Integrated Corridor Management

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U.S. DOT ITS-Joint Program Office
Agenda

• Background
• ICM Program
• ICM Fundamentals
  • What is a corridor?
  • Integration challenges
  • Management approaches
• Demonstration Sites
• Next steps
Surface transportation systems are made up of several independent networks:
- Freeways, bus/rail transit, arterials, etc.

Most efforts to reduce congestion have focused on optimization of individual networks:
- Agency/facility/mode – specific ITS systems & strategies

Minimal cross-network management in response to increased demand / reduction in demand
ICM Program Vision

- An opportunity exists to realize significant improvements in the efficient movement of people and goods through aggressive and proactive management of major multimodal transportation corridors.
Integrated Corridor Management
San Diego, CA (I-15)

Dallas, TX

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
Integrated Corridor Management

Let’s take a closer look...
Corridor

- Travel shed
- Linear geographic band
- Movement of people, goods, and services within and through the corridor
- Similar transportation needs and mobility issues
- Various networks that provide similar or complementary transportation functions
- Cross-network connections
Generic Corridor

Local Jurisdiction 1 – Traffic Signal System

Regional Rail Agency – Train Management System

State DOT – Freeway Management System

Bus Company – AVL System

Local Jurisdiction 2 – Traffic Signal System

Last mile service
Approaches and strategies based on the concept of **Load Balancing**

Time and Space

Supply

Demand
Integrated

**Institutional Integration**
Coordination 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 – Capability Maturity Model

- **Level 1: Initial**
  - Processes unpredictable, poorly controlled and reactive

- **Level 2: Repeatable**
  - Processes characterized for projects and is often reactive

- **Level 3: Defined**
  - Processes characterized for the organization and is proactive (Projects tailor their processes from organizational standards)

- **Level 4: Managed**
  - Processes measured and controlled

- **Level 5: Optimized**
  - Focus on process improvement

The diagram illustrates the progression from level to level, indicating the development and maturity of processes.
“Management”

ICM requires that the notion of managed corridors, and the active management of ALL individual facilities within the corridor, be considered.
The ACTIVE and INTEGRATED Continuum

Active, But Not Integrated

DESTINED END STATE: Active and Integrated

Early in Active and/or Integrated Operations

Integrated, But Not Active
Stakeholders

Who’s here today?
Who’s missing?

- Roadway Agencies
- Planning Organizations
- Private Sector
- Transit Agencies
- Activity Centers
- Fleet Operations
- Public Safety
- Other agency departments
- Traveler
# Institutional Approaches

<table>
<thead>
<tr>
<th>LESS FORMAL</th>
<th>MORE FORMAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad hoc arrangements based on near-term issues and personal relationships and interests</td>
<td>Dedicated resources, authorities, and a governing board that represents agencies in ICM development, implementation, and operation efforts</td>
</tr>
<tr>
<td>Informal working groups that meet regularly to address topics of more effective use of existing corridor capacity</td>
<td>Funded entity (i.e., a “corridor manager”) with full-time staff and well-defined responsibilities related to ICM operations</td>
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<td>Operating objectives for each agency understood. Formally established joint working groups with assigned responsibilities for ICM</td>
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# Integration Processes

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<tr>
<td><strong>COORDINATING</strong></td>
<td><strong>COLLABORATING</strong></td>
</tr>
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</table>
| › Informal information sharing  
› Common use of terms  
› Coordinated actions  
› Coordinated service delivery | › Shared corridor operations vision  
› Formal institutional partnering  
› Integration and interoperability planning  
› Joint ICMS project development  
› Shared use of resources |
| **COOPERATING** | |
| › Corridor information sharing  
› Corridor performance measurement  
› Corridor operating policy development  
› Corridor concept of operations  
› ICM requirements |
<table>
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<td>Alerts provided to stakeholder TMCs through Regional or Corridor ITS Architecture ITS information connectivity features. TMCs take action based communication among the stakeholders.</td>
<td>Corridor manager requests stakeholder TMC’s to provide particular controls according to ICM Operations Plan. Stakeholder may modify request before taking action. Modifications are reported to corridor manager.</td>
</tr>
<tr>
<td>Corridor manager directs stakeholder TMC to provide particular controls according to ICM Operation Plan.</td>
<td>Decision Support System OR Corridor manager directly controls corridor field devices (traveler information messages, signal timing, lane controls, transit priority, etc.) through ICMS according to agreed upon ICM Operations Plan.</td>
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### ICM Operational Approaches

