigation company. However, utilizing the framework developed in this project is a first step toward consistently submitting map updates to mapping/navigation companies, with future efforts that states may collectively consider for defining and standardizing the process nationally. During this project ENTERPRISE was made aware of one effort that has already started on developing a common data format/feed that could be provided by DOTs for mapping companies to use in their own systems. The Eastern Transportation Coalition is identifying standard information fields for states to provide to mapping companies. The common data format would be beneficial for real-time changes.

Table 5 - Summary of Steps 1-5 by Mapping/Navigation Company

Company	Step 1: DOT Requests to be an Authoritative Source	Step 2: DOT Identifies Map Update	Step 3: DOT Prepares Map Update Request	Step 4: DOT Submits Request	Step 5: DOT Confirms Change has been Made
HERE Technologies	<p>Email: Derek Barthel: derek.barthel@here.com</p>	<p><i>PERMANENT changes accepted:</i></p> <ul style="list-style-type: none"> • Road alignment change • Road name or number change • System change (e.g., state route to local route) • New road • Permanent road closure • Updates on HOV/HOT lanes • Speed limit change • Truck weight restrictions (non-seasonal, permanent) • Height/clearance restrictions, • Change in address points (e.g., if 18 new roads, also 200 new addresses) <p><i>TEMPORARY changes accepted:</i></p> <ul style="list-style-type: none"> • Road closure (e.g., due to work zones, major crashes, flooding) • Posted detour route • Roadwork event (presence of roadwork) • Speed limit changes for work zones • Lane closures • Planned construction • Planned closure • Seasonal truck restrictions (e.g., width, weather-related) 	<p><i>AUTOMATED</i></p> <ul style="list-style-type: none"> - API <p><i>MANUAL</i></p> <ul style="list-style-type: none"> - .shp or .gpd files 	<p><i>PERMANENT (in Priority Order)</i></p> <ol style="list-style-type: none"> 1. Direct edit in Map Creator (editing tool to manually edit a place or edit a road for minor updates): https://mapcreator.here.com/ Map Creator Basics (help page for Map Creator): https://mapcreator.here.com/2021.11.01/help/ 2. Email for region contact and to check if request is on the current priority roadmap of updates HERE is making: <ul style="list-style-type: none"> - Derek Barthel: derek.barthel@here.com - Alonso Victal: alonso.victal@here.com 3. Upload data to the Supplier Portal (onboard portal for several changes at once: https://upload.here.com/) <p><i>TEMPORARY (in Priority Order)</i></p> <ol style="list-style-type: none"> 1. Direct edit in Map Creator (editing tool to manually edit a place or edit a road for minor updates): https://mapcreator.here.com/ Map Creator Basics (help page for Map Creator): https://mapcreator.here.com/2021.11.01/help/ 2. Email for region contact: <ul style="list-style-type: none"> - Derek Barthel: derek.barthel@here.com - Alonso Victal: alonso.victal@here.com 	<p>Link to live map: https://wego.here.com</p>

Company	Step 1: DOT Requests to be an Authoritative Source	Step 2: DOT Identifies Map Update	Step 3: DOT Prepares Map Update Request	Step 4: DOT Submits Request	Step 5: DOT Confirms Change has been Made
TomTom	Email: - Peter King: peter.king@tomtom.com - Brandy Boyle: Brandon.boyle@tomtom.com - Rob Hoyler: Robert.hoyler@tomtom.com	<p><i>PERMANENT changes accepted:</i></p> <ul style="list-style-type: none"> • Road alignment change • Road name or number change • System change (e.g., state route to local route) • New road • Permanent road closure • Updates on HOV/HOT lanes • Speed limit change • Truck weight restrictions (non-seasonal, permanent) • Height/clearance restrictions, <p><i>TEMPORARY changes accepted:</i></p> <ul style="list-style-type: none"> • Road closure (e.g., due to work zones, major crashes, flooding) • Posted detour route • Roadwork event (presence of roadwork) • Speed limit changes for work zones • Lane closures • Planned construction • Planned closure • Seasonal truck restrictions (e.g., width, weather-related) 	<p><i>AUTOMATED</i></p> <ul style="list-style-type: none"> - API - Data Feed (XML or KML) <p><i>MANUAL</i></p> <ul style="list-style-type: none"> - .shp or geodatabase files 	<p><i>PERMANENT (in Priority Order)</i></p> <ol style="list-style-type: none"> 1. Automated 2. Email request to <ul style="list-style-type: none"> - Peter King: peter.king@tomtom.com - Brandy Boyle: Brandon.boyle@tomtom.com - Rob Hoyler: Robert.hoyler@tomtom.com 3. MapShare Reporter (tool to submit permanent base map changes for specific locations, not ideal for submitting bulk changes: https://help.tomtom.com/hc/en-us/articles/360013960619-About-MapShare-reporter) <p><i>TEMPORARY (in Priority Order)</i></p> <ol style="list-style-type: none"> 1. Automated 2. Email request to: <ul style="list-style-type: none"> - Peter King: peter.king@tomtom.com - Brandy Boyle: Brandon.boyle@tomtom.com - Rob Hoyler: Robert.hoyler@tomtom.com 3. Road Event Reporter (tool to quickly input planned temporary closures and unplanned emergency road closures): https://www.tomtom.com/products/road-event-reporter/ 	<p>Link to route planner map: https://mydrive.tomtom.com/</p>

