

# Expanding a Condition Reporting System into a Statewide TMS

## The New York State Thruway Authority TMS Deployment

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# Presentation Outline

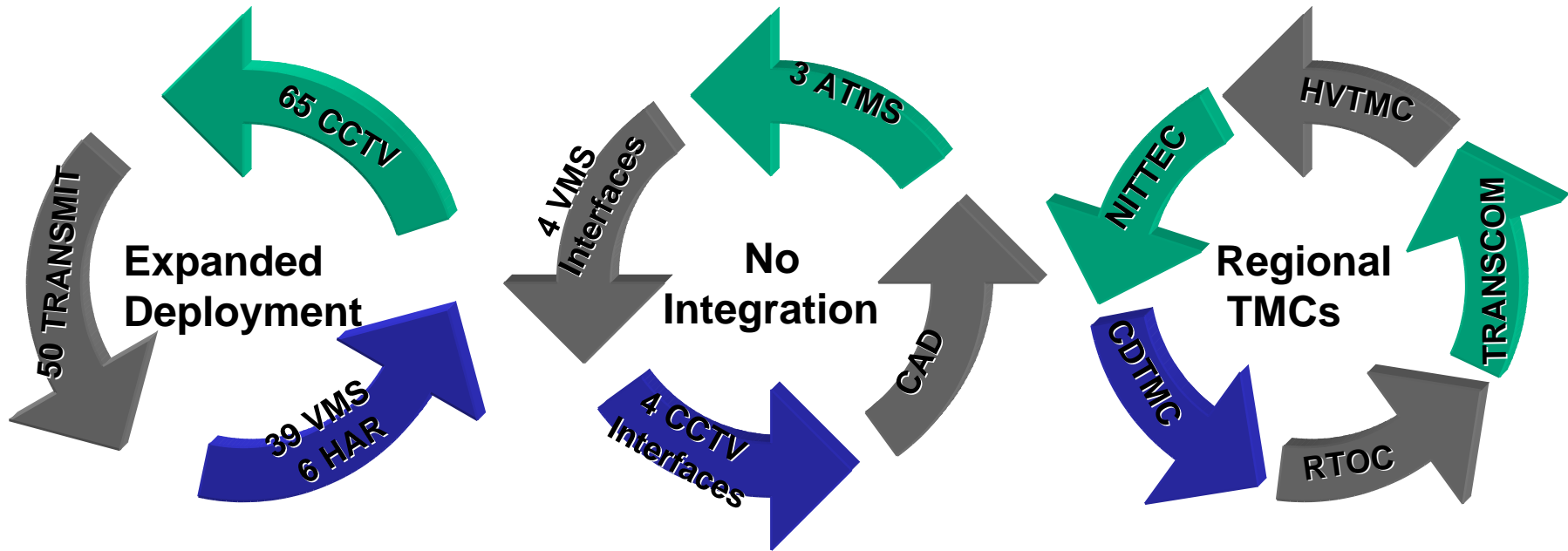
- NY State Thruway Authority (NYSTA)
- CARS - Condition Reporting System
- Expanding CARS to a TMS
- *Inputs:* CAD, Automated Traffic Reports
- *Outputs:* HAR/LPFM, DMS, Messenger

# New York State Thruway Authority



- 641 Miles of Roadway
- 5 Major Metro Areas
  - Albany
  - New York City
  - Syracuse
  - Rochester
  - Buffalo
- One Statewide Operations Center

# Problem: Stovepipe Systems



# Need for NYSTA ATMS

- Manage ITS Infrastructure/  
Traveler Info
- Manage incidents from CAD
- Need for single operator interface

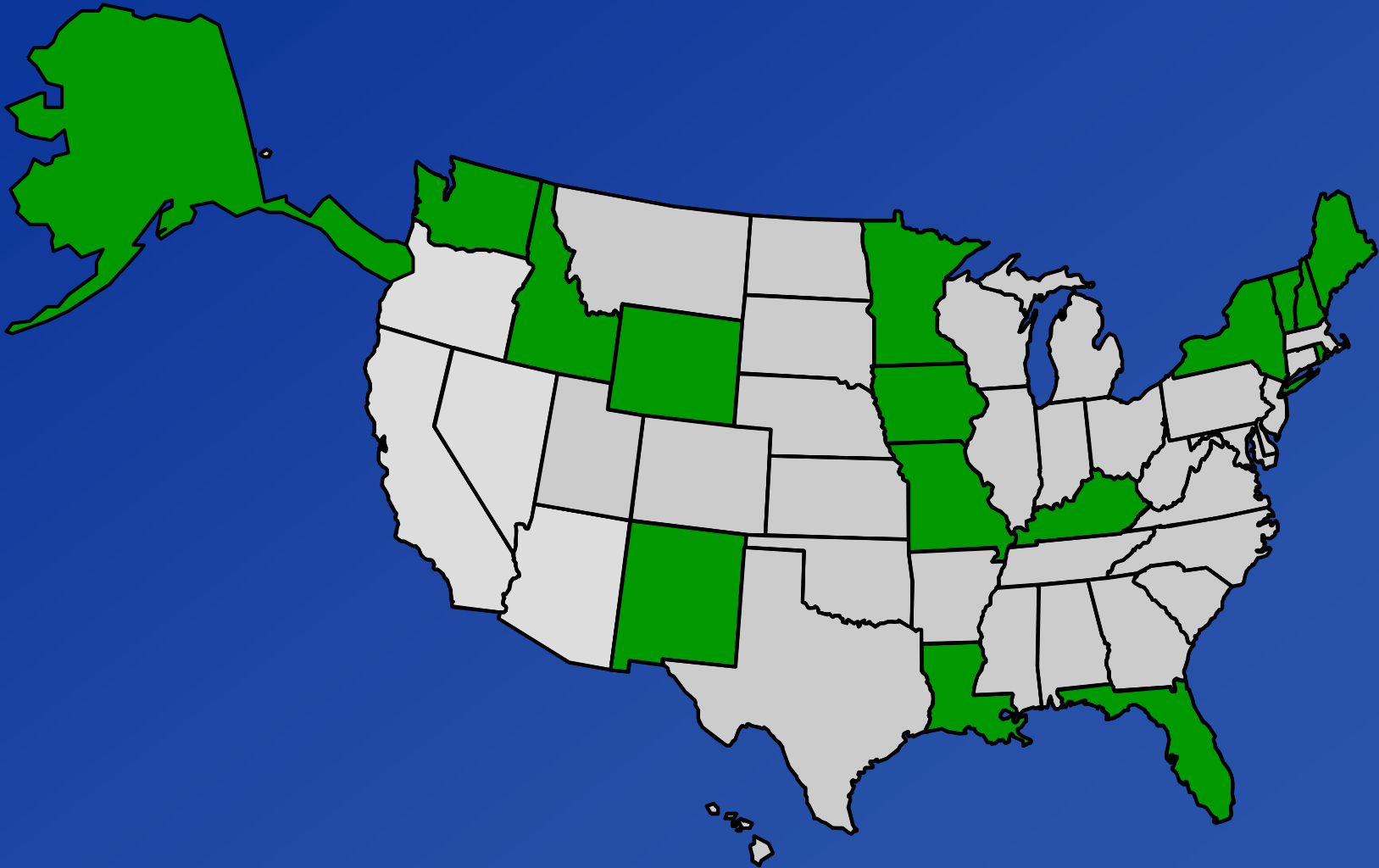
# Solution: CARS Consortium

- 1999: 4 States: IA, MN, WA, MO
- 2006: 18 Agencies: AK to FL;  
ME to NM
- State, Province and City

