Effectiveness of Disseminating Traveler Information on Travel Time Reliability

Research Results Webinar
January 18, 2017

Battelle Memorial Institute
Texas A&M Transportation Institute
Agenda

• Overview of Travel Time Reliability Concept
• Project Overview & Understanding
• Lexicon Overview & Selection for Study
• Research Project Activities & Results
• Data Analysis
• SWOT Analysis
• Updated Lexicon
• Questions from Participants
Overview of Travel Time Reliability Concept
Reliability Information

- Reliability information describes underlying trip variability and includes other contextual data travelers use to manage on-time performance, such as:
  - Information describing the statistical variation in travel time dependent on departure time choice.
  - Data describing on-time performance and lateness risk by route, mode, and destination.
  - Contextual information to interpret cueing throughout the travel experience allowing travelers to better assess travel time and lateness risk, both pre-trip and en route.
Why Reliability Information?

• The value of real-time information is evident for routine daily trips.
  ▪ You already know what to expect on normal days.
  ▪ You need to know if something is different.

• Reliability information is more nuanced and valuable in commute & non-commute decisions.
  ▪ How much time should I budget? I can’t be late!
  ▪ How bad might it be if I move a little further into the suburbs?

• Reliability information focuses on conveying historic travel time variation.
  ▪ Trip-based typical versus ‘bad’ ranges in travel time by time of day, day of week, weather condition, etc.
  ▪ Based on historic data of travel times along with event data that is route-specific.

Inrix Traffic (2009)
Project Overview and Understanding
Understanding the Problem

- Travel time reliability (TTR) information is a complex concept.
- Usefulness of TTR information may be different than that for real-time information.
- SHRP2 L14 Research
  - Developed a lexicon for disseminating travel time reliability information to stakeholder groups.
  - Consisted of extensive human factors laboratory experiments to develop the lexicon.
  - Need for field tests of reliability terminology.
# SHRP2 L-14 Lexicon

<table>
<thead>
<tr>
<th>Technical Term</th>
<th>95th Percentile</th>
<th>Definition</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best</strong></td>
<td></td>
<td>The point on a travel time frequency distribution at which 95% of the trips made would be at or less than the identified time.</td>
<td>To describe the longest time a driver can expect a trip to take.</td>
</tr>
<tr>
<td><strong>Adequate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Avoid</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Alternate Phrase</th>
<th>Wording Context/Additional Information</th>
<th>Information Technology Platforms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best</td>
<td><strong>Majority of the time</strong></td>
<td>“The majority of the time, your trip will take X minutes or less.”</td>
<td>Web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MAJORITY OF TIME TRIP TO [DESTINATION] X MIN OR LESS</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Graphical representation of the average + 95th percentile.</td>
<td>✓</td>
</tr>
<tr>
<td>Adequate</td>
<td><strong>Most of the time</strong></td>
<td>“Most of the time, your trip will take X minutes or less.”</td>
<td>Web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MOST OF THE TIME TRIP TO [DESTINATION] X MIN OR LESS</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>Travel time for planning</strong></td>
<td>“Travel time for planning is X minutes or less.”</td>
<td>Web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>95th percentile trip time</strong></td>
<td>“The 95th percentile trip time is X minutes or less.” Provide description such as “19 out of 20 days.”</td>
<td>Web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| Avoid          | **Maximum trip time** | Transportation Agency concerns regarding liability and credibility. | N/A | N/A | N/A | N/A | N/A |
|                | **Most common trip time** | | N/A | N/A | N/A | N/A | N/A |
|                | **Worst-case trip time** | | N/A | N/A | N/A | N/A | N/A |

+ Underlined terms to be removed for this platform; other phrase shortening may be possible depending on user preference.
Project Objectives

- Convey TTR information from theory to reality.
- Better understand travelers’ perceived value of TTR information and its current and future marketplace.
- Better understand what network travel and TTR information travelers require.
- Test the SHRP2 L14 TTR lexicon in the field in three locations.
Project Objectives (cont.)