Company	Step 1: DOT Requests to be an Authoritative Source	Step 2: DOT Identifies Map Update	Step 3: DOT Prepares Map Update Request	Step 4: DOT Submits Request	Step 5: DOT Confirms Change has been Made
Waze	Join <u>Waze for Cities</u> ¹	<p><i>PERMANENT Changes</i> Only road name, road number change, or permanent road closure accepted. All other changes through <u>Waze Volunteers</u>².</p>	<p>AUTOMATED - <u>Waze for Cities</u>¹ (XML or JSON)</p>	<p><i>PERMANENT (in Priority Order)</i> 1. Automated – <u>Waze for Cities</u>¹ 2. Manual – <u>Waze Volunteers</u>²</p>	<p>Link to map: https://www.waze.com/live-map</p>
		<p><i>TEMPORARY Changes</i> Only road closure, roadwork event, planned construction, planned closure, and snowplows accepted. All other changes through <u>Waze Volunteers</u>².</p>	<p>MANUAL - Coordinate with <u>Waze Volunteers</u>²</p>	<p><i>TEMPORARY (in Priority Order)</i> 1. Automated – <u>Waze for Cities</u>¹ 2. Manual – <u>Waze Volunteers</u>² 3. Direct edit in Waze Map Editor³</p>	
<p>¹Waze for Cities (https://www.waze.com/wazeforcities): Signed partnership for sharing among partners, allows direct access to make map updates, and collaboratively address issues.</p> <p>²Waze Volunteers (https://support.google.com/waze/partners/answer/7237974?hl=en): Designated volunteers who edit the map with elevated permissions. Waze partners can coordinate with Waze volunteers on temporary or permanent changes.</p> <p>³Waze Map Editor: Must be a Waze for Cities Partner. DOT staff can make manual updates for</p> <ul style="list-style-type: none"> Road closures https://waze.medium.com/sharing-road-closures-to-help-reroute-waze-drivers-9ee2ac1c0459. Planned traffic event (e.g., major construction, special events) https://waze.medium.com/submitting-planned-traffic-events-to-alert-drivers-of-closures-1b66852be42 Incident Data (e.g., flooding, ice, object in roadway) https://waze.medium.com/exchanging-incident-data-to-improve-roadway-safety-1d745312b2ba 					
TrafficCast	Unknown	Incident or Traffic Update	Email to: ntoc_list@trafficcast.com		<p>Link to TomTom map: https://mydrive.tomtom.com/</p> <p>NOTE: TomTom provides the base map for TrafficCast.</p>

Company	Step 1: DOT Requests to be an Authoritative Source	Step 2: DOT Identifies Map Update	Step 3: DOT Prepares Map Update Request	Step 4: DOT Submits Request	Step 5: DOT Confirms Change has been Made
Bing	Unknown	<ul style="list-style-type: none"> - Roads - Address - City - Neighborhood - Country/Region/County - Landform - Waterbody - Bridge - Airport - Imagery - Something else 	<p>Select “Feedback” on Bing Map in the lower right corner (https://www.bing.com/maps)</p> <p>Select “Report a Map Problem”</p> <ul style="list-style-type: none"> • Drag a pushpin to the location of the issue on the map • Describe the problem area, specific issue, and more about the problem • Select “Send” the request 		<p>Link to map: https://www.bing.com/maps</p> <p><i>NOTE: TomTom provides the base map for Bing</i></p>
Google	Unknown process	<ul style="list-style-type: none"> - Closures - Missing address - Missing place - Missing road - Wrong information 	<p>Email closures to: closures@google.com</p> <p>Select “Send Feedback” on Google Map in the lower right corner (https://maps.google.com)</p> <ul style="list-style-type: none"> • Missing address – add details about an address and where it appears on the map • Missing place – add a business or landmark • Missing road – add a road • Wrong information – fix wrong info about businesses, places, or roads 		<p>Link to map: https://maps.google.com</p>