# CARS Consortium

- Pooled Fund - shared ownership
- Joint Developments / Enhancements
- No licensing or “per user” fees

# CARS States - 2006





# What is CARS?

- Condition Acquisition and Reporting System
- Create, view, edit, and monitor travel events
- Map-based GUI
- Web-based: no special hardware or software
- Uses TMDD Standards for data exchange

# CARS GUI

**CARS, v1.0** [Window Title Bar]

Situation Map [Dropdown] Map Settings [Button] Back [Button] Help [Button]

**Legend**

- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Info
- Lane Closed
- NWS Report
- NWS Warning
- Parking
- Visibility
- Warning
- Wind

**Situation Element** [Modal Dialog]

stop and go traffic on I-35W northbound from Exit 13 to Exit 11A since 7:38 AM, 02/15/01 for the next hour due to multi vehicle accident

OK More Edit Delete

Warning: Applet Window

Map showing Minnesota, Iowa, and parts of Wisconsin and Illinois. Major roads include I-35W, I-494, I-94, and various state routes. Cities shown include Minneapolis, St. Paul, Woodbury, Newport, Eagan, and Bloomington.

Lat=44.9503; Lon=-93.1860; Scale=97

**Pan/Zoom Controls** [Buttons: Left, Right, Up, Down, In, Out]

**Area Controls** [Buttons: Region, Default, Back]

**Mouse Action**  
Left is Zoom  
Right is Create Situation

Warning: Applet Window [Status Bar]

# Data Entry – Point and click

CARS, v1.0

Create Description for Element 1 of 1 Elements Back Help

Category 1-10 of 36 More Phrase 1-10 of 15 More Action

Traffic conditions	stopped traffic	<span>Add</span>  <span>Add as Cause</span>       <span>Delete selection</span>
Road closure	stop and go traffic	
Accident incident	slow traffic	
Lane closure	heavy traffic	
Roadwork	traffic flowing freely	
Obstruction hazard	traffic building	
Road condition index	long queues	
Skid hazard	traffic easing	
	traffic flowing freely	

Phrases Selected:

Duration: until further notice  
Current Situation: 45 min  
Description: freely on SR 55 at County Road 3 until further notice

Direction:  Northbound  Southbound

Location Description Times Quantities More Info Text Cancel Done

Warning: Applet Window

# CARS in New York State

- New York State Department of Transportation (NYSDOT)
- Joined CARS Consortium in 2004
- CARS, CARS-Web
- Data Exchange with NYSTA & other Regional Agencies

# NYSTA CARS Deployment

- CARS
- CARS-CAD
- CARS-Signs
- CARS-CCTV
- CARS-RWIS
- CARS-Traffic
- CARS-Messenger

