Drivers' Awareness of and Response to Two Significant Winter Storms Impacting Utah's Wasatch Front and the Correlation of Weather to Road Impacts During the Winter of 2012-13'

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Today's Discussion

- The motivation
- Existing partnerships
- COMET Partners Project
- The approach
- The events
- The analysis

Increasing Transportation Demands

- Population growth = Increased demand
  - ~24% increase in the past decade

- Congestion results in annual cost of $250 million in Utah
  - Recurring (i.e., a.m./p.m. commute times)
  - Non-recurring congestion (i.e., weather and accidents)

- Inclement weather plays a significant role in non-recurring congestion
  - Delays, mobility, productivity, and safety

"Large weather events cause trips to take 40-50% longer"

Photo courtesy UDOT

Utah Department of Transportation (UDOT)/ NorthWest Weathernet/National Weather Service (NWS) Partnership

- Collaboration on messaging to ensure consistency
  - UDOT/NorthWest Weathernet services/NWS services/Media messages
- Collaboration on meteorology – especially road weather
  - NWSChat
  - Conference calls
- Events
  - Winter weather
  - High wind events
  - Dense fog
  - Wildfires

Photo courtesy Deseret News

An Opportunity – COMET Partners Project

- Examine relationship between meteorological phenomena, road conditions, and resultant impacts
- Acquire knowledge of drivers' awareness and use of winter storm information

Desired outcome: Modified commuter behavior that leads to improved mobility and safety!

How: Effective strategies for communicating critical information

The Approach - COMET Partners Project

- Multisector/Multidisciplinary
  - America's Weather Industry (NorthWest Weathernet and NarwhalMet)
  - Academia (University of Utah)
  - State (UDOT)
  - Federal (NWS)

- Targeted surveys administered by PEGUS Research

- 2 events

- 400 completed surveys per event
  - Determine sources of weather and road information
  - Assess satisfaction with sources
  - Identify changes to accommodate or avoid storm
  - Examine perceptions of what influenced response

Event 1 - 10 January 2013 Snowstorm

- Strong cold front passage just ahead of evening commute
  - Band of heavy snow
  - Significant temperature drop
- Road surface temperatures drop
  - Snow accumulated on roads during the late afternoon and evening
- Event was well forecast and collaborated between NWS and UDOT meteorologists leading up to event

Event 2 - 24 January 2013 Ice Storm

- Weak storm system moving across region
- Strong inversion in place across valleys of northern Utah
- Light freezing rain develops before the a.m. commute
- Potential for freezing rain event only identified within 24 hours of onset, though commute impacts mentioned for several days
- Large degree of uncertainty surrounding precipitation type
- Messaging between NWS/UDOT/NorthWest Weathernet not as cohesive

The Analysis – Sources Used

- Asked participants if any of 11 specific sources used

Category/Type of Information Source	Percent
Personal Sources	80%
Personally observed	59%
Friend or family	48%
Social media	15%
Media Sources	77%
Local television	57%
Local radio	43%
National television	22%
Government Sources	27%
NWS website	12%`
UDOT website	12%
UDOT Smart Phone App	7%
NOAA Weather Radio All Hazards	4%

- 83% used multiple sources
- Only 3 indicated no information source used
- Mean number of sources was 2.8

The Analysis – Behavior Change

- Asked if residents had done any of four specific behavior changes

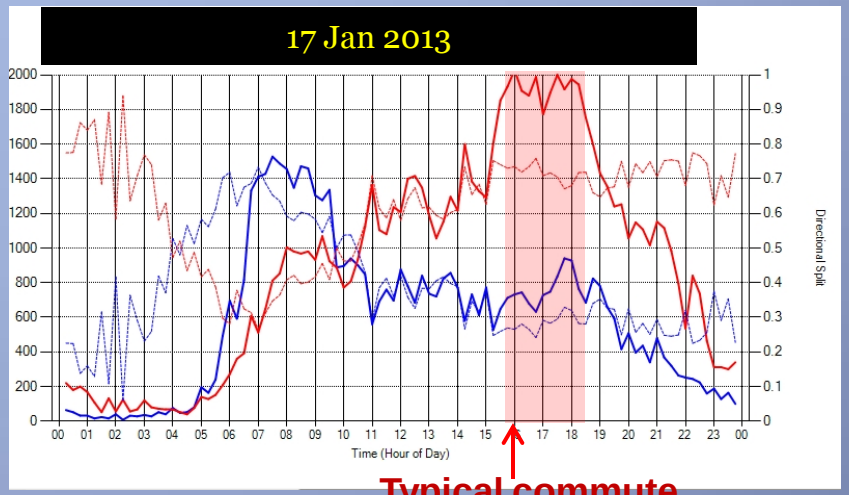
Type of Behavior Change	Percent
Changed schedule	62%
Changed route	26%
Did not travel	13%
Used transit	6%