Company	Step 1: DOT Requests to be an Authoritative Source	Step 2: DOT Identifies Map Update	Step 3: DOT Prepares Map Update Request	Step 4: DOT Submits Request	Step 5: DOT Confirms Change has been Made
Apple	No formal method	<ul style="list-style-type: none"> - Map Labels (rename road, businesses, or places) - Transit (schedules, stations, and line info) - Accident (Report accidents near you) - Hazard (Report hazards near you) - Speed Check (Report speed checks) 	<p>With an Apple device.</p> <ul style="list-style-type: none"> • Launch Apple maps from your device. • Click on the Information button (“i” in a circle). • Select “Report an Issue” and add issue details. NOTE for submitting multiple or complex issues, send an email to: maps_support@apple.com. <ul style="list-style-type: none"> - Select location - Option for some issue types to add a photo - Option to add additional information and comments - Select “submit” <p>Without an Apple device:</p> <ul style="list-style-type: none"> • Send an email to: maps_support@apple.com 		<p>Link to map: https://www.apple.com/maps</p>
MapQuest	TomTom provides the base map for MapQuest. DOTs may follow TomTom’s process for becoming an authoritative source and submitting map updates.	<ul style="list-style-type: none"> - Residential Map Error - Error in MapQuest’s Directions 		<p>Go to “How Do I Report a Residential Map Error or an Error in MapQuest’s Directions?” (https://help.mapquest.com/hc/en-us/articles/202903380--How-Do-I-Report-a-Residential-Map-Error-or-an-Error-in-MapQuest-s-Directions-), enter error details and submit.</p>	<p>Link to map: https://www.mapquest.com/</p>

Company	Step 1: DOT Requests to be an Authoritative Source	Step 2: DOT Identifies Map Update	Step 3: DOT Prepares Map Update Request	Step 4: DOT Submits Request	Step 5: DOT Confirms Change has been Made
INRIX	Unknown	Closure or Map Edit	Closures Email: incidentsupport@inrix.com Map Edits Email: support@inrix.com		Subscribe to an INRIX IQ Account (https://iq.inrix.com/?utm_source=Google%20Paid%20Search&utm_medium=cpc&utm_campaign=Search_Brand_Product_INRIX_IQ)
	NOTE: HERE Technologies provides Traffic Message Channel segment data to INRIX				

Appendix A: DOT Survey Distribution List

The following traveler information and mapping contact list was created in November 2020 and was updated as the project was informed throughout the duration of the project.

<u>State</u>	<u>Name</u>	<u>Email</u>
Alabama	Chris Hilyer	hilyerc@dot.state.al.us
Alaska	Alicia Stevens	alicia.stevens@alaska.gov
Arizona	Caroline Carpenter	ccarpenter2@azdot.gov
Arkansas	Denise Powell	denise.powell@ardot.gov
California	Kien Le	kien.le@dot.ca.gov
	Saeed Valizadeh	saeed.valizadeh@dot.ca.gov
Colorado	Rob Bruening	rob.bruening@state.co.us
Connecticut	Hal Decker	harold.decker@ct.gov
Delaware	Gene Donaldson	gene.donaldson@state.de.us
Florida	Fred Heery	fred.heery@dot.state.fl.us
Georgia	Matt Glasser	mglasser@dot.ga.gov
Hawaii	Bryan Kimura	bryan.kimura@hawaii.gov
Idaho	Saran Becker	saran.becker@itd.idaho.gov
Illinois	Kevin Price	kevin.price@illinois.gov
Indiana	Matthew Cook	MCook@indot.in.gov
Iowa	Sinclair Stolle	sinclair.stolle@iowadot.us
Kansas	Tom Hein	tom.hein@ks.gov
	Dale Kirmer	dale.kirmer@ks.gov
Kentucky	Randi Feltner	randi.feltner@ky.gov
Louisiana	Rosalinda Deville	rosalinda.deville@la.gov
	Steve Glascock	stephen.glascock@la.gov
Maine	Colby Fortier-Brown	colby.fortier-brown@maine.gov
Maryland	Scott Yinger	syinger@mdot.maryland.gov
	Joey Sagal	jsagal@mdot.maryland.gov
Massachusetts	Lorenzo Parra	Lorenzo.Parra@dot.state.ma.us
Michigan	Joe Gorman	gormanj4@michigan.gov
Minnesota	Todd Fairbanks	todd.fairbanks@state.mn.us
Mississippi	Russell Cooke	rcooke@mdot.ms.gov
Missouri	Alex Wassman	alexander.wassman@modot.mo.gov
Montana	Mike Warren	mwarren@mt.gov
Nebraska	Jessica Sherwood	Jessica.Sherwood@nebraska.gov
Nevada	LaShonn Ford	lford@dot.nv.gov