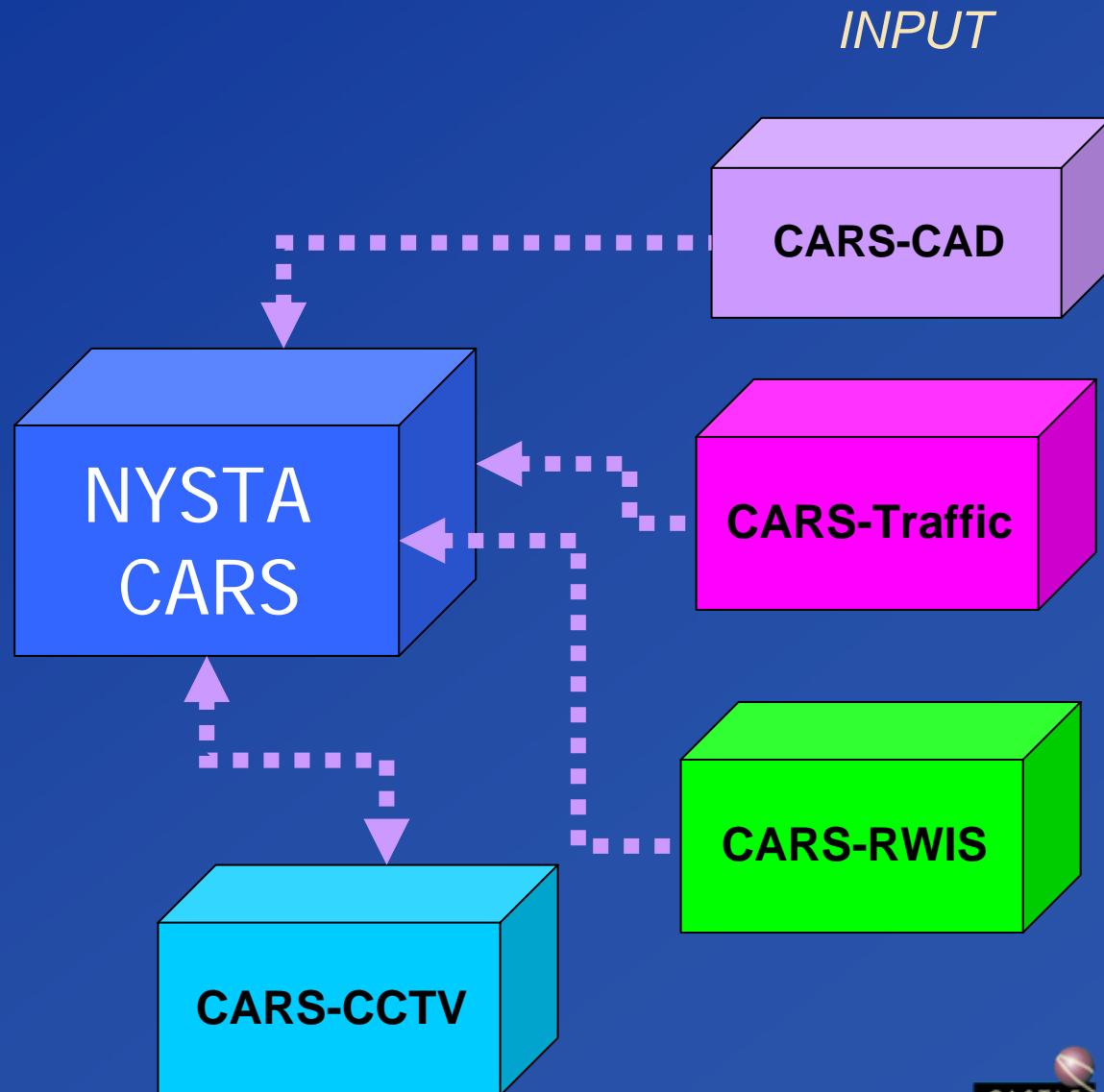
**CARS-TMC**



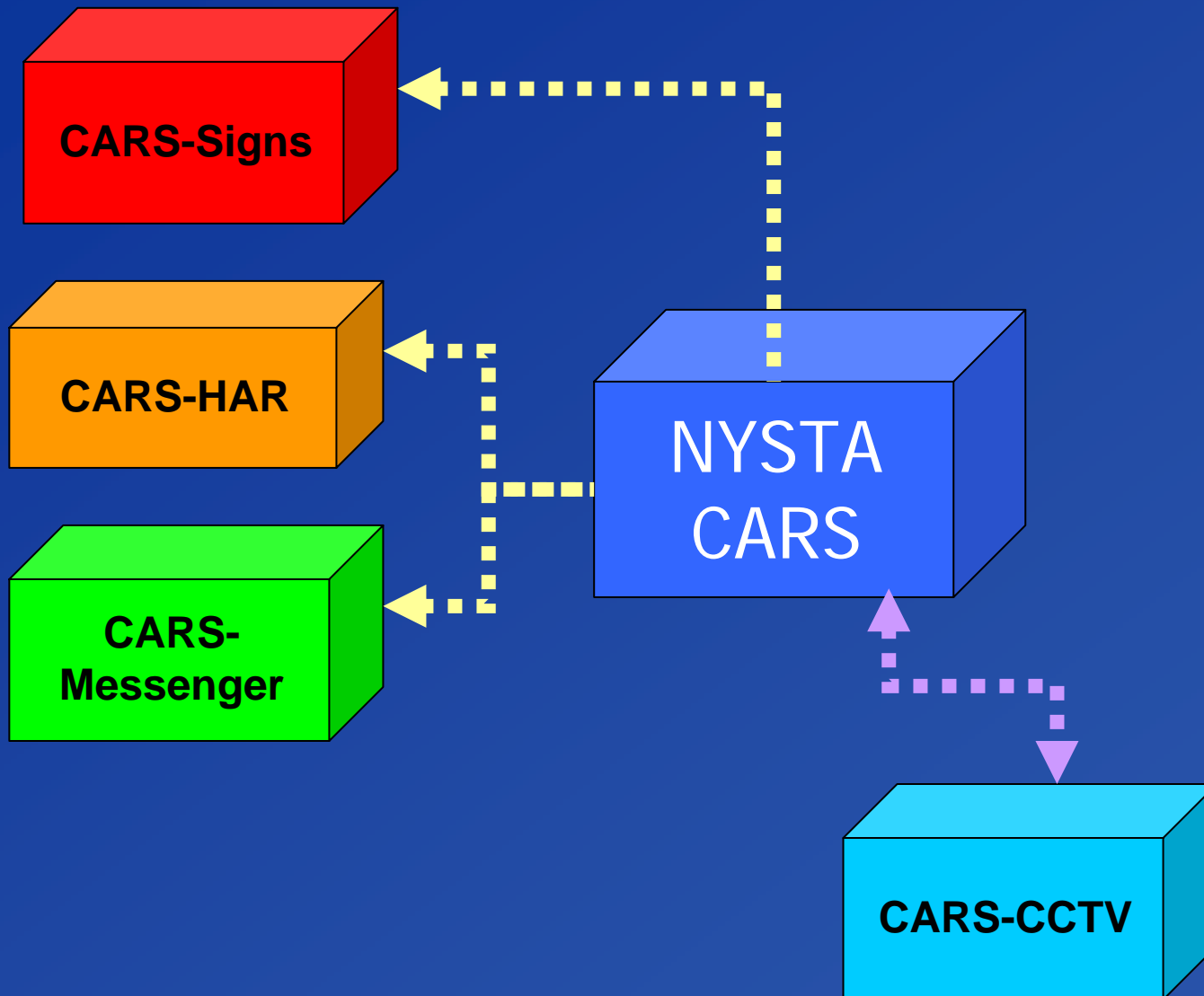


NYSTA  
CARS

# Information Collection Modules

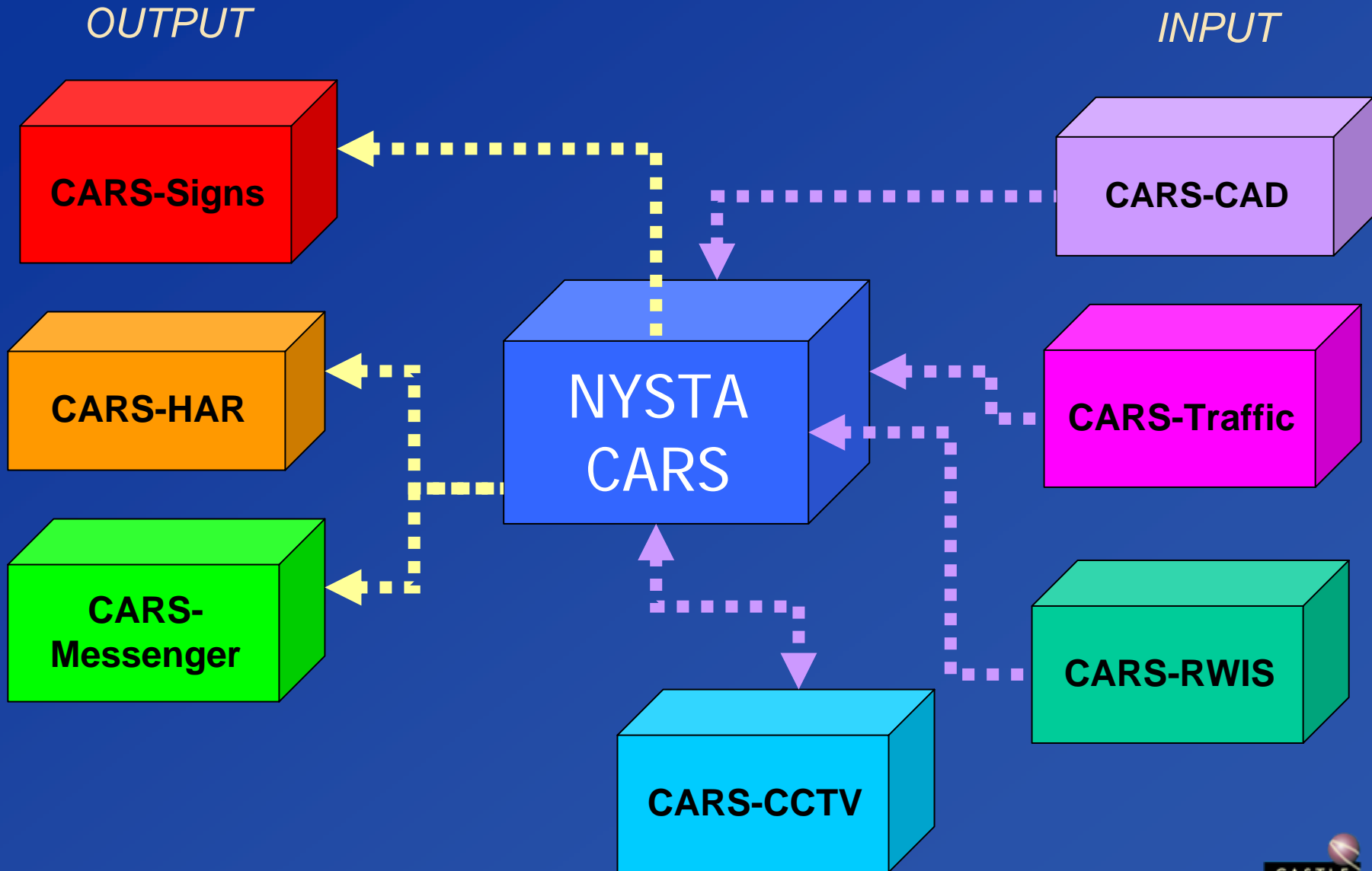


# Information-Sharing Modules





# From Condition Reporting to TMS



# CARS-CAD

# CARS-CAD Event Verification Screen

FLCRS v03\_40\_001

Incoming Messages Back

Region: All Event Type: All

### CAD Event List

- 1. accident**  
SR 528A at SR 527; Orange Ave  
2:39 PM, 07/21/05
- 2. accident**  
I-95 at Exit 191 - CR 509  
2:44 PM, 07/21/05
- 3. accident**  
SR 436 at SR 552  
3:01 PM, 07/21/05  
Reviewed by admin

Show Accepted Events

Refresh Sort by Start Time

### Situation #: 1

Compare Messages

**CARS:** accident  
on SR 528A at SR 527; Orange Ave  
since 2:39 PM, 07/21/05 for the next day

Edit

**CAD:** 07/21/05 2:39:46 PM  
ACCIDENT  
-81.36377 28.45097

Dispatch time: 07/21/2005 12:35:19  
Arrive time: 07/21/2005 12:39:46  
Remarks: @WEB NO ROADBLOCK

Accept Hold Take Over Event

Brief descriptions All situations Sort by Location  History View Settings Refresh

X 722819. SR 50 westbound from Western Beltway; SR 429 to Florida Turnpike; SR 91 flcrs-2555.5 Author: CRS-DATA traffic flowing freely on SR 50 westbound from Western Beltway, SR 429 to Florida Turnpike; SR 91 since 3:09 PM, 07/21/05 until 3:53 PM, 07/21/05 Priority level: lowest Confidence level: non-expert report Access level: public domain

