Evaluation of the Minnesota Road Fee Test: Preliminary Data

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Overview of Presentation

1. Background on Minnesota Road Fee Test
2. Evaluation Approach
3. Wave A Data Collection
4. Wave A Preliminary Results
Background
Minnesota Road Fee Test

• Test of integrated safety and mileage based user fee applications
  – Mileage based user fee
  – In-vehicle safety signing
  – Intersection Collision Avoidance (CICAS)
  – Travel time applications

• Real-world deployment
  – 500 participants

• Simulated revenue operations

• Test is on-going
  – Across 14 months
  – 3 “waves” to control for seasonal variations; within each wave:
    • 2 month Baseline Period
    • 4 month Testing Period
Minnesota Road Fee Test: Role of the Evaluator

- SAIC role
  - Develop the experimental design and implementation framework
  - Manage participant feedback
  - Conduct evaluation and develop recommendations / lessons learned
Evaluation Approach – Data Sources

- **Driving Data**
  - Quantitative
  - Baseline vs. Test Driving Behavior

- **Surveys**
  - Quantitative
  - 1 Baseline Survey vs. 2 Test Surveys

- **Focus Groups**
  - Qualitative
  - 2 Focus Groups per Wave

- **Interviews**
  - Qualitative
  - Individual Participant Interviews

5/24/2012
Data Collection

Driving Data
- **MBUF** – number of miles driven by geography
- **Trip data** – non-associated data including second-by-second speed, heading, location, etc.
- **Signage data** – trip data at signage locations
- **Service requests**

Evaluation Data
- Surveys
- Focus groups
- Interviews
- Diaries
- Participant feedback
WAVE A – PRELIMINARY RESULTS
Wave A Data Collection: By the Numbers

A Data Rich Test – Wave A completed March 2012

- 137 participants
- 37,180,193 **trip data points**
- 34,314 **trips** through signage zones
- 426 online **survey** responses
  - Baseline (n=146)
  - Novice (n=141)
  - Experienced (n=139)
- 19 **focus group** participants
- 127 participant **telephone interviews**
- 107 participant **diaries** received
Preliminary Results (Wave A only)

1. Vehicle Trip Data Collection
2. In-Vehicle Safety Signage
3. Mileage Based User Fees
VEHICLE TRIP DATA COLLECTION
Example of Trip Data Collection

432,014 data points collected across 381 total trips for a single participant.

Key Consideration – The system is designed so that this data is protected and cannot be associated with an individual without their permission.
Potential for Enhanced Travel Time Estimation

Even a basic application shows the opportunities for enhanced travel time estimation.
Driver Perceptions of a Service Providing Travel Time Estimation

- Drivers did **not** experience travel time data
- Focus group findings
  - Potential for better allocations of road maintenance funding
  - Real-time travel information not perceived as immediately valuable but drivers would be open to trying it
IN-VEHICLE SAFETY SIGNAGE
Participant Experience – What does the participant see?

- Speed Limit 65
- Speed Limit 20 when flashing
- Road Work Ahead
- Curve Ahead
Wave A Sample Size: One School Signage Zone

- 606 trips through signage zone during test
- 85 different participants traveled through zone (62% of participants)
Participant Experience: In-Vehicle Safety Signage

- 1 Participant’s Experience
  - 76 trips during the test period involved a signage zone (20 percent of total trips)
  - Experienced 12 different signage zones

<table>
<thead>
<tr>
<th>Signage Zone Type</th>
<th>Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>47 (62%)</td>
</tr>
<tr>
<td>School</td>
<td>27 (36%)</td>
</tr>
<tr>
<td>Curve</td>
<td>2 (3%)</td>
</tr>
</tbody>
</table>
Example of Speed Profile Data for One Trip Through a Signage Zone

**Signage Zone 128**  
Speed Zone  
Speed Limit = 40 mph

US 12 - EB  
near Delano, MN

**Speed Profile - Signage Zone ID 128**

- **Speed = 63 mph**  
  Signage Zone Entered;  
  Signage Displayed;  
  No Audible Alert (44mph)

- **40 mph speed limit**

- **Speed = 34 mph**  
  Signage Zone Exited;  
  Speed = 34 mph
### Driver Perceptions of In-Vehicle Speed Safety Signage

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs Easy to Read</td>
<td>100%</td>
<td>99%</td>
</tr>
<tr>
<td>“Beeps” Easy to Hear</td>
<td>99%</td>
<td>96%</td>
</tr>
<tr>
<td>Signs Easy to Understand</td>
<td>100%</td>
<td>98%</td>
</tr>
<tr>
<td>Understand Why “Beeps” Occur</td>
<td>99%</td>
<td>96%</td>
</tr>
</tbody>
</table>

“Novice” indicate responses after 2-3 weeks of usage  
“Experienced” indicate responses after 3 months of usage

Percentages indicate responses of “Agree” or “Somewhat Agree” excluding those who responded “Not Sure”
## Driver Perceptions of In-Vehicle Speed Safety Signage (cont’d)

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs are Useful</td>
<td>72%</td>
<td>73%</td>
</tr>
<tr>
<td>“Beeps” are Useful</td>
<td>65%</td>
<td>61%</td>
</tr>
<tr>
<td>Prefer to Disable Signs</td>
<td>45%</td>
<td>47%</td>
</tr>
<tr>
<td>Prefer to Disable “Beeps”</td>
<td>52%</td>
<td>59%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Novice</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs Distracting</td>
<td>52%</td>
<td>57%</td>
</tr>
<tr>
<td>“Beeps” Distracting</td>
<td>73%</td>
<td>63%</td>
</tr>
</tbody>
</table>