<u>State</u>	<u>Name</u>	<u>Email</u>
New Hampshire	Susan Klasen	susan.klasen@dot.nh.gov
New Jersey	Susan Catlett	Susan.Catlett@dot.nj.gov
New Mexico	Charles Remkes	charles.remkes@state.nm.us
New York	Paul Krekeler	paul.krekeler@dot.ny.gov
North Carolina	Kelly Wells	kwells@ncdot.gov
North Dakota	Brandon Beise	bbeise@nd.gov
Ohio	John MacAdam	John.MacAdam@dot.ohio.gov
	Mike McNeill	Michael.McNeill@dot.ohio.gov
	William Welch	William.Welch@dot.ohio.gov
Oklahoma	Reina Wilson	rwilson@odot.org
	Marty (James) Farris	jfarris@odot.org
	Alan Stevenson	astevenson@odot.org
Oregon	Brent Atkinson	brent.d.atkinson@odot.state.or.us
Pennsylvania	David Gaffney	davgaffney@pa.gov
Rhode Island	Dan Herstine	daniel.herstine@jacobs.com
South Carolina	Jennifer Rhoades	rhoadesjo@scdot.org
South Dakota	Dave Huft	dave.huft@state.sd.us
Tennessee	Adam Moncivaez	Adam.Moncivaez@tn.gov
	Sarah Berryhill	sarah.berryhill@txdot.gov
	Brent Eastman	Brent.Eastman@txdot.gov
Texas	David Freidenfeld	David.Freidenfeld@txdot.gov
	Lisa Miller	lisamiller@utah.gov
Utah	Lisa Miller	lisamiller@utah.gov
Vermont	Ryan Knapp	ryan.knapp@vermont.gov
Virginia	Scott Cowherd	scott.cowherd@vdot.virginia.gov
Washington	Jeremy Bertrand	BertraJ@wsdot.wa.gov
West Virginia	Jim Lambert	jim.e.lambert@wv.gov
Wisconsin	Stacey Pierce	Stacey.Pierce@dot.wi.gov
Wyoming	Vince Garcia	vince.garcia@wyo.gov
Ontario	Steve Birmingham	steve.birmingham@ontario.ca

Appendix B: DOT Survey Results

Question 1: Has your agency provided map updates (e.g., road change alignment, road closure, detour route) to a mapping/navigation (e.g., Waze, Google, Apple, TomTom) company?

Responding Agencies: 23

- 2 No
- 21 Yes

Responses from Agencies that HAVE NOT provided map updates to a mapping/navigation company

Responding Agencies: 2

- Maryland DOT SHA
- Washington State DOT

Question 2: Please describe the reason for not providing mapping updates (e.g., not sure how to proceed)?

- Different aspects of the mapping update would come from various updates. We do currently input road closures into Waze via the Waze Map Editor from TMC as a Connect Cities Program.
- We've tried, they don't make the changes we need in a timely manner.

Question 3: Do you plan to provide updates in the future?

- We would like to create automated feeds that will send events (crashes, work zones, etc.) from our ATMS and Road Closure Tool directly to Waze, Google, Apple, etc.
- We'd love to, but they don't give us an easy way to do it.

Question 4: Please provide any additional information you would like the project to consider as a consistent approach is developed for providing map updates (e.g., road name/alignment change, road closure, detour route) from transportation agencies to mapping/navigation companies (e.g., Waze, Google, Apple, TomTom).

- There are certain portions of information that would be helpful to incorporate such as which lane is blocked, agency recommended detour route (if available), and expected duration. We also hope this project will result in a unified direction/standard for what schema and format data should be in so it is in the most consumable form to all of these companies. Our data is publicly available already via XML or RSS from our website, however the structure of the data may need to be changed based on the outcomes of this project. It's that direction/insight we are looking for.
- Even if we just had a data spot where we could tell them that the road closure they had listed was accurate or not that would certainly help.

Responses from Agencies that HAVE provided map updates to a mapping/navigation company

Responding Agencies: 21

- Alabama DOT
- Alaska DOT&PF
- Georgia DOT
- Idaho Transportation Department
- Iowa DOT
- Kansas DOT
- Missouri DOT
- Nevada DOT
- New Hampshire DOT – TSMO
- North Carolina DOT
- North Dakota DOT
- Ohio DOT
- Oklahoma DOT
- Ontario Ministry of Transportation
- Oregon DOT
- Rhode Island DOT
- South Carolina DOT
- Tennessee DOT
- Texas DOT
- Utah DOT
- West Virginia DOT

Question 2: Which mapping/navigation company have you provided updates to? Select all that apply.

Options	Responses
Waze	21 responses
Google	16 responses
HERE Technologies	9 responses
TomTom	9 responses
Apple	8 responses
Garmin	3 responses
Bing	2 responses
MapQuest	1 response
Continental Mapping	0 responses
OnStar	0 responses
Other	<ul style="list-style-type: none"> • 511 event data (1 response) • INRIX (1 response) • StreetLight (1 response) • Metropia (1 response)

**Question 3: What type of information did you submit to the mapping/navigation company?
Select all that apply.**

Options	Responses
Road closure	17 responses
Road alignment change	12 responses
Road name change	12 responses
Detour route	8 responses
Other	<ul style="list-style-type: none"> • API (1 response) • Waze (1 response) • 511 events (1 response) • Crashes/incidents (1 response) • Roadwork events (1 response) • Planned closure/construction (1 response) • New roads (1 response) • New highway details (1 response) • Updates on HOV/HOT lanes (1 response) • Speed limit changes (1 response) • Speed limit reduction for work zones (1 response) • Road number change (1 response) • System change (1 response)

Question 4: When was the last time you submitted an update?