X 722795. SR 50 eastbound from SR 423: North John Young Parkway to LA flcrs-2557.9 Author: CRS-DATA traffic flowing freely on SR 50 eastbound from SR 423: North John

■ ends soon ■ recently created ■ from archive

# CAD Events in CARS

FLCRS v03\_40\_001

Situation Map

**Legend**

- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Ferry
- Info
- Lane Closed
- Weather Report
- Weather Warning
- Parking
- Visibility
- Warning
- Wind
- Range of Incident
- 511 Report
- DMS Sign
- Traffic Detector

**Incoming Messages**

Region: **Statewide**

Require Approval: 2

On Hold: 1

**Situation element**

cad-wRTO.1 Author: T441-CAD serious accident on US 27 at CR 48 starting 4:08 PM, 07/21/05 for the next day Internal Comment: Incident type: SERIOUS ACCIDENT County/Region: Remarks: Priority level: highest Access level: public domain

Lat=28.6138; Lon=-81.1268; Scale=2645

**Pan/Zoom Controls**

**Area Controls**

**Mouse Action**

Left is Zoom  
Right is Create Situation

# CARS-Traffic

# CARS-Traffic Concept

- Data Input
  - Loops
  - Radars
  - Toll tag readers
  - License plate readers
- Information Output
  - Speed Reports (e.g., "slow traffic")
  - Travel Times

# CARS-Traffic Operator GUI

FLCRS v03\_B2\_015

Situation Map

**Legend**

- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Ferry
- Info
- Lane Closed
- Weather Report
- Weather Warning
- Parking
- Visibility
- Warning
- Wind
- Range of Incident
- 511 Report
- DMS Sign
- Traffic Detector