- Develop guidelines based on the study outcomes.
- Identify barriers to communicating TTR information and how to overcome them.
- Outline different traveler uses of TTR information.
- Outline steps agencies need to take to start getting TTR information into travelers’ decision processes.
Lexicon Overview & Selection for Study
Lexicon Overview

- 95th Percentile
- Arrival Time
- Average Travel Time
- Buffer Time
- Departure Time
- Recommended Departure Time
- Reliability
- Recommended Route

Selected for Study
## Assembly Generation

<table>
<thead>
<tr>
<th>Travel Time Reliability Phrase</th>
<th>Assembly A</th>
<th>Assembly B</th>
</tr>
</thead>
<tbody>
<tr>
<td>95th Percentile</td>
<td>Majority of the time</td>
<td>Most of the time</td>
</tr>
<tr>
<td>Arrival Time</td>
<td>Arrive by</td>
<td>What time do you want to get there?</td>
</tr>
<tr>
<td>Average Travel Time</td>
<td>Estimated travel time</td>
<td>Approximate travel time</td>
</tr>
<tr>
<td>Buffer Time</td>
<td>Extra time</td>
<td>Recommended cushion</td>
</tr>
<tr>
<td>Departure Time</td>
<td>Departing at</td>
<td>What time will you start your trip?</td>
</tr>
<tr>
<td>Recommended Departure Time</td>
<td>Recommended departure time</td>
<td>Suggested departure time</td>
</tr>
<tr>
<td>Reliability</td>
<td>Predictable</td>
<td>Reliable</td>
</tr>
</tbody>
</table>

*SHRP2 “best”*  
*SHRP2 “adequate”*
Research Project Activities & Results
Study Dates / Locations

• Texas
  ▪ West Houston
    – April – June 2015
    – July – August 2015
  ▪ North Houston

• Ohio
  ▪ North Columbus
    – April – June 2015
    – October – December 2015
    – February – March 2016

• North Carolina
  ▪ Triangle Region
    – May – July 2015
West Houston Transportation Study

- Corridor bordered by I-10 Katy Freeway and Westpark Tollway.
- Travel time reliability data collected by TxDOT used to populate the study website.
North Houston Transportation Study

• Corridor bordered by I-45 North Freeway and Hardy Toll Road.

• Travel time reliability data collected by TxDOT used to populate the study website.
North Columbus Transportation Study

- Corridor along I-71 from downtown Columbus north to US 36.
- INRIX data secured by ODOT used to populate the study website.
Triangle Transportation Study

• Corridor along I-40 between Raleigh and Durham that includes the Research Triangle Park.

• HERE data obtained by Durham-Chapel Hill-Carrboro MPO used to populate the study website.
Data Needs

• TTR calculations based on historical traffic datasets.

• Datasets benefit from:
  - Average segment-based travel time data with origins/destinations corresponding to the majority of entry/exit points along each corridor by direction.
  - The 95th percentile travel time to determine the worst-case travel times for each segment and aggregation period.
  - Travel time data aggregated by day of week in at least hourly intervals for a 6-month period or more.
  - The most recent historical dataset possible to reflect current traffic conditions as accurately as possible.
Participant Tasks

Baseline Survey

Phase 1
Without travel time reliability information channel.
- GPS Information
- Travel Diaries

Phase 2
With travel time reliability information channel.
- GPS information
- Travel diaries
- Pre-trip planning activity

Exit Interview
Participant Tasks

• Web-based survey.

• Minimum criteria for participation / demographics.

• Pre-study travel habits.
  ▪ Usual routes, modes, trip times, and variability.
  ▪ Alternative commute routes and modes.
  ▪ Non-commute travel to familiar/unfamiliar destinations.

• Pre-study information-use habits.
  ▪ Familiarity and comfort with travel information.
  ▪ Channels, impacts.
Participant Tasks

- Install mobile application on smartphone.
- Features.
  - Tracks participants trips.
  - Allows participants to create travel diary entries (end-of-trip survey).
- Diary entries.
  - Trip mode and purpose.
  - Resources used.
  - Impact of information obtained.