Options	Responses
0 to 6 months	14 responses
6 to 12 months	2 responses
It's been over a year	0 responses
Other	<ul style="list-style-type: none"> • Continuous (e.g., API) (4 responses) • Annually (1 response)

Question 5: What format was the information in that you provided to the mapping/navigation company? Select all that apply.

Options	Responses
Manual edit	12 responses
.shp file	5 responses
Spreadsheet	1 response
Other	<ul style="list-style-type: none"> • Data feed (e.g., XML, API) (3 responses) • KML (2 responses) • Automatic data sharing from traveler information system using their email DL (1 response) • Highway plan sheets (1 response) • Maps (1 response) • Paper map edits on road atlas (1 response) • PDF (2 responses) • Email (2 responses) • Twitter (1 response)

Question 6: Approximately how long did it take for the changes to go live?

Options	Responses
1 week	6 responses
Less than 4 hours	5 responses
1 to 3 months	2 responses
3 to 6 months	1 response
Other	<ul style="list-style-type: none"> • Immediate for Waze (1 response) • Overnight for Waze (1 response) • Same day for Google and Waze (1 response) • Varies for Google (1 response) • Within a couple days for Apple (1 response) • Depends (2 responses) • A few months (1 response) • Experiencing difficulties but change is being implemented (1 response)

Question 7: Do you have any guidance (e.g., policy, procedure) on providing map updates to a mapping/navigation company?

Responding Agencies: 18

- No: 15 responses
- Yes: 3 responses
 - North Carolina DOT – Spreadsheet provided
 - Ohio DOT – In the process of developing
 - Tennessee DOT

Question 8: Please provide any additional information related to providing updates to mapping/navigation companies.

- MoDOT created a process to share updates through an SFTP site, but we have not implemented it yet. It includes current mapping and naming, ITS device locations and updates, and current incidents and work zones. It will require the mapping company to set up a process to download and integrate the files.
- I try to go to the source map and then it usually propagates through other users of that map.
- We've done minimal updates, and more to try to learn the procedures. For many items I looked into updating in WAZE, the community had already set the changes up and they were in the process of going live.
- Would love to be able to provide the changes in one format to all the companies instead of adjusting to each and every provider.
- We provide an API that companies can register for. It is updated as our databases are update and pushed out regularly. Any company or entity that has subscribed gets those updates immediately.
- What sharing we are doing is mostly ad hoc and limited. We are looking for a better and more systematic way to share these kinds of updates with mapping companies. We would like to move toward a strategy where we provide a standard API or similar feed to provide comprehensive updates to all the mapping companies, emergency responders, local transportation partners, research institutions, and other partners that could benefit from this. There are a couple challenges we need to address to make that a reality. Internally, we don't have a single source of truth for this information, but it resides in several systems, which we are working on merging. Externally, there is no standard format that we are aware of that we could publish this information in to make it usable by all partners.
- WAZE did require a Highway Commissioner Order for speed limit reduction.

Appendix C: Mapping/Navigation Companies Interview Notes

HERE Technologies – Interview Notes

Interview Date: February 26, 2021

Contact: Derek Barthel, HERE Technologies

Authoritative Source Program

1. Do you have an authoritative source program (automatically approved to receive map updates from a Department of Transportation (DOT))? If yes, please describe the process for a DOT to be approved.

- Map Creator (online map editor) (<https://mapcreator.here.com/>)
 - To be named as an authoritative source, email Derek Barthel (derek.barthel@here.com)
 - Map Creator allows users to make manual updates.
 - Typically used for minor mapping changes.
 - This is the fastest way to get map changes reflected.
- Supplier Portal (<https://upload.here.com/>)
 - Well-suited for lots of changes submitted at once.
 - Submit updates to the Supplier Portal in a Zipped file containing .shp files or .gbd files.
 - Downside of using the Supplier Portal:
 - HERE has a roadmap of areas that are priority for mapping updates.
 - The areas in the roadmap rotate over time, but they typically are only updating the roadmap area at any given time.
 - If someone submits changes outside of scope of the roadmap, the change will not be made right away. The request will be put on a backlog until that geographical area is moved to the current roadmap.
 - Once the priority counties are finished, they move onto the “surplus” data, but they typically have a heavy workload, so they may not get to the request right away.
 - Process to submit several mapping updates at once:
 - Email Derek to see if the area(s) for the map update being requested are on the current roadmap. If yes, Derek will take the changes. If not, Derek will ask you to defer the update or use Map Creator to have the change made faster.

Type of Information

2. What type of information can DOTs submit to your company to request a change? If a change isn't accepted, why?

- All of the temporary and permanent changes listed below are aligned with information HERE is interested in receiving.
- All temporary and permanent changes can be submitted in MapCreator. Only permanent changes can be submitted through the Supplier Portal. However, Map Creator is still the best option.