**Incoming Messages**

Region: Statewide

Require Approval: 32

On Hold: 0

Lat=28.5444; Lon=-81.3913; Scale=300

**Pan/Zoom Controls**

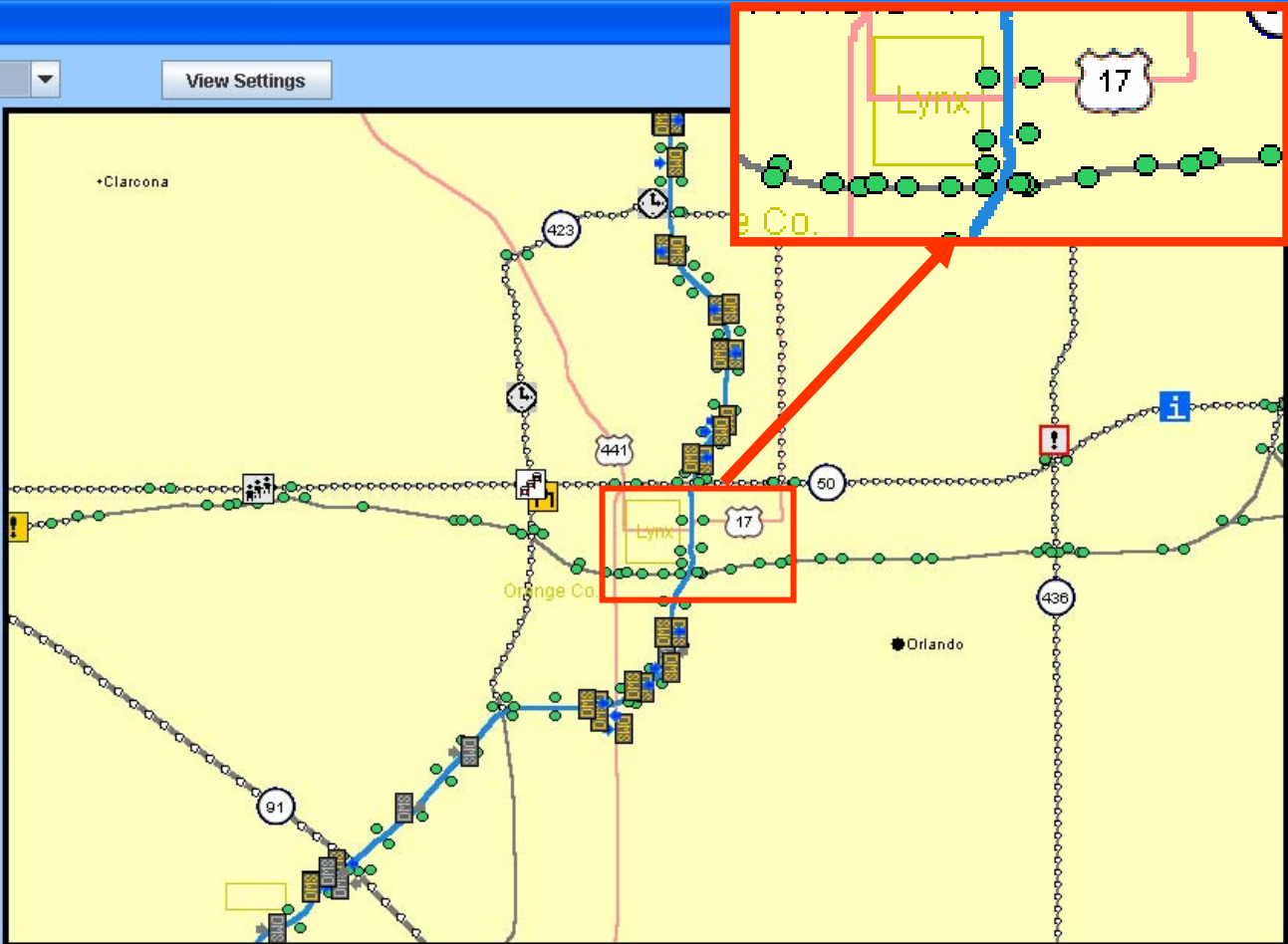
**Area Controls**

**Mouse Action**

Left is Zoom / Center  
Right is Create Situation

**Master Clock**

4:03:28 AM



The screenshot displays a traffic management interface. The main map shows a network of roads in Florida, with several incidents marked by icons such as accidents, road closures, and congestion. Two specific areas are highlighted with red boxes and labeled 'Lynx' in yellow text. A red arrow points from the upper 'Lynx' area to the lower one. The interface includes a legend on the left with various traffic-related symbols, an incoming messages panel, and a control panel at the bottom with pan/zoom, area, mouse action, and master clock controls.



# CARS-Traffic Operator GUI

FLCRS v03\_82 SR-408

Automatically Refresh Refresh ... 0:15

Situation Map

Legend

- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Ferry
- Info
- Lane Closed
- Weather Rep
- Weather War
- Parking
- Visibility
- Warning
- Wind
- Range of Incid
- 511 Report
- DMS Sign
- Traffic Detect

**SR-408**

Detector			Positive Direction						
ID	Route	Milepoint	MPH	VPH	Latency	On/Off	1	MPI	
<u>LNK-0408E-WColonialDMSGoodHomesRd</u>	SR-408	1.7	?	?	n/a	on	on	n/a	
<u>LNK-0408E-WBoundaryGoodHomesRd</u>	SR-408	1.9	?	?	n/a	on	on	n/a	
<u>LNK-0408E-GoodHomesRdHiawasseRd</u>	SR-408	2.4	?	?	n/a	on	on	n/a	
<u>LNK-0408E-HiawasseRdKirkmanDMS</u>	SR-408	4.3	?	?	n/a	on	on	n/a	
<u>LNK-0408E-KirkmanDMSKirkmanRd</u>	SR-408	4.4	?	?	n/a	on	on	n/a	
<u>LNK-0408E-KirkmanRdMercyDr</u>	SR-408	4.9	?	?	n/a	on	on	n/a	
<u>LNK-0408E-MercyDrJYPDMS</u>	SR-408	7.2	?	?	n/a	on	on	n/a	
<b><u>LNK-0408E-JYPDMS.JYP</u></b>	SR-408	7.3	?	?	n/a	on	on	n/a	
<u>LNK-0408E-JYPTampaAve</u>	SR-408	8.0	?	?	n/a	on	on	n/a	
<u>LNK-0408E-TampaAveOBT</u>	SR-408	9.2	?	?	n/a	on	on	n/a	
<u>LNK-0408E-OBTI4</u>	SR-408	9.5	?	?	n/a	on	on	n/a	

OK

Incoming Messages

Region: Statewide

Require Approval: 32

On Hold: 0

View

Lat=28.5444; Lon=-81.3913; Scale=300

Pan/Zoom Controls

Area Controls

Region Default Back

Mouse Action

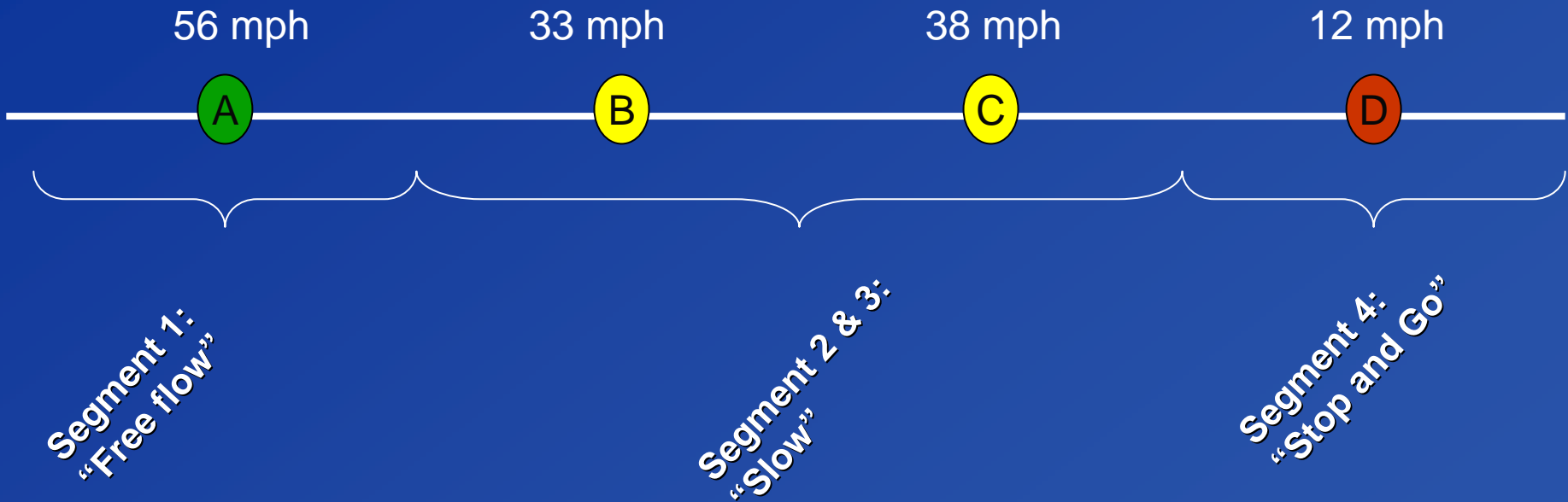
Left is Zoom / Center Right is Create Situation

Master Clock

4:10:00 AM



# Through-traffic algorithm



# CARS-Traffic Speed Reports

IACARS V03\_55\_002

Situation Map

**Legend**

- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Ferry
- Info
- Lane Closed
- Weather Report
- Weather Warning
- Parking
- Visibility
- Warning
- Wind
- Range of Incident
- 511 Report
- DMS Sign
- Traffic Detector

**Situation element**

traffic flowing freely on I-80 westbound from Exit 149 ( Polk County Road S27 ) to Exit 117 ( Dallas County Road R22 ) until 7:13 PM, 04/04/06

Lat=41.6159; Lon=-93.6308; Scale=495

**Pan/Zoom Controls**

**Area Controls**

**Mouse Action**  
Left is Zoom  
Right is Create Situation

CASTLE ROCK

# CARS-Traffic Travel Times

Florida Department of Transportation - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Stop

Address [http://www.F1511.com/traveltimes.asp?display=times&area=FL\\_StateWide&textOnly=False](http://www.F1511.com/traveltimes.asp?display=times&area=FL_StateWide&textOnly=False)

Traffic Conditions Construction Weather Evacuation Info Traffic Cameras **Travel Times** Congestion Map

### Central Florida Real Time Route Planner

**Instructions**

Use the Real Time Route Planner to find the fastest estimated drive time between two points on the map. Travel time is always provided for the shortest driving distance for selected points. If the system can give you a quicker alternate route it will, but the driving distance may be longer.

