From Integrated Corridor Management To Integrated Regional Mobility
Agenda

➢ Regional Mobility
➢ Dallas ICM
➢ Operational Needs
➢ Expansion and Enhancements
➢ Transit Improvements
➢ MPO’s Leadership
➢ Future Direction
Smart… Transformation…

Smart Mobility

ICM
City Platform for Operators and Citizens

ATMS
Advanced Traffic Management Systems

Smart City

Public Services
Security
Emergency
Urban Services
Buildings
Efficiency

Utilities
Energy
Water
Efficiency

Citizens
E-government
Social
Companies

Integrated Corridor Management
US 75 Corridor Networks

- Freeway with continuous Frontage Roads
- Managed HOV lanes
- Dallas North Toll way
- DART Bus and Ligh Rail Network
- Three Cities, 900 Signals, 167 Miles of Arterials
- Multiple TMCs
- Regional ATIS
Incident Creation

(20151160802305074) Traffic inci... Dallas/Ft. Worth Area, US 75 Northbound/TxDOT Dallas at Celina

AFFECTED Lanes

QUICK COMMANDS

DESCRIPTION

TxDOT Dallas: Due to accident on US 75 Northbound (TxDOT Dallas) at Galatyn Pkwy (6.79); Affected Lanes: right shoulder (closed), lane 1 (closed), lane 2 (narrowing)

OWNED BY

CREATED BY

You (TxDOTAdmin) (TxDOT Dallas) TxDOTAdmin (TxDOT Dallas)

START

Today 09:08 AM

Unknown

Event: (20151160802305074) TxDOT Dallas: Due to accident on US 75 Northbound/TxDOT Dallas at Galatyn Pkwy (6.79); Affected Lanes: right shoulder, lane 1 (closed), lane 2 (narrowing)
### DSS Expert Rule Engine Process

#### Rules

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<td>3</td>
<td>15</td>
<td>14</td>
<td>65%</td>
<td>68%</td>
<td>4%</td>
<td>2%</td>
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#### Strategies

- Short Diversion to Frontage
- Long Diversion to Frontage
- Diversion to FR. + Greenville.
- Diversion to FR. + Greenville + Transit

DSS Picks a Strategy based on the Rules

FR = Frontage Rd.
GV = Greenville

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Agencies Readiness

(2015111608082305074) Traffic inci...
Dallas-Fort Worth Area, US 75 Northbound (TxDOT Dallas) at Gala...

AFFECTED Lanes

QUICK COMMANDS

DESCRIPTION

TxDOT Dallas: Due to accident on US 75 Northbound (TxDOT Dallas) at Galatyn Pkwy (8.79). Affected Lanes: right shoulder (closed), lane 1 (closed), lane 2 (narrowing)

OWNED BY
You (TxDOTAdmin) (TxDOT Dallas) TxDOTAdmin (TxDOT Dallas)

START
Today 08:08 AM

END
Unknown

Status
Devices/Resources
Plans

SYNC

PLAN

11/16/15 08:11:12 AM
+00:00:01

J75N271 X (TXDOT DALLAS, ... 3/3

CONFIRM CANCEL

DU - DART

CORU - Richardson

COPU - Plano

Plan Implementation

Plano: Plano: Activate Flex Group 19

Richardson: Richardson: Activate Flex ...

DART: DART: Monitor every 15 min.

TxDOT Dallas: Enable DMS Message#1

Plan Termination

ICM: Wait time: 0:00:01

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TxDOT Response

(201511608082305074) Traffic inci...
Dallas-Fort Worth Area, US 75 Northbound (TxDOT Dallas) at Galatyn Pkwy (8.79). Affected Lanes: right shoulder (closed), lane 1 (closed), lane 2 (narrowing)

QUICK COMMANDS

DESCRIPTION
TxDOT Dallas: Due to accident on US 75 Northbound (TxDOT Dallas) at Galatyn Pkwy (8.79). Affected Lanes: right shoulder (closed), lane 1 (closed), lane 2 (narrowing)

OWNED BY: You (TxDOTAdmin) (TxDOT Dallas)
CREATED BY: TxDOTAdmin (TxDOT Dallas)
START: Today 08:08 AM
END: Unknown

Plan Implementation

Plano: Plano: Activate Flex Group 19
+00:08:01
Richardson: Richardson: Activate Flex ...
+00:08:01
DART: DART: Monitor every 15 min.
+00:08:01
TxDOT Dallas: Enable DMS Message#1
YES | NO
Incident Closed, Plan Terminated
Additional Needs

► Improved User Interface / Map Centric
► Improved Event Management
► Situation Awareness
► Regional Expansion
► Resources and Responsibilities Sharing
► Sharing of ICM Coordinator Responsibility
► Transit Applications
► Video Sharing
► Dynamic Performance Measures
Improved Event Management
Situation Awareness
Event Ownership / Transfer
# ICM Coordinator Flexibility

![ICM Coordinator Flexibility](image_url)

