

Standardized Lexicon for ATMS Inputs

Member Project Team: NH, VT, ME

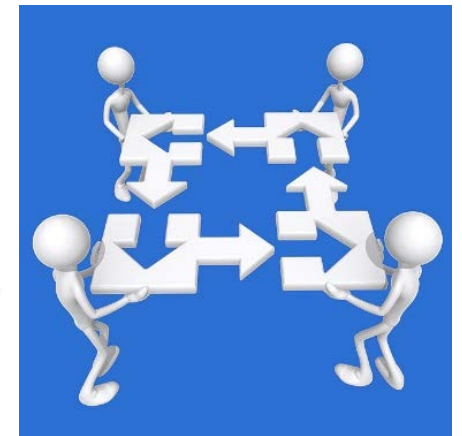
I-95 Corridor Coalition: Denise Markow, PE

Consultant Team: KMJ Consulting, Inc.

Objective: To adopt a common lexicon of terms to describe ATMS inputs that may be used by agencies throughout the corridor. Three specific sets of inputs were selected for this study. They are:

1. Road Weather Conditions' Descriptions
2. Incident Management Timeline Elements
3. ITS Device Uptime/Reliability

Talk the same talk



Contents - ATMS Inputs

1. Road Weather Conditions' Descriptions
2. Incident Management Timeline Elements
3. ITS Device Uptime/Reliability



Project Scope

- Project Kick-off Meeting
- Identify three ATMS inputs for inclusion in the project
- Conduct Literature Search and Member Scan
- Prepare a Common Lexicon for Review and Discussion
- Review the Lexicon with Agencies and Finalize



