Integrated Corridor Management Update

presented to

ITE California

presented by

Vassili Alexiadis

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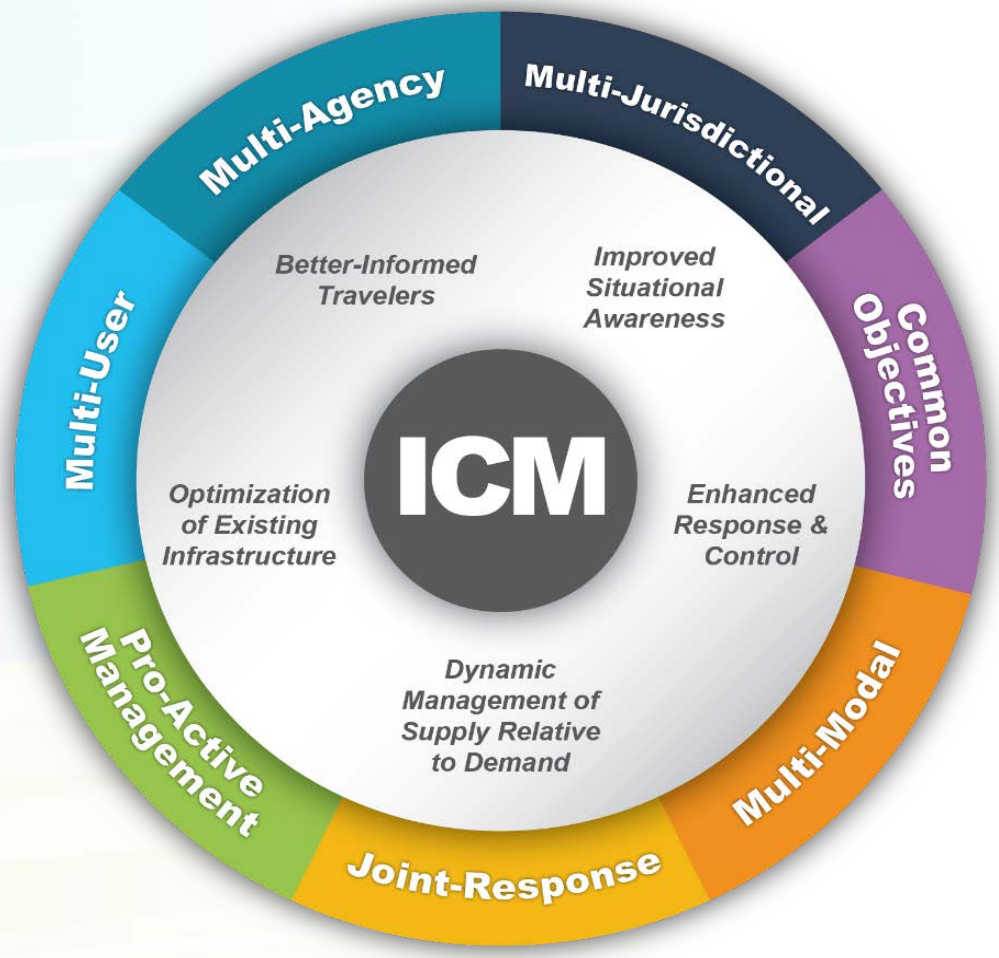
Think Forward

Goals of ICM

- Improve travel time
- Increase corridor person throughput
- Improve travel time reliability
- Improve incident management
- Enable intermodal travel decisions



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Nationwide ICM Activity - Examples

NCHRP 03-121 - Broadening Integrated Corridor Management Stakeholders

- Equip transportation decision makers with a systematic approach to engaging non-traditional stakeholder groups in ICM planning
- Give transportation decision makers the tools to present a strong case on why to involve non-traditional stakeholder groups
- Help transportation decision makers develop win-win scenarios to engage non-traditional stakeholder groups