1. Select start point by clicking one of the green points on the map.
2. Select destination by clicking another green point on the map.
3. The fastest available route will be displayed in green

**Map Information**

**Map Legend**

- Travel Time Indicator
- Quickest Route
- Slower Route

This information should not be used as the only factor in determining whether to travel in a particular area.

Applet Realtime Route Planner started

# CARS-RWIS

# CARS-RWIS Weather Reports

The screenshot displays the CARS, v2.6 application window. The main map shows a portion of Alaska with various road segments and weather-related icons. A legend on the left lists categories such as Accident, Road Closure, Congestion, Construction, Danger, Delay, Hazard, Event, Info, Lane Closed, Weather Report, Weather Warning, Parking, Visibility, Warning, Wind, and Range of Influence. A popup window titled "Situation Element" is overlaid on the map, displaying the text: "hurricane force winds on Seward Highway at 76th Avenue since 10:15 PM, 09/28/03 for the next 15 mins". Below the text are "OK" and "More" buttons. The status bar at the bottom of the application window shows coordinates: "Lat=60.9150; Lon=-149.7260; Scale=252". The Windows taskbar at the bottom of the screen shows the start button, several open applications including "2 Microsof...", "CARS V2.6 -...", "CARS, v2.6", "5 Microsof...", and "Network Co...", and the system clock showing "11:22 PM".

**Situation Element**

hurricane force winds on Seward Highway at 76th Avenue since 10:15 PM, 09/28/03 for the next 15 mins

Warning: Applet Window

Lat=60.9150; Lon=-149.7260; Scale=252

**Pan/Zoom Controls**

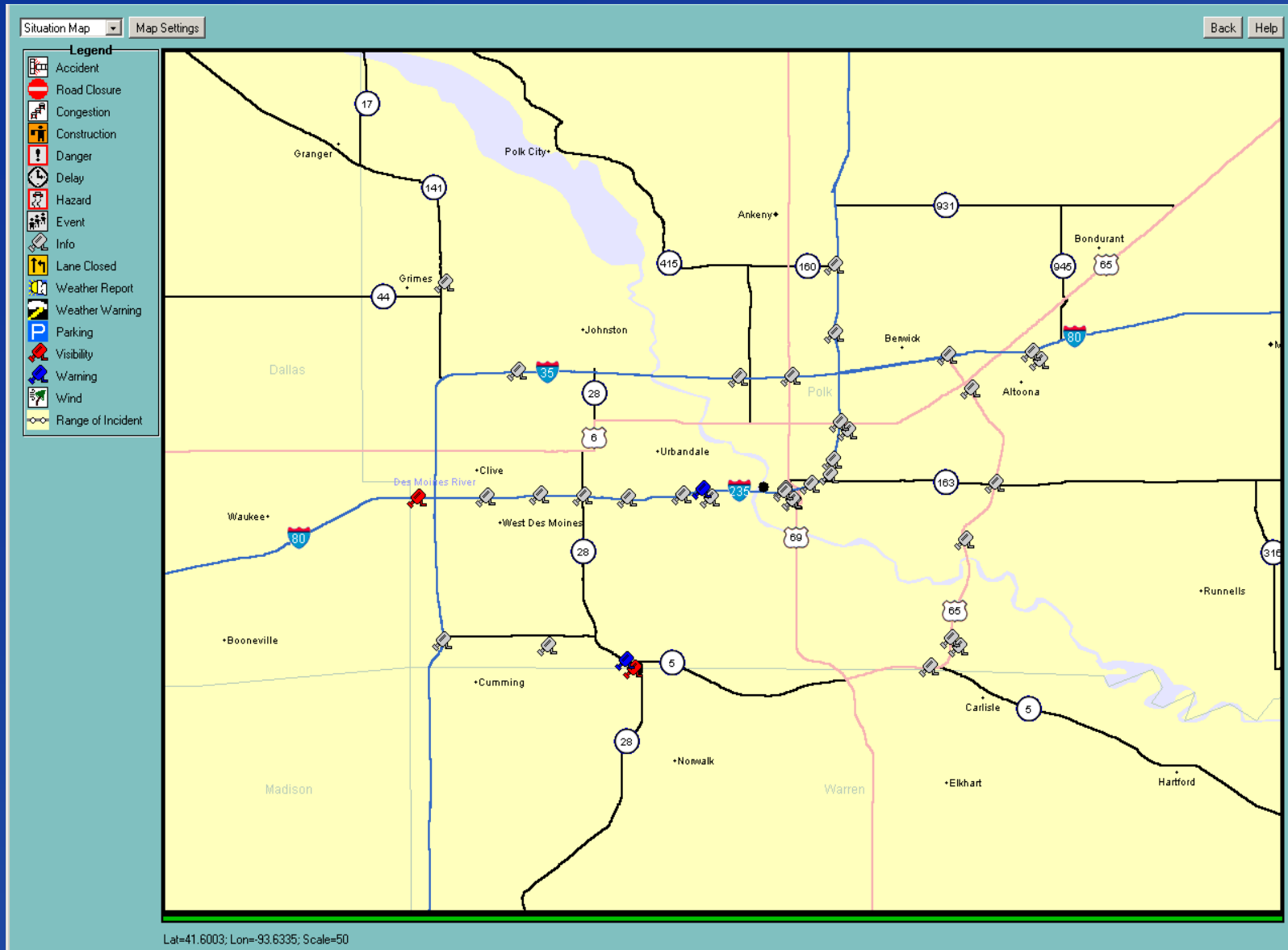
**Area Controls**

**Mouse Action**

Left is Zoom  
Right is Create Situation

# CARS-CCTV

# CARS-CCTV GUI





# CARS-CCTV Camera Control

http://67.106.3.232 - CCTV\_03 - Microsoft Internet Explorer

CCTV\_03  
N NE 00:50 Hold

Preset Views  
Edit Presets  
View Panoramas  
Create Situation

Close

Zoom

STATUS: Ready

Internet





# Rubber-banding Navigation



# Camera / Event Integration

- Create, edit, delete events from the CARS-CCTV GUI
- CARS-CCTV “knows” locations from camera positions

# CARS-Signs

# CARS-Signs GUI

Iowa Test CARS - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Situation Map View Settings Back Help

**Legend**

- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Ferry
- Info
- Lane Closed
- Weather Report
- Weather Warning
- Parking
- Visibility
- Warning
- Wind
- Range of Incident

Jehrotes

Des Moines River

Urbandale

West Des Moines

Lat=41.6256, Lon=-93.7169, Scale=197

Done

**DMS Dialog**

ACCIDENT AHEAD

MERGE LEFT

Add/Edit Message Queue

Java Applet Window

# CARS-Signs Decision Support

Events Entered Manually  
or Automatically



Triggers Decision Support



CARS Event  
"Bridge Closure"