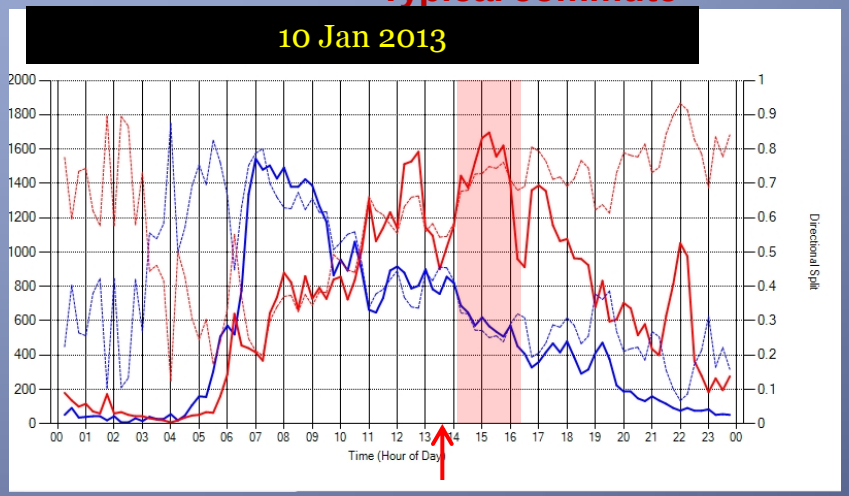
- Majority reported just one behavior change
- While 97% gathered information, 34% did not change travel behavior

UDOT Signal Performance Metrics system data confirmed self-reports!