Non-Traditional Stakeholders

Freight

- DOT freight committees
- Freight associations
- Trade associations and user groups
- Major carriers
- Major freight rail carriers
- Distribution centers
- Port authorities

Transit

- State DOT transit groups
- Regional MPO transit planning groups
- Transit agencies at the local, intercity, and regional levels
- Rail, bus, ferry, private shuttle, streetcar, paratransit agencies
- Transit advocacy group/citizens committee

Incident Responders

- State and local law enforcement
- Fire and Rescue
- Emergency medical services
- Towing and recovery
- Medical examiner
- HazMat responders
- Border patrol
- Coroner's office

Non-motorized Roadway Users

- State and local bicycle coalitions
- Local and regional advocacy groups
- Bicycle and pedestrian planning groups at local and regional agencies
- Pedestrian advisory groups/committees

ICM Planning Framework

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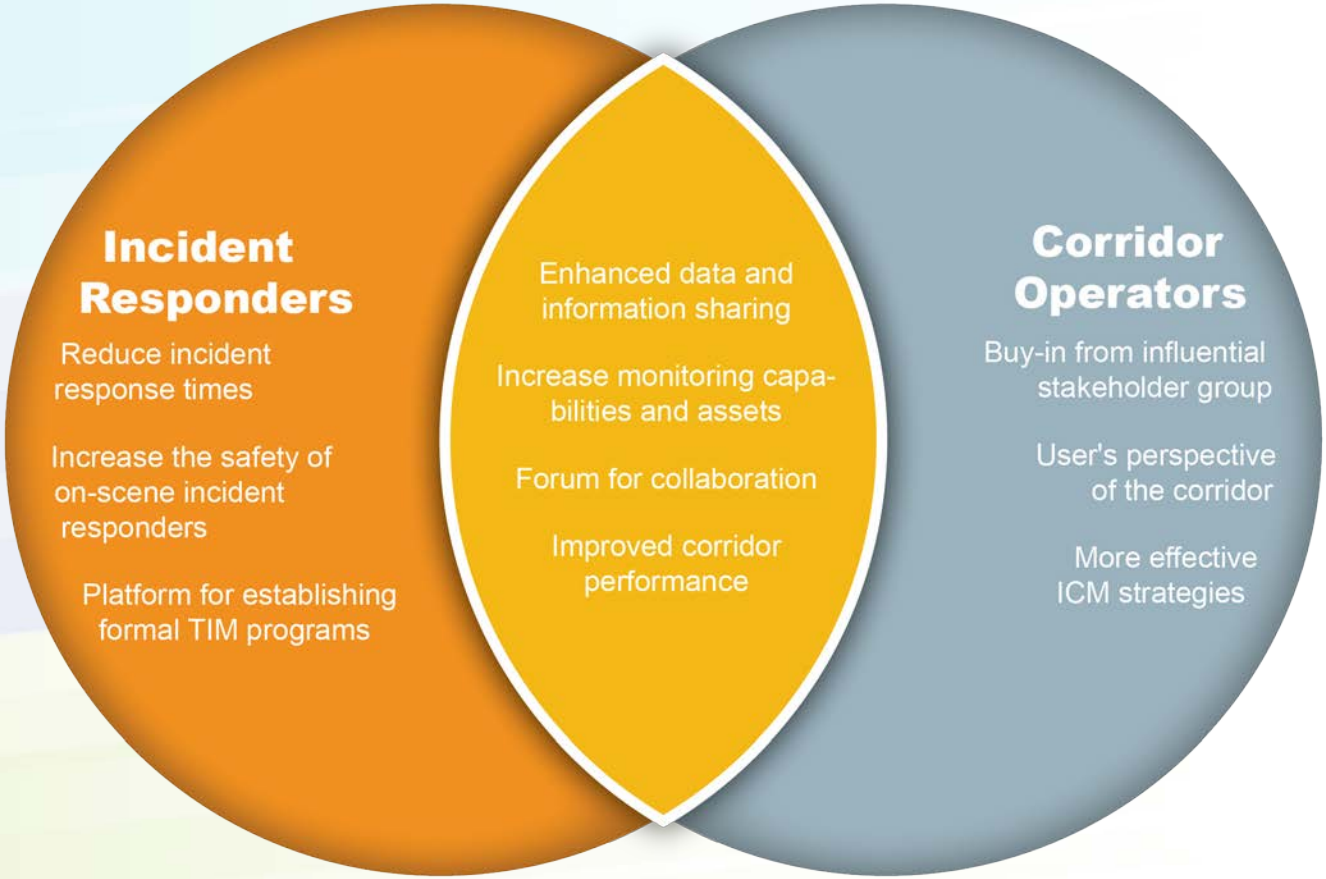
Potential Freight Decision Makers