XML Message to  
DMS Central Server



DMS  
Central  
Software

Message Posted



# DMS Plan Recommendation

DMS Recommendation - Microsoft Internet Explorer

## DMS Sign Recommendation

**Situation:**  
Accident on Spaulding Turnpike at Exit 8 (State Route 9)

**DMS Sign Location:**  
Spaulding Turnpike at Exit 6 (State Route 16); Facing Northbound Traffic;

**Current Message:**  
[No Message Currently Displayed]

**Recommended Message:**  
Accident Ahead

Accept Edit Ignore Reject

# CARS-Signs VSL Integration

FLCRS v03\_40\_001

Situation Map

**Legend**

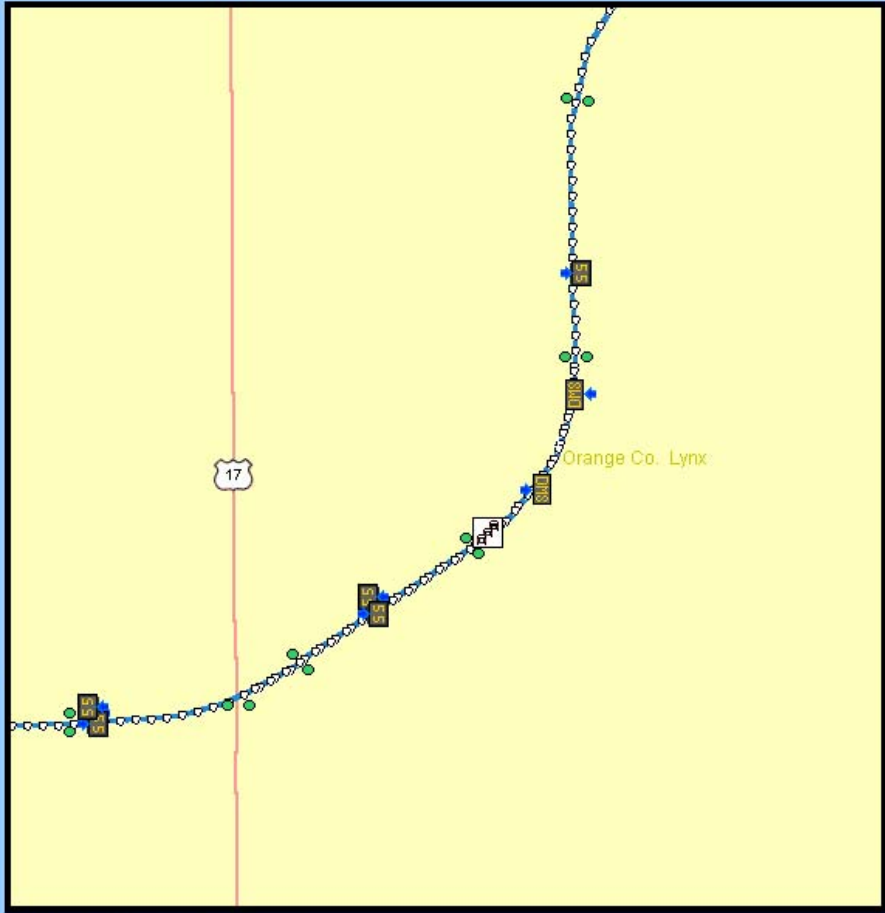
- Accident
- Road Closure
- Congestion
- Construction
- Danger
- Delay
- Hazard
- Event
- Ferry
- Info
- Lane Closed
- Weather Report
- Weather Warning
- Parking
- Visibility
- Warning
- Wind
- Range of Incident
- 511 Report
- DMS Sign
- Traffic Detector

**Incoming Messages**

Region: **Statewide**

Require Approval: **0**

On Hold: **0**



Lat=28.5178; Lon=-81.3902; Scale=50

**Pan/Zoom Controls**

**Area Controls**

**Mouse Action**

Left is Zoom  
Right is Create Situation

# VSL Plans

- Heavy Traffic VSL Plan
- Adverse Weather VSL Plan
- Accident / Incident Plan
- Construction / Manual



# CARS-Signs VSL GUI

FLCRS v03\_40\_001

Back

**Situation List**

Show Nearby Situations Only

Brief descriptions: All situations Sort by End Time  History Refresh

5529. **8:17 PM, 07/20/05** flcars-7000.170 Author: admin traffic flowing freely on I-4 westbound from Exit 75A - Universal/International Drive and to SR 435 South ( Universal/International Drive and to SR 435 South ) to Exit 67 - SR 536 East ( SR 536 East ) since 11:50 AM, 07/19/05 until 8:17 PM, 07/20/05 Priority level: lowest Confidence level: non-expert report Access level: public domain

5530. **8:17 PM, 07/20/05** flcars-6999.170 Author: admin traffic flowing freely on I-4 westbound from Exit 81A - Michigan Street ( Michigan Street ) to Exit 75B - SR 435 North (Kirkman Road) ( SR 435 North (Kirkman Road) ) since 11:50 AM, 07/19/05 until 8:17 PM, 07/20/05 Priority level: lowest Confidence level: non-expert report Access level: public domain

5531. **8:17 PM, 07/20/05** flcars-6998.170 Author: admin traffic flowing freely on I-4 westbound from Exit 87C - Anderson Street ( Anderson Street ) to Exit 87A - SR 408 (East-West Expressway) ( SR 408

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**I-4 VSL Signs**

**Eastbound**

MP 79.15	MP 79.15	MP 80.4	MP 81.5	MP 83.88	MP 85.4	MP 85.9	MP 87.0	MP 88.8	MP 88.8
Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = ???	Current Speed = 50	Current Speed = ???	Current Speed = ???
50 ▾	50 ▾	50 ▾	50 ▾	50 ▾	50 ▾	X	50 ▾	X	X

**Westbound**

MP 88.8	MP 88.8	MP 87.0	MP 85.9	MP 85.4	MP 83.88	MP 81.5	MP 80.4	MP 79.15	MP 79.15
Current Speed = ???	Current Speed = ???	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 50	Current Speed = 55	Current Speed = 55
X	X	50 ▾	50 ▾	50 ▾	50 ▾	50 ▾	50 ▾	55 ▾	55 ▾