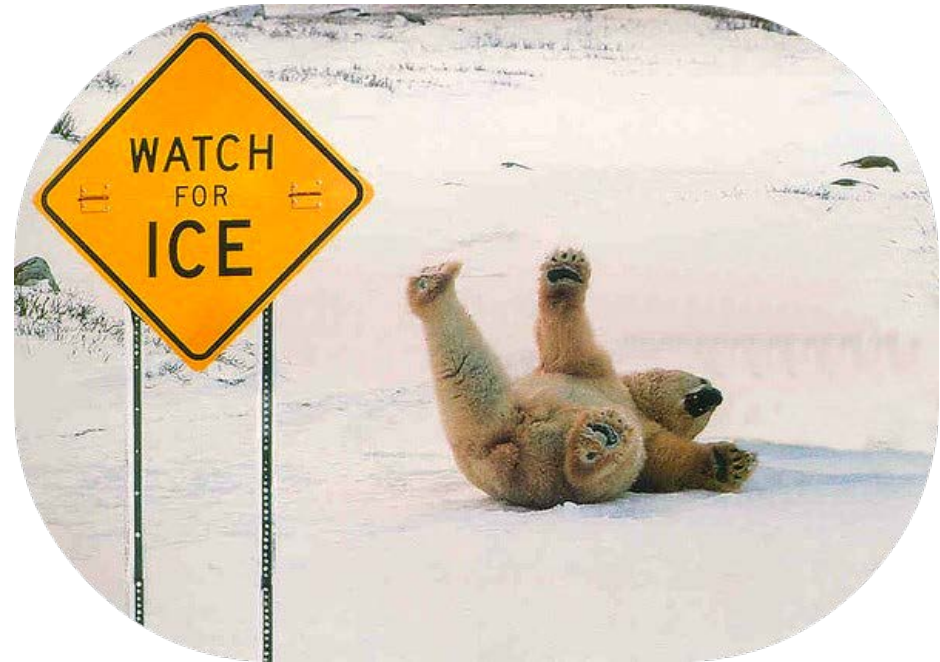
Overview – ATMS Inputs

Goal	<ul style="list-style-type: none"> • Consistent ATMS inputs to enable consistent performance measurements for use with ATMS/RITIS. • Consistent standards for agency evaluation of reliability for ITS communication, devices, and reporting. 		
	Road Weather Conditions' Descriptions	Incident Management Timeline Elements	ITS Device Uptime/ Reliability
How?	<ul style="list-style-type: none"> • Use consistent ATMS inputs to RITIS • Use the same definitions on website, signs and possibly to the media 	<ul style="list-style-type: none"> • Agree upon definitions for critical incident timeline elements • Input these consistent element into ATMS and RITIS 	<ul style="list-style-type: none"> • Establishing baseline percentages for minimum uptimes • Building a consistent reporting framework
Why?	<ul style="list-style-type: none"> • Have a common understanding of roadway conditions • Consistent performance measurements (apples to apples) • Better travel information/reduced driver confusion 	<ul style="list-style-type: none"> • Have a common understanding of incident elements and standard metrics • Consistent performance measurements • Allow for sharing with additional agencies/partners beyond the tristate region 	<ul style="list-style-type: none"> • Develop consistent standards for agency decisions • Consistent performance measurements • Better travel information



Road Weather Conditions' Descriptions

- Existing Conditions
- Recommendations
- Example implementation






How Some States Describe Road Weather Conditions

Agency	Winter Weather Road Conditions							
	1a	1b	2	3	4	5a	5b	
RITIS/MATOC*	Clear/ Wet/ Dry		Snow/Slush Covered with Wheel Tracks Exposed	Snow and/or Slush Covered	Icy/Snow Packed	Impassable/ Dangerous/ Treacherous		
New Hampshire	Good	Fair		Difficult				
Maine	Good	Fair		Difficult				
Vermont	Good	Fair		Difficult		Hazardous		
Iowa*	Seasonal		Partially Covered	Completely Covered		Travel Not Advised	Impassable or closed	
Minnesota*	Normal		Partially Covered	Completely Covered		Travel Not Advised	Closure Do Not Enter (symbol)	
Virginia*			Minor	Moderate	Severe		Closed	
Wisconsin	Good Winter Driving		Slippery Stretches	Snow Covered	Ice Covered		Travel Not Advised	No Information
West Virginia*	Good		Fair	Difficult		Hazardous	Closed	Unreported

* Detailed description exists for these conditions







Recommended Road Weather Conditions' Descriptions

<i>Winter Weather Road Condition</i>				
	<i>Category</i>	<i>Name</i>	<i>Description</i>	<i>Image</i>
0	Good	Clear/Dry	The road is dry and has returned to a normal condition. All snow and ice has been cleared.	
1	Fair	Wet	Wet pavement surface is the general condition from shoulder to shoulder with no visibility problems. There may be small snow patches and bridge decks may be starting to ice up. Black Ice is possible.	
2		Snow/Slush Covered with Wheel Tracks Exposed	Accumulations of loose snow or slush are found on the pavement surface. Roadway is partially covered (up to 50%). Packed and bonded snow and ice are not present. Drifting snow could exist.	



Recommended Road Weather Conditions' Descriptions

(continued)

		<i>Winter Weather Road Condition</i>		
	<i>Category</i>	<i>Name</i>	<i>Description</i>	<i>Image</i>
3	Difficult	Completely Snow and/or Slush Covered	The pavement surface has continuous stretches of packed snow with or without loose snow on top of the packed snow or ice. Accumulation is to the point that the roadway markings are most likely obscured, making it difficult to differentiate between the roadway and its surroundings. Lane drops on certain sections of roadways.	
4		Icy/Snow Packed	The pavement surface is covered with packed snow and/or ice. There may be loose snow on top of the icy or packed snow surface. Refreeze is possible. Lane drops in certain sections.	
5	Hazardous	Dangerous/ Treacherous/ Travel Not Advised	The roadway has deteriorated to the point that it is very dangerous to travel due to severe weather (low visibility, etc.) or road conditions (drifting, excessive unplowed snow, glare, ice, accidents, stranded vehicles, etc.) Being on the road is dangerous. Ice covered roadways - near blizzard conditions. Lane drops in certain sections.	
6		Impassable or Closed	A road that is impassable is blocked by snow or disabled vehicles. A road that is closed has official travel restrictions and/or is physically closed by barricades, fence, gate, or official equipment/vehicles.	