End-User	Operations-Level	Program-Level
Freight vehicle operator	*Trucking associates*	*State or regional transportation commissions*
Dispatchers	*Port staff*	*Metropolitan planning organizations*
Fleet managers	*Marine terminal operators*	*Trucking associations*
Fleet supervisors	*Non-vessel operating common carrier*	*Port authorities*
	Beneficial cargo owners	*Freight company executive and management staff*
	Rail company operators	*U.S. DOT*
	Dispatchers, fleet managers, supervisors	

Transit Needs

Goals and Objectives	Main ICM Concerns	Potential ICM Strategies
• Reliability • System efficiency • Safety • Affordability • Accessibility	• Making a case for ICM • Potential for negative transit impacts • ITS investment coordination • Potential interoperability issues • One-directional information flow • Lack of ITS infrastructure • Restricted access to roadway assets • Right-of-way constraints	• Customer trip-planning and wayfinding • Real-time arrival and status information • Transit access and intermodal transfers • Incident/operations management • Transit signal priority • Integrated fare payment

Benefits of ICM Involvement: Incident Responders and Corridor Operators



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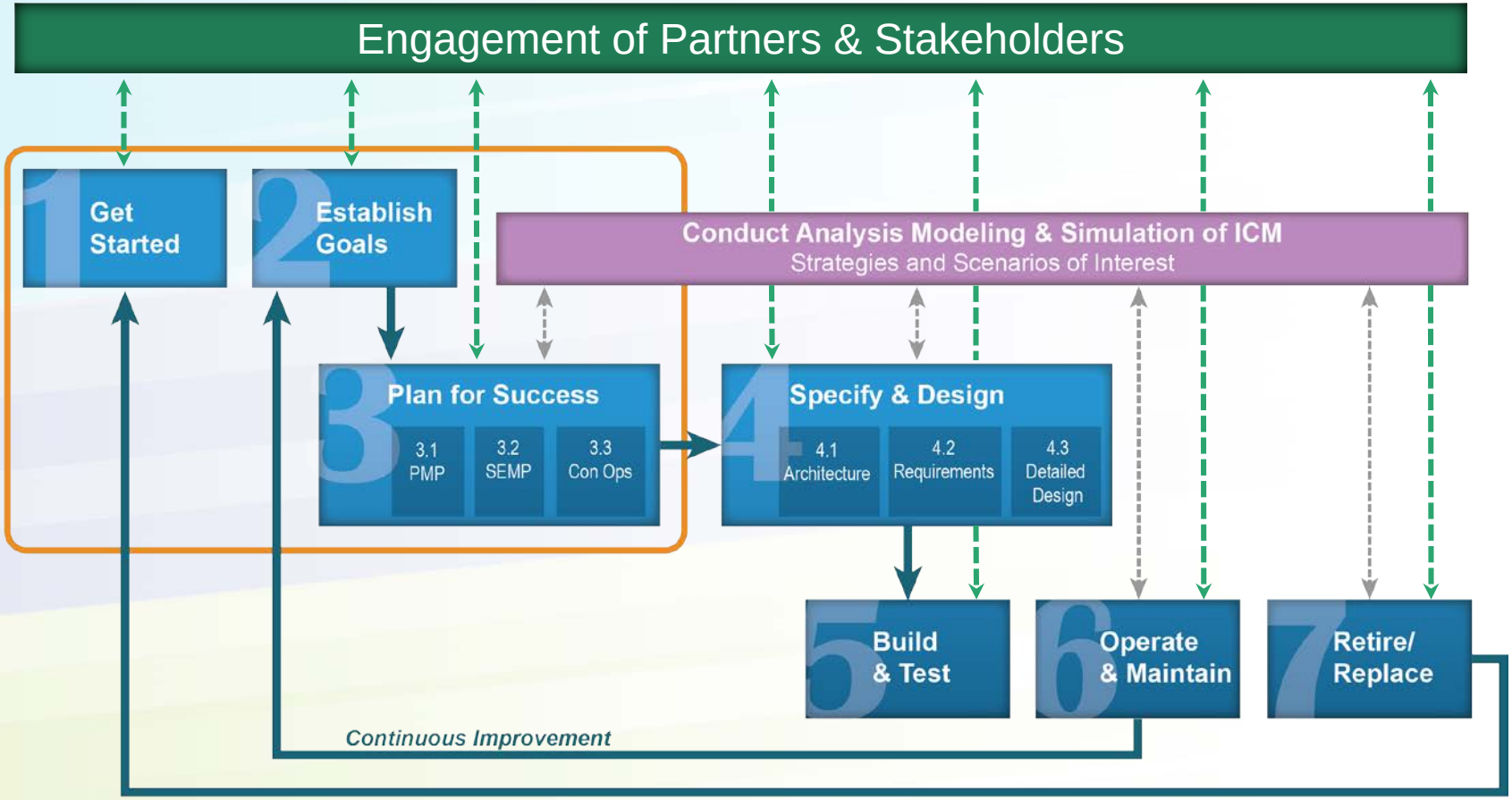
Overall Lessons Learned