Cancel Select Sign Defaults Update Posted Speeds

# CARS-Radio



Browser-based  
CARS data entry

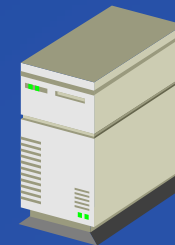


CARS



*Automated,  
Custom,  
Live Content for  
HAR/LPFM*

*No new data entry*

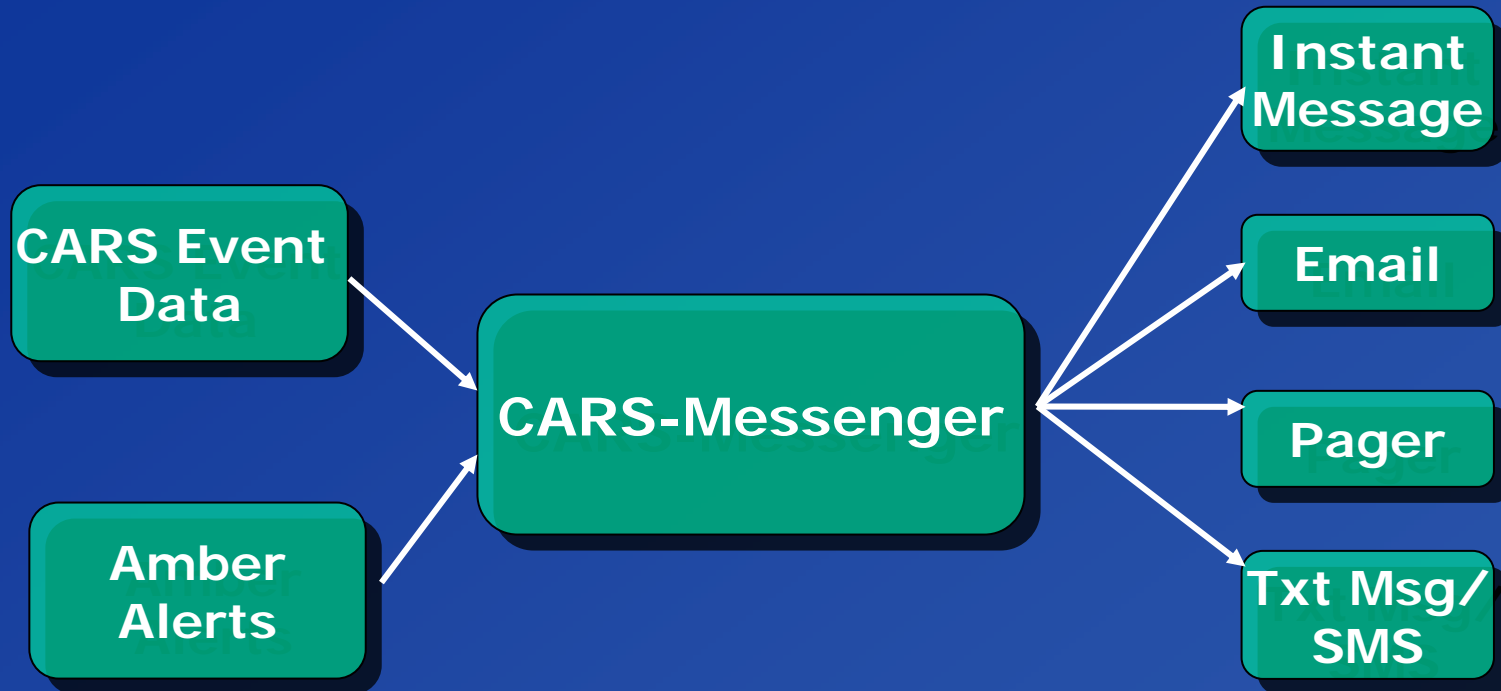


CARS-Radio

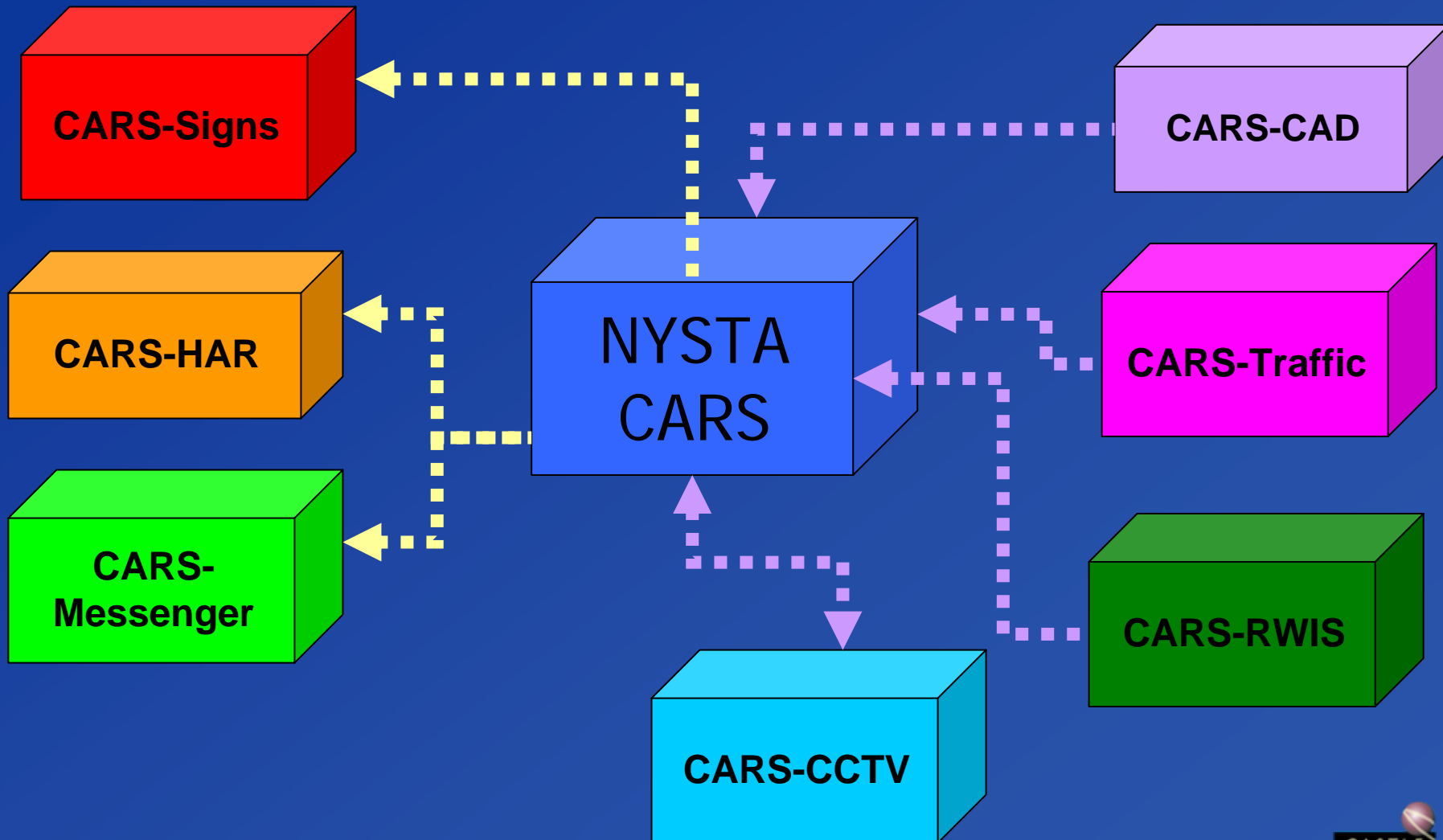


# CARS-Messenger

# CARS-Messenger



# Information Collection and Information Sharing



# Summary

- NYSTA CARS: From Condition Reporting System to Traffic Management System
- Module-by-Module
- CARS Consortium Pooled Fund