Crowdsourcing Road Weather: Human-based Methods for Collecting Weather & Road Condition Information

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Outline

1. Crowdsourcing in a transportation agency (DOT) context
2. Introduction to 3 crowdsourcing approaches used by Departments of Transportation (DOTs) in the US
3. Comparisons of the 3 approaches
Pressures Facing Transportation Agencies

• Public pressure:
  - Culture of constant connectivity and information availability
  - Demand for transparency and communication from government agencies

• Legal pressure:
  - US Law (23 CFR 511) set minimum requirements for agencies to assimilate and disseminate timely, available and accurate road weather observations and travel conditions to the public.

• Economic pressure:
  - Agencies also need regular reports from the field, but...
  - Tightening budgets demand cost-effective sources of information

→ Challenge: Minimize cost while increasing the flow of information from the roads to the agency and back to the traveling public.
Crowdsourcing

The practice of obtaining . . . content by soliciting contributions from a large group of people, especially from the online community . . .

» Merriam-Webster

• For a transportation agency, this means sourcing roadway observations from travelers.

• Crowdsourcing falls within the larger context of “Big Data”
Operational Usage

Benefits of Crowdsourcing Road Condition Data

• Nuanced and descriptive
• Supplement to traditional data sources
• Fills gaps in observation
• Relatively inexpensive
• Growing in trustworthiness
Challenges* when Crowdsourcing Road Condition Data

- Distracted driving
- Data may be noisy, biased, delayed, poor quality
- Not always available when and where it’s needed
- Data ownership, attribution, anonymization
- Data type and format are vastly different than traditional observations

*Many of these can be managed or mitigated.
Crowdsourcing Approaches

Social media monitoring

Third-party smartphone apps

Connected vehicles

DOT citizen reporting programs

Images: Twitter, Waze, MnDOT CR program, USDOT
Specific considerations:

- **Wealth** of information; very little is road weather specific.
- Monitoring may be manually intensive:
  - #hashtags and software help
- Certain users more trusted.
- Inconsistencies, errors, obscenities, exaggeration, etc. are possible.
  - Secondary verification may be required.
- Back-and-forth communication available—gather more info.
- Photographs are often posted and are very helpful.
Third-party Apps

**Specific considerations:**
- Agency has less control of data collection.
- Fewer weather-specific reports.
- Data can be very noisy.
- Regular users gain credibility so data is more trusted.
Citizen Reporting Programs

State of practice: “Citizen Reporting of Current Road Conditions”
http://ops.fhwa.dot.gov/weather/best_practices/citizenreportingcrc/

Reporting website: Minnesota DOT
Traveler information map: Iowa DOT
Citizen Reporting Programs

Specific considerations:
- Front-end work is required to develop program.
- Data collection is controlled/managed by DOT.
- Report-gathering application can be built to meet DOT needs.
- Quality control occurs via reporter training.
- Reporter base is not as wide (as general public).
## Approach Comparison

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<th>Third-Party Apps</th>
<th>Citizen Reporting Programs</th>
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See FHWA publication (not yet in print) for detailed matrix.
Summary

• Though crowdsourced data have some shortcomings, collecting data from this abundantly available resource (humans) satisfies a number of public and political pressures.

• Agencies can choose what works best for them.
• Will work well in concert with Connected Vehicles and the growing Internet of Things/Big Data environment.
• A next step: how to better harness and integrate the information into operational platforms
Thank you

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