- Operational and Institutional integration are as important as Technological integration
  - » Engage stakeholders early and often – 8-step graph
- Analyze expected impacts early and often – in parallel with design and operation
  - » Analysis chart
- Corridors are rarely isolated – Integrated Active **System** Management is the new trend

ICM Implementation Process



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10 Attributes of a Successful ICM Site

10. Significant Congestion and Unreliable Travel Times
9. Infrastructural Availabilities
8. Multimodal Capabilities
7. Centralized Data Hub
6. Successful Procurement Practices
5. Readily Available Alternative Transit Options
4. Optimization of Existing Transportation Systems
3. Public Engagement
2. Open-mindedness for Change
1. Institutional Support

ICM Capability Maturity Model

		Level 1 Silo	Level 2 Centralized	Level 3 Partially Integrated	Level 4 Multi-modal Integrated	Level 5 Multi-modal Optimized
Institutional Integration	Inter-agency Cooperation	Agencies do not coordinate their operations	Some agencies share data but operate their networks independently	Agencies share data, and some cooperative responses are done	Agencies share data, and implement multi-modal incident response plans	Operations are centralized for the corridor, with personnel operating the corridor cooperatively
	Funding	Single Agency	MPO tracks funding	Coordinated funding through MPO	Cooperatively fund deployment projects	Cooperatively fund deployment and operations and maintenance projects
Technical Integration	Traveler Information	Static information on corridor travel modes	Static trip planning with limited real-time alerts	Multi-modal trip planning and account-based alerts	Location-based, on-journey multi-modal information	Location-based, multi-modal interactive routing
	Data Fusion	Limited or Manual	Near real-time data for multiple modes	Integrated multi-modal data (one-way)	Integrated multi-modal data (two-way)	Multi-source multi-modal data integrated and fused for operations
Operational Integration	Performance Measures	Some ad hoc performance measure based on historical data	Periodic performance measures based on historical data	High-level performance measures using real-time data	Detailed performance measures in real time for one or more modes	Multi-modal performance measures in real time
	Decision Support System	Manual coordination of response	Pre-agreed incident response plans	Tool selection of pre-agreed plans	Model-based selection of pre-agreed plans	Model-based creation of incident response plans

