Integrated Corridor Management

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USDOT ITS Joint Program Office
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ICM Program Objectives

1. Demonstrate and evaluate pro-active integrated approaches, strategies, and technologies for efficient, productive, and reliable operations.

2. Provide the institutional guidance, operational capabilities, and ITS technical methods needed for effective Integrated Corridor Management.
ICM Building Blocks for Success

**Institutional Integration**
Cooperation to collaboration between various agencies and jurisdictions that transcends institutional boundaries.

**Operational Integration**
Multi-agency and cross-network operational strategies to manage the total capacity and demand of the corridor.

**Technical Integration**
Sharing and distribution of information, and system operations and control functions to support the immediate analysis and response.
ICM Pioneer Sites

- Dallas, TX (US 75)
- Pioneer Sites
  - Dallas, TX
  - Houston, TX
  - Minneapolis, MN
  - Montgomery County, MD
  - Oakland, CA
  - San Antonio, TX
  - San Diego, CA
  - Seattle, WA

San Diego, CA (I-15)
Demonstration and Evaluation Schedule

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<td>ConOps</td>
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**Dallas, TX**

**San Diego, CA**

- Design-build
- "Go Live"
- Operation

- Pre-deployment Framework
- Test plans
- 12 month pre-deployment data collection
- 12 month post-deployment data collection
- Final Report
Example ICM Strategies – Dallas

- Divert onto frontage roads, arterials, and/or light rail, depending on severity of event on freeway
- Implement dynamic signal timing to maximize throughput on diversion routes
- Provide real-time information on traffic conditions (including speeds), public transit, and parking availability through 511 system
- Provide diversion recommendations (including mode shift to light rail) on dynamic message signs, under certain conditions
Example ICM Strategies – San Diego

• Provide en-route and pre-trip traveler information and enhanced transit network information through a new 511 smartphone app for trip decision-making

• Coordinate signal timing with ramp meters to optimize mode shifts between the freeway and arterials

• Deploy dynamic wayfinding signs on arterials to re-direct diverted traffic back to freeways
ICM Decision Support Systems

- PREDICTION ENGINE
- DYNAMIC RESPONSE PLAN SELECTION
- VISUALIZATION
- DATA FUSION
- MESO AND MICRO SIMULATION
- BUSINESS PROCESSES
- AUTOMATION

PERFORMANCE MONITORING → RECALIBRATION OF DSS
ICM DSS Process – San Diego

Predict
- Next 60 minutes
- Every 5 minutes

Decide
- Capacity
- Availability
- Posture

Evaluate
- Response Strategies
- 15 minute interval

Control
- Send to the field
- Monitor

Algorithmic adjustment of simulation demand-seed every 15 mins from field-data.

Inputs from Operational Concept to evaluate prediction MOE’s - formulate a strategy to respond

Response Strategies are evaluated against a “do-nothing” for person-throughput performance improvement

Top ranking Response Strategy is automatically pushed to the field, and monitored for successful implementation
ICM User Interface – San Diego
What’s Happening Now – San Diego

• Providing a Multimodal Open Data Feed
• Conducting Operational Review Meetings
  – Venue to check in and review system operations
    » Events and response plans occurring in past period
    » Performance statistics associated with events
    » Expectations regarding event identification and appropriate responses
    » Corridor configuration parameters (particularly congestion score, congestion event finder, congestion thresholds)
  – Ongoing process for discussing, reviewing, assessing, and ultimately modifying ICM system settings and response plans

Source: SANDAG
ICM Evaluation Questions

• Did the implementation of ICM:
  – Improve situational awareness?
  – Enhance response and control capabilities?
  – Provide better information to travelers?
  – Improve corridor performance?

• Did the implementation of ICM have a positive or no effect on air quality and safety?

• Did the benefits justify the costs?

• How and what role did DSS play?

• What were the institutional and organizational factors in success of the deployment?
ICM Evaluation Approach

- Analysis of Real-time System Data
- Panel Survey
- In-Depth Incident/Case Analysis
- MOVES Air Quality Modeling
- Modeling and Simulation for Person-based measures
ICM Evaluation Status

• Baseline (Pre-Deployment) Data Collection and Analysis – Completed
  – Conducted: Summer 2013
  – Publishing: Winter 2014
• Post-Deployment Data Collection and Analysis – Underway
  – Interim Results: Summer 2015
Demonstration Lessons Learned to Date

• Communicate regularly with partner agencies
• Apply systems engineering “V” process
• Factor time-intensive data collection and processing into schedule
• Decide on performance measures and evaluation criteria early in the process
• Keep funding sources and regional agreements for O&M in mind when designing ICM system
• Conduct a requirements walkthrough
• Make sure that requirements trace back to the original objectives, strategies, and needs
• Incorporate elements of ICM AMS methodology into transportation planning process (San Diego)
ICM Knowledge and Technology Transfer

• Guidance Documents
  – ICM Implementation Guide
  – ICM Analysis, Modeling and Simulation Guide

• Demonstration Site Model Documents
  – ConOps
  – System Requirements
  – High-level Design
  – Detailed Design
  – System Acceptance Testing
  – Evaluation Test Plans

• Workshops
  – Half-day introductory workshop
  – 1-2 day in-depth workshop
Learn More

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