Screenshot of Road Conditions on New England 511

The screenshot displays the newengland511.org website interface. At the top, the browser address bar shows 'newengland511.org'. Below the navigation bar, there are three main sections: 'Emergency Announcements', 'Incidents/Construction', and a 'Map Legend'. The 'Emergency Announcements' section lists three incidents in New Hampshire: 'NH: US-3 North: Incident', 'NH: NH 101 East: Incident', and 'NH: US-1 Bypass North: Roadwork'. The 'Incidents/Construction' section lists several events and road conditions in Maine, including 'ME: ME-113 North: Special Event', 'ME: Rockland Ferry North: Special Event', 'ME: I-95 South: Special Event', 'ME: ME-43 East: Road Condition', 'ME: US-201 North: Road Condition', 'ME: ME-16 East: Road Condition', 'ME: Swan's Island Ferry North: Special Event', and 'ME: I-95 North: Roadwork'. The map shows various road conditions, including 'Roads bare & wet' in Franklin County, Maine. A pop-up window for this condition shows the text 'Roads bare & wet' and 'Last updated: 01/12/2017 3:20 PM'. The 'Map Legend' section includes a list of features: Incident, Roadwork, Future Events, Traffic Speeds, Special Events, Cameras, Weather Stations, Road Conditions, Fair, Difficult / Hazardous, Message Signs, and NWS Doppler Radar. The website also features a 'New Hampshire FISH AND GAME' banner and a 'NH - Get a Hunting and Fishing License' link.



Incident Management (IM) Timeline Elements

- IM Timeline Elements States Currently Use
- Recommended Critical IM Timeline Elements



IM Timeline Elements States Currently Use

Agency	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16
I95-CC	Incident Occurs	Initial Notification		Incident Verified		Responder Dispatch	Responder Arrives	Responder Summons Help	Required Help Arrives	Summon Wrecker	Wrecker Arrives	Other Help Leaves	Wrecker Clears the Lanes	Wrecker Leaves Site	Law Enforcement Leaves Site	Normal Traffic Flow
		Detection		Verification		Response				Roadway Clearance		Clearance				
																Recovery
PennDOT RCRS	Incident Occurs	Incident Detected	TMC Notified	Incident Verified	RCRS Entered	Resources Dispatched	Responders Arrive						Road Cleared		Incident Cleared	Normal Conditions
	Detection Time	Notification	Verification	Record	Deploy Resources	PennDOT Response										
						Response Time			Clearance Time				Linger Time			Time to Normal Conditions
PennDOT TIT	Incident Occurs	Incident Reported		Incident Validated		Responders Dispatch	Responders on Scene		No Groupings				Roadway Cleared		Incident Cleared	Return to Normal
GDOT	Incident Occurs	Incident Reported		Incident Verified		Response Identified/Dispatched	Response Arrives								Incident Cleared	Normal Flow Returns
		Detection				Response										
FHWA	Incident Occurs	Incident Reported		Incident Verification is Complete		Response Dispatch									Incident Cleared	Traffic Returns to Normal Conditions
				Respond												
MD SHA	Incident	Control Center Notified					Arrival on Scene									Incident Completely Cleared
							Response Time									
FDOT	Incident Occurs	FDOT or FHP Notified	TMC Notified	Incident Verified by TMC			Arrival on Scene						Travel Lanes Cleared			
		Notification	Verification													
							Response Time									
MassDOT	Incident Occurs	Incident Reported		Incident Verified		Response Identifid & Dispatched	Response Arrives on Scene						All Lanes Open to Traffic (Roadway Cleared)		Response Departs Scene (Incident Cleared)	Normal Flow Returns
	Detection															
		Verification				Response										
NH DOT	Incident Occurs	Incident Detected	Agency Notified	Incident Verified									All Lanes Available to Traffic Flow		Last Responder Leaves Scene	