1. Assess where the project stands **now** along each dimension.

2. And where you **want to be** in X number of years.

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Develop ICM System Concept – Operational Conditions

- Consider the roles and responsibilities of each stakeholder group for these (and other) scenarios:
  - Daily operations
  - Freeway incidents at different locations and of different durations/frequency/impact
  - Arterial incidents at different locations and of different durations/frequency/impact
  - Transit incident
  - Special events – Games at Inglewood Stadium, Concerts, Olympics
  - Disaster response - Evacuation

Prioritize Potential ICM/ATM Strategies Based on Stakeholder Input - Examples

- Express lanes
- Dynamic lane management
- Bus signal priority
- Hard shoulder running
- Queue warning system
- Dynamic routing
- Predictive traveler information
- Adaptive ramp metering
- Coordination of ramp meters and arterial signals
- Responsive traffic signal control on arterials

Map Expected Effectiveness of ICM/ATM Strategies against Operational Conditions (Example)

Scenario	Daily Operations – No Incident		Minor Incident		Major Incident		
Demand	**Med**	**High**	**Med**	**High**	**Low**	**Med**	**High**
Traveler Information							
Comparative, multimodal travel time information (pre-trip and en-route)	●	●	●	●	●	●	●
Traffic Management							
Incident signal retiming plans for frontage roads			●	●	●	●	●
Incident signal retiming plans for arterials			●	●	●	●	●
Managed Lanes							
HOT lane (congesting pricing)	●	●					
Express toll lane (congestion pricing)	●	●					
Light-rail Transit Management							
Smart parking system						●	●
Red line capacity increase						●	●
Station parking expansion (private parking)						●	●
Station parking expansion (valet parking)						●	●

Conduct Transportation Analysis

- Improved understanding of system dynamics and problem diagnosis
- Invest in the right strategies
- Invest with confidence
- Lower risk associated with implementation
- Continually improve implementation
- Improved transportation decision making

Assess Performance Measures and Conduct Benefit Cost Analysis

Performance Measure	Useful Metrics
Mobility	Travel time, delay, throughput.
Reliability and Variability of Travel Time	Changes in Planning Index, changes in the standard deviation of travel time.
Emissions and Fuel Consumption	Emissions and fuel consumption rates based on factors such as facility type, vehicle mix.
Safety	Accidents or crashes in the study area (fatalities, injuries, property-damage-only accidents).
Cost Estimation	Capital, operating, and maintenance costs.

Example Benefit Cost Results from Pioneer Sites ICM AMS

	San Diego	Dallas	Minneapolis
Annual Travel Time Savings (Person-Hours)	246,000	740,000	132,000
Improvement in Travel Time Reliability (Reduction in Travel Time Variance)	10.6%	3%	4.4%
Gallons of Fuel Saved Annually	323,000	981,000	17,600
Tons of Mobile Emissions Saved Annually	3,100	9,400	175
10-Year Net Benefit	$104M	$264M	$82M
10-Year Cost	$12M	$14M	$4M
Benefit-Cost Ratio	10:1	20:1	22:1

