Tennessee 511 Program and the Future of ATIS and ATMS

Presentation to ITS Tennessee
2011 Annual Meeting
Points of Discussion

- Short overview of the problems facing Agencies and Travelers
- How to Integrate ATIS and ATMS features
  - Something for everyone
  - System requirements
  - The user experience
- Analytics and Decision Support
- Next Steps for TN
- Questions and Answers
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Agency and Traveler Problems
Problem Statement

- Daily traveler information is at best sporadic.
- Integrated multi-modal information is rarely available.
- Much of the data is insufficient, incomplete and untimely.
- Service providers have limited access to real-time data.
- Rarely do systems provide any useful transit information.
- Generally only freeway routes are covered.
- Travelers have to search for information to assist them in making decisions.

Agencies have insufficient information to fully manage the entire transportation network and are therefore unable to disseminate accurate, timely and useful information to the traveling public.
Congestion is on the Increase

- Peak in 2006 — Yellow Ribbon
- Peak hours start an hour earlier in 2007
- Congestion continues to grow, nearing peak of 2006
- Currently starting earlier and finishing later
- Trend cannot continue
Use - Information Gathering
Agency - Information Gathering

Silo’d Operations
Disparate non-integrated systems
Older-style communication
Limited Infrastructure Intelligence

Data in different formats
Limited aggregation of information
Limited real-time Information
Almost no Prediction Capability
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Integrating ATMS and ATIS
Something for Everyone – Travelers

Car Driver
- Real-time and predictive Road Speeds
- Real-time weather Information
- Incidents and Construction Alerts
- Parking Guidance Destination
- Nearby Services
- HOT-HOV Lane utilization
- Congestion Charging
- Toll Plaza Information

Transit User
- Real-time transit information
- Late running alerts
- Nearby Services
- Special Events Information
- Parking Guidance Origin
- On-demand Transit

Shipper
- Real-time and predictive Road Speeds
- Real-time weather Information
- Incidents and Construction Alerts
- En-route Truck Parking Guidance
- Roadway Capabilities
- Permitting
- Freight user charging
- Economic Analysis

Agency
- Operation Coordination
- Operational real-time data
- Network efficiency
- Real-time and predictive Road Speeds
- Real-time weather Information
- Schedule Adjustment
### Typical Real-time Data Feeds
- Road Data Sensing
- Computer Aided Dispatch

### Speed, Occupancy, Volume
- Automatic Vehicle Location
- Weather Conditions

### On-the-move Solutions
- Social Applications
- Real-time User Alerting
- IVR

### Outbound IVR
- Next Services

### Web Advertising
- Revenue Generation Opportunities

### Open Mobile Framework
- Common GIS/Map Platform
- Early Standards Adoption
- C2C Interconnectivity

### Browser-based Solutions
- Corridor Management
- Multi-Modal Trip Planning
- Traffic Planning
- Incident/Event Management

### Core System
- Common Technology Platform
- Real-time Data Fusion and Aggregation

### Mobile Advertising
- Revenue Generation Opportunities

### Specialized Mobile Apps
- Broadcasting
- Travel Time Calculator
- Traffic Prediction
- Traffic Planning
- Mobile Ticketing
- Transit Planning
- Car Sharing
- Car Parking
- Travel Angels
- Truck Parking

### Open Framework
- API Sandbox
- Out-sourced Framework
- Outbound XML

### Typical Static Data Feeds
- Transit Schedules
- DMS Locations
- Road Link Definitions
- HOV Lanes
- Transit Patterns
- Sensor Locations
- Places of Interest
- Express Lanes
- Transit Stops
- CCTV Locations
- Aliases
- Local Names
- Transit and Traffic Hubs

### Processing Information
Disseminating Services

- Must plan for different user types requiring different services
- Must differentiate between pre-trip and on-trip requirements
- Must plan for higher level of personalized services
In Summary

Provide a tool to assist the management and planning of an entire transportation network including:

- Incident and event management
- Data aggregation, fusion and dissemination
- Information portal delivery
- Multi-channel Delivery
- Consolidated platform for ease of solution integration
- Traffic simulation engine
- It can accept data from almost any source
- It has full GIS capability