Phase 1

Without travel time reliability information channel.
- GPS Information
- Travel Diaries
Mobile Application Login Screen

Email Address Entry

Participant Code

Login Button
Mobile Application Home Screen

Start Trip

Travel Diary Entries
2015-03-23 04:04
2015-03-24 01:13
2015-03-24 01:15
2015-03-24 01:18
2015-03-25 03:40
2015-03-26 09:32
2015-03-26 09:43

Refresh

Stop Trip

Travel Diary Entries
2015-03-23 04:04
2015-03-24 01:13
2015-03-24 01:15
2015-03-24 01:18
2015-03-25 03:40
2015-03-26 09:32
2015-03-26 09:43

Refresh
Mobile App Travel Diary Screen

1. What mode or modes did you use for this trip? (Select all that apply)
   - Personal vehicle (drove alone)
   - Carpool / Vanpool (drove or rode with others)
   - Public Transit (bus/light rail)
   - Other (e.g., bicycled/walked)

2. Did the nature of this trip necessitate arrival at a specific time?
   - Yes
   - No

Next
Participant Tasks

• Use one of three pre-assigned information channels.
  - Dedicated website.
  - Smartphone application.
  - 511 phone number.

• Use mobile app to log trips via travel diary.

• Diary entries.
  - Trip mode and purpose.
  - Resources used.
  - Impact of information obtained.

Phase 2
With travel time reliability information channel.
- GPS information
- Travel diaries
- Pre-trip planning activity
Dedicated Website

Assembly A

Plan a Predictable Trip

Facility
IH-10 Katy

Direction
Inbound

Where are you starting from?
Pin Oak

Where are you going?
IH-610 West Loop

Base Output On
○ Departure Time  □ Arrival Time

Departing at
7:00 AM  □ on 3/30/2015

Get Travel Time Info

IH-10 Katy Eastbound from Pin Oak to IH-610 West Loop (21.70 miles)

Selected Departure Time: 7:00 AM

Your estimated travel time will be 50 minutes.

Plan 37 minutes of extra time if you are departing at 7:00 AM.

The majority of the time, your trip will take 1 hour and 27 minutes or less.

You will arrive by 8:27 AM at your destination.

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Assembly B

Plan a Reliable Trip

Facility
IH-10 Katy

Direction
Inbound

Where are you starting from?
Pin Oak

Where are you going?
IH-610 West Loop

Base Output On
○ Departure Time  □ Arrival Time

What time will you start your trip?
7:00 AM  □ on 3/30/2015

Get Travel Time Info

IH-10 Katy Eastbound from Pin Oak to IH-610 West Loop (21.70 miles)

Selected Departure Time: 7:00 AM

Your approximate travel time will be 50 minutes.

Use a recommended cushion of 37 minutes if you start your trip at 7:00 AM.

Most of the time, your trip will take 1 hour and 27 minutes or less.

You will get there by 8:27 AM.

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Mobile Application Home Screen

- **Region**
- **Trip Start Button**
- **Data Refresh Button**
- **Travel Time Info Button**
- **Travel Diary Entries**
Mobile Application Travel Time Screen

Plan a Predictable Trip

Facility
IH-10 Katy

Direction
Inbound

Where are you starting from?
Brazos River

Where are you going?
FM-1489

Base Output On
Departure Time

Departing at
7:00 AM

on
3/7/2015

Travel time entry

Get Travel Time Info

IH-10 Katy Eastbound from Brazos River to FM-1489 (4.20 miles)

Selected Departure Time: 7:00 AM
- You will arrive by 7:06 AM at your destination.
- The majority of the time, your trip will take 6 minutes or less.
- Departing at 7:00 AM, your estimated travel time will be 3 minutes.
- Plan 2 minutes of extra time if you are departing at 7:00 AM.

Scroll to see travel time info

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Mobile Application In Trip

- Travel Time Info
- Stop Trip

Trip Stop Button

Travel Diary Entries:
- 2015-02-16 12:20
- 2015-02-16 09:35
- 2015-03-06 08:25

Refresh
Mobile Application Travel Diary Screen

1. What mode or modes did you use for this trip? (Select all that apply)
   - Personal vehicle (drove alone)
   - Carpool / Vanpool (drove or rode with others)
   - Public Transit (bus/light rail)
   - Other (e.g., bicycled/walked)

Next

2. Did the nature of this trip necessitate arrival at a specific time?
   - Yes
   - No

Next

7. How did you change your planned trip (select all that apply)?
   - I left at a different time
   - I took a different route
   - I changed my mode of travel

Done
5-1-1 Application

twilio
Participant Tasks

• Web-based survey.
• Use of TTR information and kinds of trips.
• Impacts of TTR on travel behavior and trip experience.
• Satisfaction with information.
• Factors that might make information more useful.