#### Information Sharing/Distribution
- Information sharing (data, video)
- Information clearinghouse
- Corridor ATIS
- Using traveler information devices to describe conditions in other networks
- Shared control of CCTV

#### Operational Efficiency of Network Junctions
- Signal priority for transit
- Multi-modal electronic payment
- Transit hub connection protection
- Coordinated ramp metering/arterial signals

#### Accommodate/ Promote Route & Modal Shifts
- Modify arterial signal timing/metering rates/transit priority to accommodate shifts
- Promote route/ mode shifts via en-route traveler info devices
- Re-route buses

#### Manage Capacity-Demand Relationship (short/long term)
- Lane use control
- Convert regular lanes to transit
- Add transit capacity (additional vehicles/reduced headways)
- Open HOV lanes/shoulders
- Modify HOV requirements
- Variable speed limits
- Modify toll/transit/parking pricing

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#### Table: Less Integration vs. More Integration

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U.S. Department of Transportation
Federal Highway Administration
ICM Analysis, Modeling, and Simulation Sites

US-75, Dallas, TX  
I-394, Minneapolis, MN  
I-15, San Diego, CA
# Potential Benefits of ICM

## Three AMS Sites – Dallas, Minneapolis, and San Diego

<table>
<thead>
<tr>
<th>PERFORMANCE MEASURE AREAS</th>
<th>San Diego</th>
<th>Dallas</th>
<th>Minneapolis</th>
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<tbody>
<tr>
<td>Annual Travel Time Savings (Person-Hours)</td>
<td>246,000</td>
<td>740,000</td>
<td>132,000</td>
</tr>
<tr>
<td>Improvement in Travel-Time Reliability (Reduction in Travel-Time Variance)</td>
<td>10.6%</td>
<td>3%</td>
<td>4.4%</td>
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<tr>
<td>Fuel Saved Annually (in Gallons)</td>
<td>323,000</td>
<td>981,000</td>
<td>17,600</td>
</tr>
<tr>
<td>Tons of Mobile Emissions Saved Annually (in Tons)</td>
<td>3,100</td>
<td>9,400</td>
<td>175</td>
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ICM Benefits Far Outweigh Costs

**KEY:**
- 10-Year Cost
- 10-Year Net Benefit
- *Benefit Cost Ratio (italicized)*

San Diego: $104M, 10:1
Dallas: $264M, 20:1
Minneapolis: $82M, 22:1
Multi-level Analysis Tools Provide Comprehensive Insight

- Regional patterns and mode shift; Transit analysis capability
- Traveler information, HOT lanes, congestion pricing and regional diversion patterns
- Traffic control strategies such as ramp metering and arterial traffic signal control
ICM Demonstration Sites

I-15, San Diego, CA

US-75, Dallas, TX
Demonstrations Include:

- Joints operations agreements
- Transit options – LRT and BRT
- Mode, route, time shift approaches
- Improved junctions between modes and facilities
- Real-time multi-modal data integration
- Parking systems

- Responsive signal and meter operations
- Data availability to public/private
- Advanced Traveler Information approaches
- Shared and automated control
- Decisions Support Systems
Real-Time Decision Support Systems

- Prediction Engine
- Dynamic Response Plan Selection
- Mesoscale and Microscale Simulation
- Visualization
- Data Fusion
- Business Processes
- Automation
What’s next for ICM Program?

- ICM Demonstration operations
- ICM Demonstration evaluation
- ICM Deployment Planning Grants selection
- Technology transfer and Technical support
- Follow up research
- A second webinar, February 27, from 10:00–11:00 PST. Case Study
- The third and final webinar, March 27, from 10:00-11:00 PST. Case studies of smaller scale applications of ICM concepts from around the country.
Contact

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