## User List

<table>
<thead>
<tr>
<th>Login name</th>
<th>Name</th>
<th>Organization</th>
<th>Active</th>
<th>Profiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORManager</td>
<td>CORManager</td>
<td>Richardson</td>
<td>Yes</td>
<td>Richardson: ICM User, Operator</td>
</tr>
<tr>
<td>CBurgan</td>
<td>Craig Burgan</td>
<td>TxDOT Dallas</td>
<td>Yes</td>
<td>TxDOT Dallas: Operator</td>
</tr>
<tr>
<td>CJanecki</td>
<td>Curtis Janecki</td>
<td>TxDOT Dallas</td>
<td>Yes</td>
<td>TxDOT Dallas: Operator</td>
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<tr>
<td>DallasAdmin</td>
<td>DallasAdmin</td>
<td>Dallas</td>
<td>Yes</td>
<td>Dallas: ICM User, Operator, Operator / TxDOT</td>
</tr>
<tr>
<td>DallasUser</td>
<td>DallasUser</td>
<td>Dallas</td>
<td>Yes</td>
<td>Dallas: ICM User, Operator</td>
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<tr>
<td>DalTransAdmin</td>
<td>DalTrans Admin</td>
<td>DalTrans</td>
<td>Yes</td>
<td>DalTrans: Manager</td>
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<tr>
<td>DalTransUser</td>
<td>DalTransUser</td>
<td>DalTrans</td>
<td>Yes</td>
<td>DalTrans: Operator</td>
</tr>
<tr>
<td>DanLoving</td>
<td>Dan Loving</td>
<td>DART</td>
<td>Yes</td>
<td>DART: Operator</td>
</tr>
<tr>
<td>DARTAdmin</td>
<td>DARTAdmin</td>
<td>DART</td>
<td>Yes</td>
<td>DART: ICM Coordinator, Organizer</td>
</tr>
<tr>
<td>DARTAdmin1</td>
<td>DARTAdmin1</td>
<td>DART</td>
<td>Yes</td>
<td>DART: Operator, Organization administrator</td>
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<tr>
<td>DARTUser</td>
<td>DARTUser</td>
<td>DART</td>
<td>Yes</td>
<td>DART: ICM User, Operator</td>
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</tbody>
</table>

[Click to view full page](link)
Real Time Transit Information
<table>
<thead>
<tr>
<th>Incident Management Systems</th>
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</thead>
<tbody>
<tr>
<td><strong>INCIDENT LOGGED</strong></td>
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<tr>
<td><strong>RAIL MOVEMENT MONITORED</strong></td>
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<td><strong>STAFF/PUBLIC INFORMED</strong></td>
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<td><strong>EVENT OBSERVATION</strong></td>
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<td><strong>RESPONSE</strong></td>
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<tr>
<td><strong>COORDINATION</strong></td>
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<tr>
<td><strong>OTHER TECHNOLOGY</strong></td>
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Incident Response Plan #1:
LRT RAIL DISRUPTION SHUTTLE
LOVERS LANE STATION & MOCKINGBIRD STATION

Instruction: Initiate Bus Bridge to transport passengers between Lover’s Lane Station and Mockingbird Station.

ROUTING TO MOCKINGBIRD STATION (Use Destination Code 04) FROM LOVERS LANE STATION
- L. MILTON TO EXIT LOVERS LANE STATION
- R. GREENVILLE
- R. YALE
- L. WORCOLA
- R. INTO MOCKINGBIRD STATION

ROUTING TO LOVERS LANE STATION (Use Destination Code 06) FROM MOCKINGBIRD STATION
- L. OUTER ROAD TO EXIT MOCKINGBIRD STATION
- L. TWIN SIXTIES
- R. US 75 FRONTAGE ROAD
- R. LOVERS LANE
- R. GREENVILLE
- R. INTO LOVERS LANE STATION

Use bus requirements and supervisory staff for Bus Bridge

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Pass/Hr</th>
<th>Bus Require.</th>
<th>Supervisors Required at each station</th>
<th>Police or fare enforcement</th>
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<tbody>
<tr>
<td>Before 6:00 am</td>
<td>600/hr</td>
<td>8 buses</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6:00 am to 9:00 am</td>
<td>1600/hr</td>
<td>20 buses</td>
<td>2</td>
<td>2</td>
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<tr>
<td>9:00 am until 3:00 pm</td>
<td>600</td>
<td>10 buses</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3:00 pm until 7:00 pm</td>
<td>1600</td>
<td>20 buses</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>After 7:00 pm</td>
<td>600</td>
<td>8 buses</td>
<td>2</td>
<td>2</td>
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</tbody>
</table>

Step #1: Announce Change in Operation to Train operators and trains supervisors.
Step #2: Notify Bus Control to Set up Bus Bridge #1 between Lovers Lane Station and Mockingbird Station at 9:00 am.
Step #3: Order 10 buses including 5 at Mockingbird and 5 at Lovers.
Step #4: Request DART Police, Fare Enforcement, Bus Supervisors.
Step #5: Notify DART PIO to inform community and users.
LRT Rail Distruption Shuttle

US 75 @ Mockingbird SB
(-96.78866767871439, 32.8307491736944)

SIGN ON STREET

ALL RED LINE SERVICE SUSPENDED

QUICK COMMANDS

Status Edit New Stack Commands

US75 @ Mockingbird

Lovers Ln. Stn.