Temporary Changes	✓
Road closure (e.g., due to work zones, major crashes, flooding)	✓
Posted detour route	✓
Roadwork event (presence of roadwork)	✓
Speed limit changes for work zones	✓
Lane closures	✓
Planned construction	✓
Planned closure	✓
Seasonal truck restrictions (e.g., weight, weather-related)	✓
Other. Please describe.	

Permanent Changes	✓
Road alignment change	✓
Road name or number change	✓
System change (e.g., state route to local route)	✓
New road	✓
Permanent road closure	✓
Updates on HOV/HOT lanes	✓
Speed limit change	✓
Truck weight restrictions (non-seasonal, permanent)	✓
Height/clearance restrictions	✓
Other. Please describe. • Changes in addresses or address points (e.g., if 18 new roads, also 200 new addresses). DOTs may not provide this type of information.	✓

Other Changes	✓
Offensive content	✓
Other. Please describe.	

Format of Information

3. What format does your company accept for map changes from a DOT? Is the format different for temporary or permanent changes?

- Manual: A .shp file is preferred. However a KML file can be converted to .shp file, but it is not desired. Also PDF file can be coded, but it is not preferred.
- Automated: HERE does pull data from automated formats. Derek to check on additional details of automated data used by HERE Technologies.

Manual Format	✓
Highway plan sheet(s)	
Spreadsheet	
Computer-aided drawing file (.shp file)	✓
PDF file	✓
KML file	✓
Other. Please describe.	

Automated Format	✓
API	✓
Data feed (XML feed, KML service)	
Other. Please describe.	

Method for Receiving Updates

4. What is the preferred method for receiving manual updates from DOTs?

- Map Creator (online map editor) is the preferred method overall to consider first.

- There is online training on the website. If a person has a GIS background, it is easier to use.
 - Email submittals should be considered second.
 - If using the Supplier Portal, the user agrees to terms and conditions.
 - If an email request is sent, a second step is needed for HERE staff to send the terms and conditions via email and for the submitter to agree to them. If a user uses the Supplier Portal, the user agrees to the terms and conditions.
 - HERE email contacts:
 - There are 5 contacts, Derek will provide the 5 contacts/email addresses and corresponding states for each region.
 - Map Creator is always the first choice (fastest and most efficient). Derek can be the liaison for Map Creator for first contact. If creating a Map Creator account, contact Derek first to request an authoritative account.

Challenges

5. *What challenges have you experienced with receiving and making map related updates from DOTs?*

- This is not a challenge specific to working with DOTs, but other data suppliers. If the change request is not on HERE's roadmap, they receive complaints about not getting the updates made right away. Need to temper expectations for non-roadmap work. Overall, for updates outside of the roadmap, recommend using Map Creator.

DOT APIs and Mapping Contacts

6. *Would a list or a central location of APIs provided by DOTs be useful to your company?*

- Yes, this would be very useful to HERE Technologies.

7. *Would a central location of each mapping contact at each DOT be useful to your company?*

- Yes, this would be helpful. It could be used to update HERE's contact list.

Other

8. *Please provide any additional information regarding developing a common approach for DOTs to submit updates to your company.*

- The processes do not change often at HERE. For the regional HERE contacts, they sometimes change the states they are responsible for. However, even if a request is sent to wrong contact, they simply forward it to the right one.

TomTom – Interview Notes

Interview Date: March 2, 2021

Contact: Brandy Boyle and Rob Hoyler, TomTom

Authoritative Source Program

1. ***Do you have an authoritative source program (automatically approved to receive map updates from a Department of Transportation (DOT))? If yes, please describe the process for a DOT to be approved.***
 - Map data updates submitted to TomTom are generally handled on a case-by-case basis.
 - Authoritative sources from DOTs can be established and updates can be submitted through:
 - [Road Event Reporter](#) - Web-based application that enables road authorities and operators to report road closures, road works, accidents and many other disruptions affecting traffic.
 - Emails to the TomTom Regional Sourcing Operations Group. A wide variety of data formats are acceptable, and once engagement has been initiated via email a more automated approach can be incorporated, as applicable.
 - Over time, there has been an evolution from “pull” requests by TomTom to scenarios where DOTs are proactively “pushing” updates and notifications to TomTom. TomTom would like this “push” approach to continue.
 - When TomTom acquires data from a DOT, they need to confirm permission from the agency to use the data that has been submitted.
 - This includes any type of data acquired, both for manual submissions and when TomTom accesses data through a DOT data feed such as an API.
 - TomTom will coordinate permissions to use DOT-submitted data initial interaction with the DOT contact(s), through the Road Event Reporter or email contact.
 - For submitting updates to TomTom:
 - State DOTs have a higher priority as a trusted source and authoritative provider compared to the general public. The TomTom team has tried to develop as many contacts as possible at the DOTs to identify those trusted sources/contacts.
 - If a DOT submits an actionable, high priority update request, TomTom will make the update quickly, as long as the source information and permission was provided. For updates requested by DOTs, less steps and approvals are needed in order to get the update made.