Prioritize across Strategies and Operational Conditions

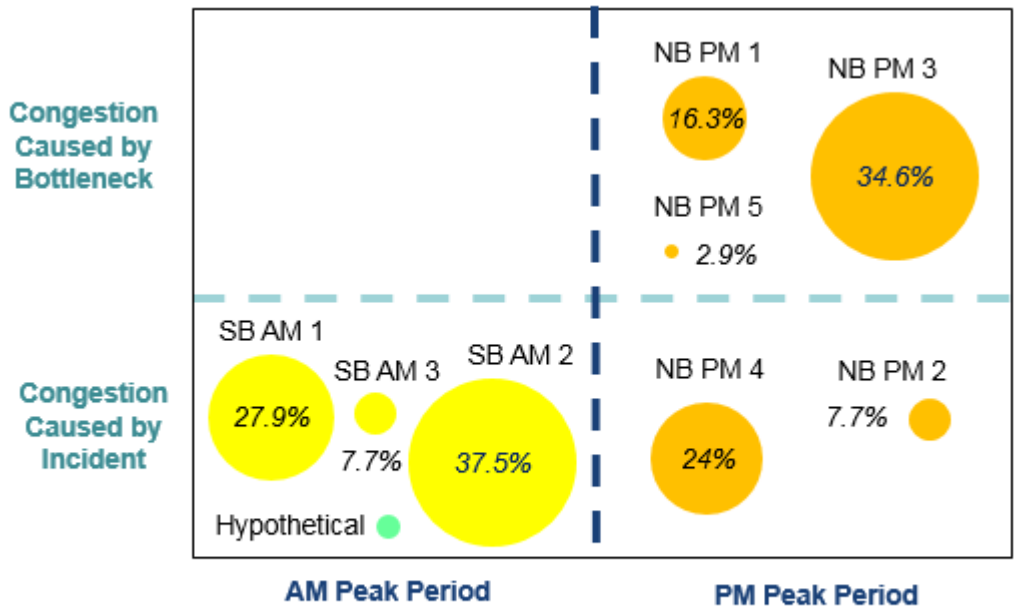
Highest Priority
- Scenarios with greatest frequency and impact

Lower Priority
- Scenarios with low likelihood but major impact
- Scenarios with frequent occurrence but limited impact

Lowest Priority
- Scenarios with low frequency and low impacts

Operational Condition Dartboard

Scenario Frequency



Note: The size of each circle represents the percent of total analysis time period.

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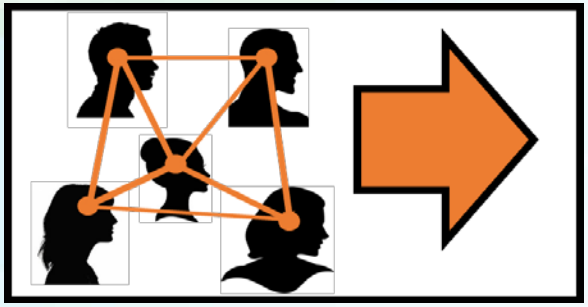
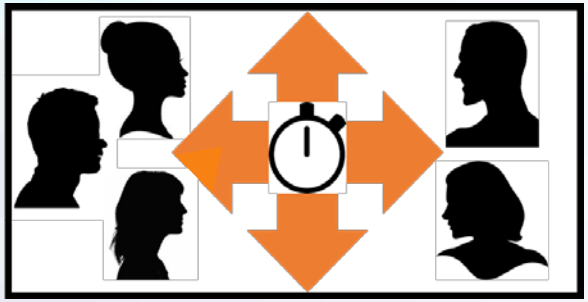
Initiate Formal Arrangements



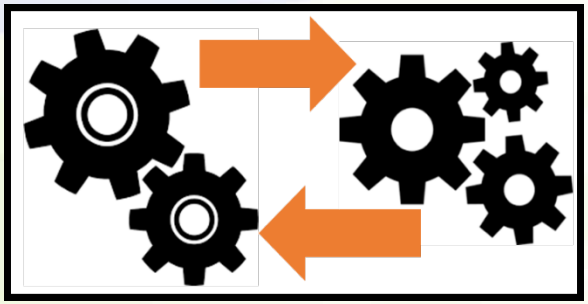
Institutional

- Governing how ICM stakeholders determine and guide the strategic direction of the ICM deployment over time



Organizational

- Governing the roles, responsibilities, limitations, and tactical interactions among ICM system operators



Technical

- Governing the ownership and responsibility among stakeholders for the security, monitoring, maintenance, and enhancements