Event 1 – How Commute Unfolded

Foothill Drive 1300 South Salt Lake City, UT – major commuter route



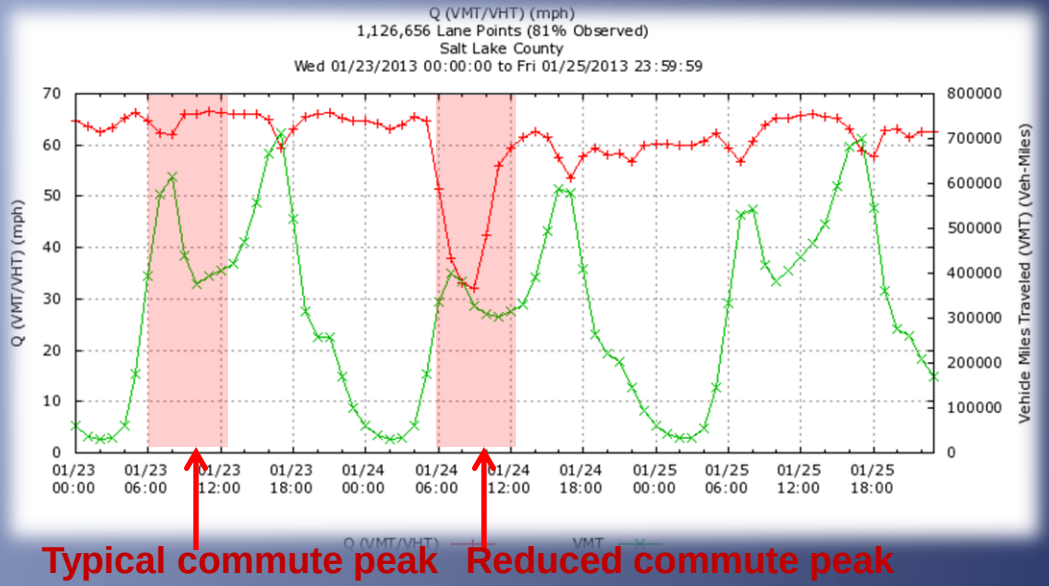


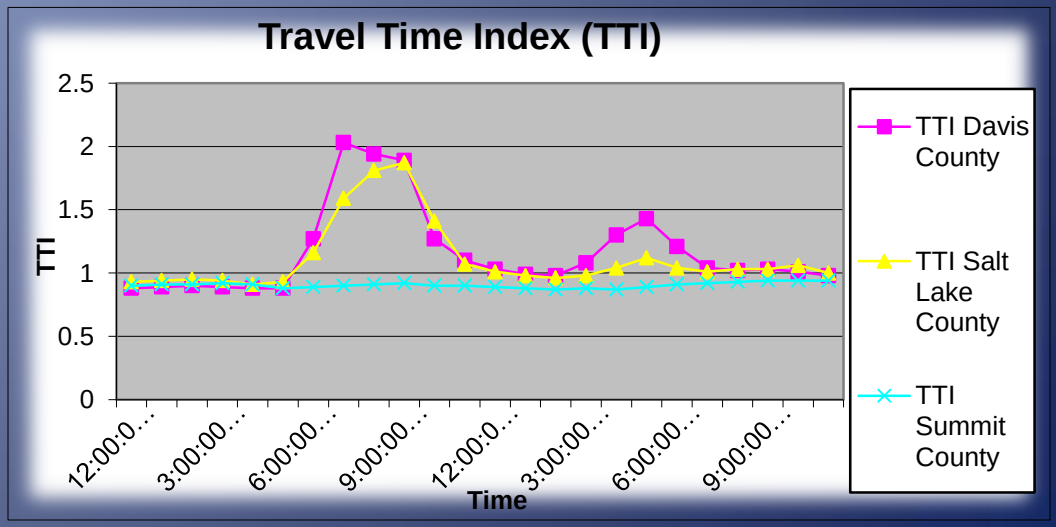
Southbound Northbound

- Afternoon peak commute time shifted (southbound)
  - Typical peak 4-6 p.m.
  - Actual peak 3-4 p.m.
- Reduced commute
  - Baseline - total volume 17,871
  - January 10 – total volume 13,540
- Based on communicated road/weather information?

Event 2 – How Commute Unfolded

- Most recorded UDOT accidents in a single day
- Reduced commute volume
  - Typical volume through 6 a.m.
  - Dramatic drop by 7 a.m.
  - Low afternoon volume
- Commutes took 1 to 2 times normal time
- Based on communicated road/weather information?





The Analysis – Are Particular Weather Information Sources More Likely to Be Related to Behavior Change?

- Regression analysis used to determine how the use of personal, media, and government sources were related to actual changes in commuting behavior.

- Results
  - Personal sources and government sources were significant predictors of change
  - Media sources showed no significant relation to behavior change
- Additional findings from model
  - Females more likely than males to adjust behavior
  - Experienced drivers less likely

The Analysis – Does Gathering More Information of Particular Kind Relate to Making Different Kinds of Prudent Changes?

Predictors of Prudent Change				
	Change Route	Change Schedule	Not Travel	Total Changes
Weather Source				
Personal sources		Significant	Marginally Significant	Significant
Media sources		Marginally Significant	Significant (Negative Coefficient)	
Government sources	Marginally Significant			Significant

The Analysis – Types of Information that Influence Behavior Change

Information Influencing Behavior Change	Percent Reported
Known road conditions	59%
Forecast weather	54%
Know weather conditions	52%
known road closures	9%

- Known road conditions, know weather conditions, and forecast weather each contributed significantly to behavior change

Public Perception and Response of Two Storms

- Public perception
  - No difference in satisfaction with information provided, or in anticipated severity of storm
  - Slightly better understanding of impacts of storm for snow event (statistically significant)

Understood Possible Impacts of Winter Storm Based on Information					
	Completely Disagree	Disagree	Neutral	Agree	Completely Agree
10 January 2013 Snow Event	0%	2%	5%	29%	63%
24 January 2013 Ice Storm	1%	7%	6%	31%	55%

Takeaways/Moving Forward

- Vast majority of respondents gathered weather and road information from multiple sources
- People do change behavior based on information
- Personal and government sources influential in getting drivers to modify their behavior
- Murky picture with respect to information communicated via media

Questions/Discussion?