Bus Bridge

Mockingbird Stn.

ALL RED LINE SERVICE SUSPENDED
Bus Bridge Response Plan
Video Sharing

- ETX Universal Video Distribution & Video Streaming
  - From Any CCTV system (MPEG-2/ MPEG-4, H.264, ...)
  - To Any web/OS Platform
- Existing Network
  - Existing CCTV System
  - ISR Router
  - Secure VPN Tunnel
- North Texas Tollway Authority
- TxDOT Dallas District
- North Central Texas Council of Governments
- Cities of Dallas, Highland Park, Richardson, Plano, and University Park
- Any ITS Platform
- Software
- Dallas ETX 511 Network
- Stateful Firewall
- Internet
- Any Live CCTV Cameras

From
Any CCTV system
(MPEG-2/ MPEG-4, H.264, ...)
To Any web/OS Platform

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Data Analytics & Performance Measures

**Analytics**

- **Descriptive Analytics**
  - (Business Intelligence)
  - What happened?
  - What is happening?
  - Reports, Dashboards & Ad-hoc Reporting

- **Predictive Analytics**
  - (Advanced Analytics)
  - What will happen?
  - Data Mining, Machine Learning, Statistics
  - Time-series forecast, relations & patterns discovery, automatic classification

- **Prescriptive Analytics**
  - What should I do?
  - Optimization, simulation, heuristics decision modelling

**Historical Data Analytics**
- Big Data Store and Visual Analytics, Interactive Data Exploration, Ad-hoc reporting/dashboarding

**Real-time Data Analytics**
- Real-time Dashboards for Operation, Predefined set of PEMs

**Traffic Patterns & Prediction**
- Traffic Data Profiling Tool,
- Traffic Prediction & Anomalies Detection,
- Custom Visualization

**Traffic Simulation**
- Action Plans Evaluation, What-if Analysis

**Generic COTS Solution**
- (Qlik, HP Vertica)

**EcoTrafIX Dashboards**
- (OLAP Engine)

**EcoTrafIX Expert Tool**
- (Custom Algorithms)

**External Tools**
- (PTV, Aimsun, etc)
Clustering configuration and target link

Traffic Pattern Recognition

Day profile

Cluster tags distribution

Day classification

<table>
<thead>
<tr>
<th>Cluster tags</th>
<th>Grouped</th>
<th>Stacked</th>
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<td>bank_holiday</td>
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<td>dt_thursday</td>
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<td>dt_saturday</td>
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<td>dt_sunday</td>
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<td>weather_bad</td>
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<td>weather_median</td>
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Data Provisioning & Presentation Layer
Expand on Regional Information

- Expand on the region’s investment and existing data interfaces
- Bike Routes, Airport and Tolling
- Fuse DTN and CASA Weather Data Providers
- Complete existing Google Transit Trip with HERE Route Planning
- Access HERE Archived Traffic Information
- Access to WAZE Event information
- Access to DART Information Publisher
- Mobile Application Crowdsourcing

Phase I (Basic data for the Expert Rules and Simulation Model)

Phase II (Transit, ITS Devices Status and HOV)

Phase III (Weather Alerts, forecast and radar)

Phase IV (Arterial Data, forecast and radar)

Phase V (Parking Management, AVL, APC)

- Bike Routes / Airport / Tolling
- (CASA / DTN) Fused Weather Data
- HERE Route Planning / Archived Traffic Data
- WAZE Traffic Information
- DART Publisher (Service Disruption / Bus Bridges)
- Mobile Application (Crowdsourcing)
511DFW NextGen Architecture

Collection & Fusion platform

DSS Subsystem
- Predictive
  - Evaluation
  - Rules Engine

IEN Subsystem (EcoTrafiX)
- EcoTrafiX
  - Performance Measures
  - Data Mart

DataFusion Subsystem

Collection & Fusion platform

- C2C (TxDOT)
- Transit AVL/APC/G TFS
- Weather Radar CASA
- Weather DTN
- Parking Management
- HERE (RT, Archive) Traffic
- HERE Route Planner
- Google Transit Planner
- Other Data Sources: WAZE, Uber

Public Web
- IVR
- Public XML
- Trip Planner
- Social Media
- MyTravel Portal - Alerts
- Mobile Application
Organization

Policy Members

General Members
High Level Architecture

- Regional Partners
- Data Mart (Web Services)
- EcoTrafiX Application (Interactive Map / Operators /Plans)

Data Fusion and Data Archiving

- NITTEC System CrossRoads
- I3B Data: NYSDOT, NYSTA, Erie County, MTO
- Border Crossings Data: Peace Bridge
- OpenReach Data
- Niagara Falls Authority
NYSDOT R11 Proposed Conceptual Architecture