Type of Information

2. ***What type of information can DOTs submit to your company to request a change? If a change isn't accepted, why?***
 - Generally, TomTom will accept all types of data. TomTom uses a similar breakdown as the tables below, in terms of temporary changes and permanent changes.

Temporary Changes	
Road closure (e.g., due to work zones, major crashes, flooding)	✓
Posted detour route	✓
Roadwork event (presence of roadwork)	✓
Speed limit changes for work zones	✓
Lane closures	✓
Planned construction	✓
Planned closure	✓
Seasonal truck restrictions (e.g., weight, weather-related)	✓
Other. Please describe.	

Other Changes	
Offensive content	✓
Other. Please describe.	

Permanent Changes	
Road alignment change	✓
Road name or number change	✓
System change (e.g., state route to local route)	✓
New road	✓
Permanent road closure	✓
Updates on HOV/HOT lanes	✓
Speed limit change	✓
Truck weight restrictions (non-seasonal, permanent)	✓
Height/clearance restrictions	✓
Other. Please describe.	

Format of Information

3. What format does your company accept for map changes from a DOT? Is the format different for temporary or permanent changes?

- Automated formats are preferred.
- Multiple formats are accepted.
 - Geodatabase files or .shp files are the typical format submitted.
 - Old CAD files or plan sheets are difficult to translate and will take longer to make the updates.

Manual Format	
Highway plan sheet(s)	✓
Spreadsheet	✓
Computer-aided drawing file (.shp file)	✓
PDF file	✓
KML file	✓
Other. Please describe.	

Automated Format	
API	✓
Data feed (XML feed, KML service)	✓
Other. Please describe.	

Method for Receiving updates

4. What is the preferred method for receiving manual updates from DOTs?

- Submitting Temporary Changes:
 - Data feeds are preferred. Next preferred method is email request, then Road Event Reporter.
 - [Road Event Reporter](#):

- This is an authoritative source program. DOT staff can sign up as a trusted provider for submitting updates.
 - This mechanism can be used by DOT staff to directly input temporary changes (e.g., road closures) and could include changes due to planned events or unplanned events.
 - This is a good mechanism to ensure that timely updates are made to TomTom’s maps.
- Submitting Permanent Changes:
 - [MapShare Reporter](#) – This method is Ok to report changes, but it’s better to work directly with the TomTom contacts so there are checks and balances in place.
 - Permanent changes are submitted via email or MapShare Reporter.
 - There is no tool for making permanent changes directly by data contributors. Contributors can directly indicate updates which are needed, thru MapShare reporter. These will go through a standard validations and ingestion process. Contributions from government sources will have a higher trust level than leads from the general public, allowing for a more streamlined path towards ingestion.
 - TomTom is working on developing a platform that would allow for permanent changes to be submitted and directly edited (“Map Editing Partnership”). They are starting to roll it out and may be interested in piloting the tool with some DOT volunteers.

Overall, TomTom prefers email for requesting updates:

- Send email requests to all three individuals on the TomTom Regional Sourcing Operations Group:
 - Pete King peter.king@tomtom.com (Western 2/3 of U.S.)
 - Brandy Boyle brandon.boyle@tomtom.com (Eastern 1/3 of U.S. and Canada)
 - Rob Hoyler robert.hoyler@tomtom.com (all areas, at high level)
- Initially email all 3 contacts at once, so the group can assess the request to best address it.
- The group works closely together to pass along updates and coordinate per each request and re-route requests internally as needed.

Challenges

5. *What challenges have you experienced with receiving and making map related updates from DOTs?*

- Challenge with obtaining data updates early enough in the process, especially for permanent changes. For example, if there’s a new alignment or new ramp opening, TomTom would like to have this data early enough to have it in place on the map when the change goes “live” in the field. If they are hearing about it the same day or even just a week ahead of time, it will be tough to accommodate the change in a timeframe which aligns with the actual opening date.

- Mapping companies would like to have the location reference coordinates (lat/long), rather than mile marker references. This would be more universal and understandable and would enable them to make the updates in a timelier manner.
- Work Zone Data Exchange (WZDx) - As smart work zones become more prevalent, this data will be very helpful to mapping companies.

DOT APIs and Mapping Contacts

6. *Would a list or a central location of APIs provided by DOTs be useful to your company?*

- Yes, this would be useful.
- Any restrictions associated with APIs would also be helpful to understand.

7. *Would a central location of each mapping contact at each DOT be useful to your company?*

- Yes, very interested in this.
- Alternate contacts or district/region-specific contacts as applicable would also be useful.