Recommended Critical IM Timeline Elements

NEW Proposed Critical Timeline Elements					
	Incident Awareness	Responders Dispatched	Responders Arrive	Responders Depart	All Lanes Available to Traffic Flow/ Equipment gone from travel lanes and shoulder
		Individual Responder Actions - Can occur multiple times throughout an event & may require multiple entries			
Changes to Lane Status (open/closed) (The timestamp of that lane status change should be recorded as any lane including a shoulder or ramp opens or closes)					
Recommended Additional Data**	---- Which ITS elements are deployed (HAR, DMS, etc.)? Content of messages displayed on DMS ----				
	---- Additional Incident details, timestamped communication logs, media files, responder names/unit numbers, etc. --- -				

** Optional



ITS Device Uptime/Reliability

- Uptime and Reliability Description
 - Communications systems and hardware/devices work hand-in-hand to enable the ITS for the transportation network.
 - The Communication network must be up for devices to be effective
 - Devices include CCTV, DMS, VSL and a variety of sensors
- Percentiles of Common Uptime and Downtime Increments
- Recommendations and Reporting for ITS Communications and Device Uptime



Percentiles of Common Uptime and Downtime Increments

Common Timescales	Percent Uptime				
	Per				
	Downtime	Day	Week	Month	Year
	One Minute	99.931	99.990	99.998	100.000
One Hour	95.833	99.405	99.863	99.989	
One Day		85.714	96.721	99.726	
One Week			77.049	98.082	
One Month				91.667	

Common Percentiles	Equivalent Downtime				
	Per				
	% Uptime	Day	Week	Month	Year
	99.9	1.4 min	10 min	44 min	8.8 hr
99.5	7 min	50 min	3.6 hr	1.8 days	
99	14 min	1.7 hr	7.3 hr	3.7 days	
98	29 min	3.3 hr	14.6 hr	7.3 days	
95	1.2 hr	8.4 hr	1.5 days	2.5 weeks	
90	2.4 hr	16.8 hr	3.1 days	5.2 weeks	
80	4.8 hr	1.4 days	6.1 days	10.5 weeks	



Recommendations and Reporting ITS Communications and Device Uptime

	PROPOSED MINIMUM UPTIME (%) for fully functional operation	RECOMMENDED REPORTING FREQUENCY
Communications System	99.9%	Monthly
Hardware/Devices (CCTV, DMS, VSL)*	99%	Quarterly

*Only a measurement for active devices (not disabled due to construction/other unavoidable reasons)



Conclusions

The Coalition, consultant and Coalition Member Team collaborated to create a set of inputs that would be used by New Hampshire, Vermont and Maine as part of their Tri-state ATMS.

- **Road Weather Conditions Descriptions**
 - The recommended actions are being implemented by each agency according to their respective current capabilities.
- **Incident Management Timeline Elements**
 - Five critical timeline elements were recommended to enable the practitioner to measure the performance of its TIM response system. The elements are: Incident Awareness; Responders Dispatched; Responders Arrive; Responders Depart; All Lanes Available to Traffic Flow/Equipment gone from travel lanes and shoulder.
 - The Agencies have begun implementing these recommendations in conjunction with their efforts on the FHWA EDC 4 TIM initiative.
- **ITS Device Uptime/Reliability**
 - Communications System uptime is recommended at 99.9% and Device uptime is recommended at 99%
 - The Agencies have not yet begun to implement reliability reporting standards but these metrics will provide guidance in future discussions



Contact



Contact

Denise Markow, PE

TSMO Director, I-95 Corridor Coalition

Phone

(301) 789-9088

E-Mail

dmarkow@i95coalition.org