Percentages indicate responses of “Agree” or “Somewhat Agree” excluding those who responded “Not Sure”
Driver Perceptions of In-Vehicle Speed Safety Signage (cont’d)

• “There is a need for this” (but I don’t need it)
  – Valuable to young drivers
  – Curve warnings could be helpful on curves at night
  – Could be useful in unfamiliar areas

• Zones should be “smart” (e.g., know when school is not in session)
  – Seen as a failure in accuracy

• Feature should be optional
MILEAGE BASED USER FEES
Wave A Mileage and Fee Summary

**Average # Days:** 120  
**Total # Trips:** 83,098  
**Avg. # Trips/Participant:** 589

**Device Miles Collected by Fee Pricing Category**

- **North America Miles ($0.00 fee):** 3 (<1%)  
- **United States Miles ($0.00 fee):** 9,574 (2%)  
- **Minnesota Miles ($0.01 fee):** $4,658.27 (88%)  
- **Twin Cities-Peak Miles ($0.03 fee):** $29.87 (12%)  

**Total Miles Driven**

- **Device Miles:** 496,400 (75%)  
- **Unaccounted Miles:** 167,672 (21%)  

**Total Fees:** $10,318.30  
**Avg. Fee/Participant:** $73.18  
(November 2011 – March 2012)

**Average Fee/Mile:** $0.0148

**Target Fee/Mile:** $0.0130
(*what the average Minnesota driver pays in the State gas tax*)
<table>
<thead>
<tr>
<th>Survey Topic</th>
<th>Baseline</th>
<th>Novice</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>I understand the reasons for considering replacing the gas tax with a mileage fee.</td>
<td>7%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>I understand how mileage fee revenue would be used.</td>
<td>15%</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Mileage fee revenue would benefit me as a driver.</td>
<td>24%</td>
<td>28%</td>
<td>20%</td>
</tr>
<tr>
<td>A mileage fee would be assessed in a way that is fair to all drivers.</td>
<td>27%</td>
<td>17%</td>
<td>11%</td>
</tr>
<tr>
<td>Mileage would be accurately counted and used to calculate fees.</td>
<td>36%</td>
<td>13%</td>
<td>14%</td>
</tr>
<tr>
<td>It would be easy to understand how a mileage fee is calculated.</td>
<td>34%</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>It would be easy to pay invoices for mileage fees.</td>
<td>45%</td>
<td>5%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Percentages indicate responses of “Not Sure”
# Opinions of MBUF Improved Throughout Test

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<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>I understand the reasons for considering replacing the gas tax with a mileage fee.</td>
<td>94%</td>
<td>92%</td>
<td>90%</td>
</tr>
<tr>
<td>I understand how mileage fee revenue would be used.</td>
<td>78%</td>
<td>84%</td>
<td>85%</td>
</tr>
<tr>
<td>Mileage fee revenue would benefit me as a driver.</td>
<td>70%</td>
<td>76%</td>
<td>70%</td>
</tr>
<tr>
<td>A mileage fee would be assessed in a way that is fair to all drivers.</td>
<td>60%</td>
<td>49%</td>
<td>66%</td>
</tr>
<tr>
<td>Mileage would be accurately counted and used to calculate fees.</td>
<td>59%</td>
<td>55%</td>
<td>65%</td>
</tr>
<tr>
<td>It would be easy to understand how a mileage fee is calculated.</td>
<td>72%</td>
<td>89%</td>
<td>85%</td>
</tr>
<tr>
<td>It would be easy to pay invoices for mileage fees.</td>
<td>53%</td>
<td>80%</td>
<td>85%</td>
</tr>
</tbody>
</table>

Percentages indicate responses of “Agree” or “Somewhat Agree”
General Reactions to MRFT

- Generally understand and respect goals of MnDOT in testing MBUF
- Very engaged; some drivers kept track & have “done the math”
- Open to GPS-based system and sharing data
  - Some perceptions of equipment malfunction or poor GPS coverage/accuracy; don’t want to be penalized unfairly
  - Some acknowledgement that people are already tracked by their cell phones
  - Not worried about government misuse of data; worried about hackers and data security
Reactions to Fees

- 81% reported fees as “expected” or “lower than expected”
- Over 60% felt it is “appropriate” to charge different fees by “Metro-zone” or by time of day
  - However, some expressed it is unfair to penalize people who can’t change their commute time or location
- Some indicated that vehicle type should be a factor
  - Heavier vehicles should pay more
- Some concerns about rural/urban equity, but not in conventional sense
  - More about how revenue will be distributed
Reactions to Technology Approach

- General concern that test system is too complicated
  - Prefer something simple and integrated like OnStar™, MnPass, or a “smart plate”
- Concern about interoperability; states would have to be able to talk to each other
- Not everyone has access to internet to pay invoices or check trips
- GPS and wireless data coverage are not available in all areas
- Concerns about how the system will be too costly to manage or administer
Conclusions

I’m open [to the concept ] if you can clearly state how it will benefit everyone.

I don’t think it’s a bad idea, but don’t know how it would work. Unless maybe if it’s 100% integrated into [the] car.

...I am willing to pay more if I thought it was going to help the roads.

If they came up with something close to how it is being done now, equally foolproof, failsafe, [it] would be more OK. A mileage based alternative to fuel? I would be ok with it if all these concerns went away.

Something is going to have to change. Because in the future with hybrids coming out ...they [the government] are going to have a major financing issue.
Questions?

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