Other

8. *Please provide any additional information regarding developing a common approach for DOTs to submit updates to your company.*

- TomTom sees lots of potential benefits from this project.
- TomTom has lots of historical traffic data available that might be of interest to the DOTs and would like to hear more about potential use cases from the perspective of DOTs, to allow for more relevant discussions about the TomTom capabilities.
- TomTom is seeing more participation from governments and it is important to continue to build these relationships to realize overall benefits for the traveling public.
- The [National States Geographic Information Council \(NSGIC\)](#) is working with industry to develop standards. NSGIC a state-led forum for developing, exchanging and endorsing geospatial technology and policy best practices. TomTom is involved in this effort.

Waze – Interview Notes

Interview Date: March 31, 2021

Contact: Noam Reshef, Waze

Authoritative Source Program

1. Do you have an authoritative source program (automatically approved to receive map updates from a Department of Transportation (DOT))? If yes, please describe the process for a DOT to be approved.

- Yes. [Waze for Cities](#) is the authoritative source data sharing program.
- When an agency becomes a signed partner and agrees to the term and conditions, they receive priority as a data contributor.
- Waze does not accept information from the general public about planned changes to map data (e.g., closures, geometric changes). The general public provides real-time updates and there are levels of trust for these Waze contributors.

Type of Information

2. What type of information can DOTs submit to your company to request a change? If a change isn't accepted, why?

- The following table shows the types of mapping changes accepted through Waze for Cities (XML or JSON formats accepted.)

Temporary Changes	✓
Road closure (e.g., due to work zones, major crashes, flooding)	✓
Posted detour route	
Roadwork event (presence of roadwork)	✓
Speed limit changes for work zones	
Lane closures	
Planned construction	✓
Planned closure	✓
Seasonal truck restrictions (e.g., weight, weather-related)	
Other. Please describe. Garbage trucks/snow plows	✓

Permanent Changes	✓
Road alignment change	
Road name or number change	✓
System change (e.g., state route to local route)	
New road	
Permanent road closure	✓
Updates on HOV/HOT lanes	
Speed limit change	
Truck weight restrictions (non-seasonal, permanent)	
Height/clearance restrictions	
Other. Please describe.	

Other Changes	✓
Offensive content	
Other. Please describe.	

- Other edits such as speed limit change, updates on HOV/HOT lanes, road alignment changes, and new roads are submitted by DOTs through Waze volunteers. This is a very dedicated group of community local experts of volunteers who keep the Waze map up

to date. Make the connection through the community of editors, and they will provide contact information for the volunteer editors.

- If your agency is not a signed partner of Waze, reach out to the Waze support team, and they will provide the name/contact information of the appropriate volunteer editor for the request. You can contact the community regardless of signing the contract.
- If your agency is a signed partner of the Waze for Cities program, Waze volunteer information in their area is provided only by request due to privacy issues
- Crisis events:
 - DOT staff can send “crisis event” information such as locations for emergency shelters, for addition to the Waze maps.
 - Send this information to a dedicated email address at Waze: waze-crisis@google.com

Format of Information

3. What format does your company accept for map changes from a DOT? Is the format different for temporary or permanent changes?

Manual Format	✓	Automated Format	✓
Highway plan sheet(s)		API	
Spreadsheet		Data feed (XML feed, KML service)	✓XML and JSON are the only formats accepted
Computer-aided drawing file (.shp file)		Other. Please describe.	
PDF file			
KML file			
Other. Please describe.			

Method for Receiving updates

4. What is the preferred method for receiving manual updates from DOTs?

- Waze would prefer not to receive manual updates. Because there are lots of partners and associated edits on an ongoing basis, prefer to have it automated or edits through Waze volunteers.

Challenges

5. What challenges have you experienced with receiving and making map related updates from DOTs?

- Main challenge is not receiving the correct feeds or closures were not placed correctly.

DOT APIs and Mapping Contacts

6. Would a list or a central location of APIs (data feeds) provided by DOTs be useful to your company?

- Waze accepts feeds from signed partners through Waze for Cities, open source feeds, and feeds Google has through other agreements. It may not be helpful to Waze to have a list of DOT data feeds.

7. Would a central location of each mapping contact at each DOT be useful to your company?

- N/A – see Waze for Cities (signed partners) community below.

Other

8. Please provide any additional information regarding developing a common approach for DOTs to submit updates to your company.

- Waze for Cities (signed partners) Community:
 - Waze treats their signed partners (Waze for Cities) as a community. Many opportunities for the community to share tools and successes.
 - This decreases the need for support, and allows more direct access to make updates, and helps collaboratively address issues.
 - This community is a resource and a benefit of belonging to the program.
 - This group has a webinar once per month, mostly presented by the partners, to learn from their successes and processes.
 - Roughly 20 State DOTs belong to the program currently. The program includes more than 900 partners in the U.S, including states, cities, first responders, police depts, toll road facilities, etc.
- The Waze for Cities website provides several use cases that show example collaborations and processes.