The solution needs to be a full integrated Decision Support System which enables the best possible flow across the network by encouraging and facilitating the most efficient blend of traffic, freight and transit needs.
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What do users really want?
Traffic Information

- On Street Parking
- Off Street Parking
- Congestion Charging
- Travel Alerts
- Travel Angels
- Speed Maps
- Traffic Prediction
- Mobile Apps
- Incident Information
- Weather
Transit Information

Transit Route Information
Next Departures
Facility Information
Nearby Services
Detour Information
Bus Stop Locations
Trip Planning
Cycle Facilities
Disabled Access
Steps, Elevators, Escalators
Parking
Fares
Create new event

1. Main info
   - Event Type: Incident
   - Mode: Traffic

2. Times
   - Available incidents types:
     - Abnormal load
     - Accident cleared
     - Accident
     - Aboarded Vehicle

3. Contact info
   - From:
     - Facility / Route: IH 77
     - Type of point: I-20
     - Exit: 86 - Richardson
     - Cross Street: US 75
   - To:
     - Facility / Route: IH 77
     - Type of point: Mile Marker
     - Exit: 86 - Richardson
     - Mile Marker: Between Exit 86 and Exit 87

4. Edit schedule
   - Same Facility/Route as Point To?

5. Edit description
   - Direction: North
   - Status: Closed
   - Lanes affected: 3

6. Alert / Alarm setup
   - Place of Interest:
     - Cross Street
     - Exit
     - Mile Marker
   - Mile Marker:
     - I-20
     - I-30
     - I-45
     - IH 77
     - US 75
     - IH 635
     - IH 69
     - IH 80
     - IH 820

Optional steps

Save Draft
Cancel
Next Step
Description
### VMS # 367 – US 77 North

**Warning:** Severe delays due to overturned truck on IH 77!

**Message:**

```
IH85 E NORTH AT IH 635
RIGHT LANE CLOSED
```

**Details:**
- **VMS Name:** 367 – US 77 - North
- **Type:** NTCIP Compliant
- **Connection:** https://123.234.44.54
- **Location:** 123456.45 – 7654323.78
- **Owned By:** TXDOT
- **Matrix:** 18 x 3
- **New Message:** Severe Delays Due to Overturned Truck

Click [Post Message](#) to update the VMS.
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Analytics & Decision Support
Analytics & Performance Monitoring

Rule #1 – You must have the data!

Add Value
- Turn Data into Information
  “Actionable Intelligence”
- Develop Criteria for Action

Evaluate & Reassess
- Performance Monitoring
- Pattern Detection
- Causal Analysis

How important is the data?

Answer:

See Rule #1
Decision Support Systems

What is a Decision Support System?

- **Data Driven**
  - Queue Detection
  - Speed Thresholds
  - Pavement Temperature
  - AQ Thresholds

- **Model Driven**
  - Scenario Comparison
  - Predicted Conditions

- **Expert System – Rules Based**
  - Policies & Procedures
  - Conditional Execution
  - Arbitration Rules
Decision Support Systems

**Inputs**
- Real-Time Traffic Data (Data Fusion)
- Predictive Traffic Data
- Incident Data
- Weather Data / Forecast
- Planned Events

**Incident Response Plan Generator**
Expert System / Rules-Based Multivariate Analysis

**Rules / Considerations:**
- Incident (new, modified, terminated)
- Incident Type / Severity
- Congestion Thresholds
- Safety Thresholds (crash probability)
- Location – Geo-Spatial Analysis
- Coordinate with Nearby Incidents
- Arbitrate between competing plans
- Plan Effectiveness (based on historical)
- Failed Devices

**Plan Execution**
- In-Vehicle Messaging
- Transit Plans
- Variable Speed Limits
- Lane Control / Ramp Metering
- HAR
- CCTV
- Fax-Email-SMS Messaging

**Auto Mode?**
- Yes
- Operator Select / Confirm
- No
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Next Steps for Tennessee
Thank you