Connected Corridors
I-210 Pilot Project

User Needs Workshop

Feb 27, 2014

Agenda

Introduction

Project Overview, Schedule, Corridor Desciption

User Needs Workshop

I-210 Project Definition

Operational Scenarios and Strategies Approach

Users and Users Needs

Performance Metrics

Additional Project Discussions (as time allows)

Marketing Needs

MOUs/Agreements

Infrastructure and Resource Needs

3 Introduction

Purpose of Today's Workshop *(Define Project Concept)*

- Get you more familiar with project details and goals
- Reach consensus on project definition, integration, strategies approach
- Reach consensus on users and users needs
- Reach consensus on performance metrics (to measure success)
- If we have time, logistics (marketing, MOUs/Agreements, resources, risks)

I-210 Project Overview and Goals

Near Term Key Tasks and Efforts

I-210 Project Milestone Schedule

Few Examples of ICMs in Other Regions

I-210 Project Corridor Description

Project Overview

- **ICM California**
  - Caltrans is leading the effort for the State
  - I-210 Connected Corridors Pilot – Replicable in fifty corridor segments over the next ten years

- **Coordination** – A lot of progress has been made

Key partners engaged (D7, Metro, LACDPW)	Cities engaged (Pasadena, Arcadia, Duarte, Monrovia)	Intro and technical meetings with the partners and cities

I-210 Pilot Project Goals

- **Bring together corridor stakeholders** to create an environment for mutual cooperation, including sharing knowledge, developing working pilots, and researching and resolving key issues

- **Formulate a roadmap** for the cost-effective implementation of future innovations

- Develop and deploy an integrated, **advanced decision support system** for use by the stakeholders as they actively manage the corridor

- Develop a **set of performance measures** to quantify the successes of the Connected Corridors pilot project

- **Demonstrate project effectiveness** that can lead to additional phases and funding for more advanced tools and capabilities

- Develop a pilot system that **can be replicated** on other corridors and be a model for other corridors in the state and country

Near Term Key Tasks & Efforts

- **Understand data needs**

- **Characterize the corridor**

- **Share data**

- **Prepare studies**

- **Request funding for resources**

- **Next steps**
  - Simple coordination between agencies
  - Bring system together (automated)
  - Keep moving forward

Communications & Outreach

- **Near-term activities**
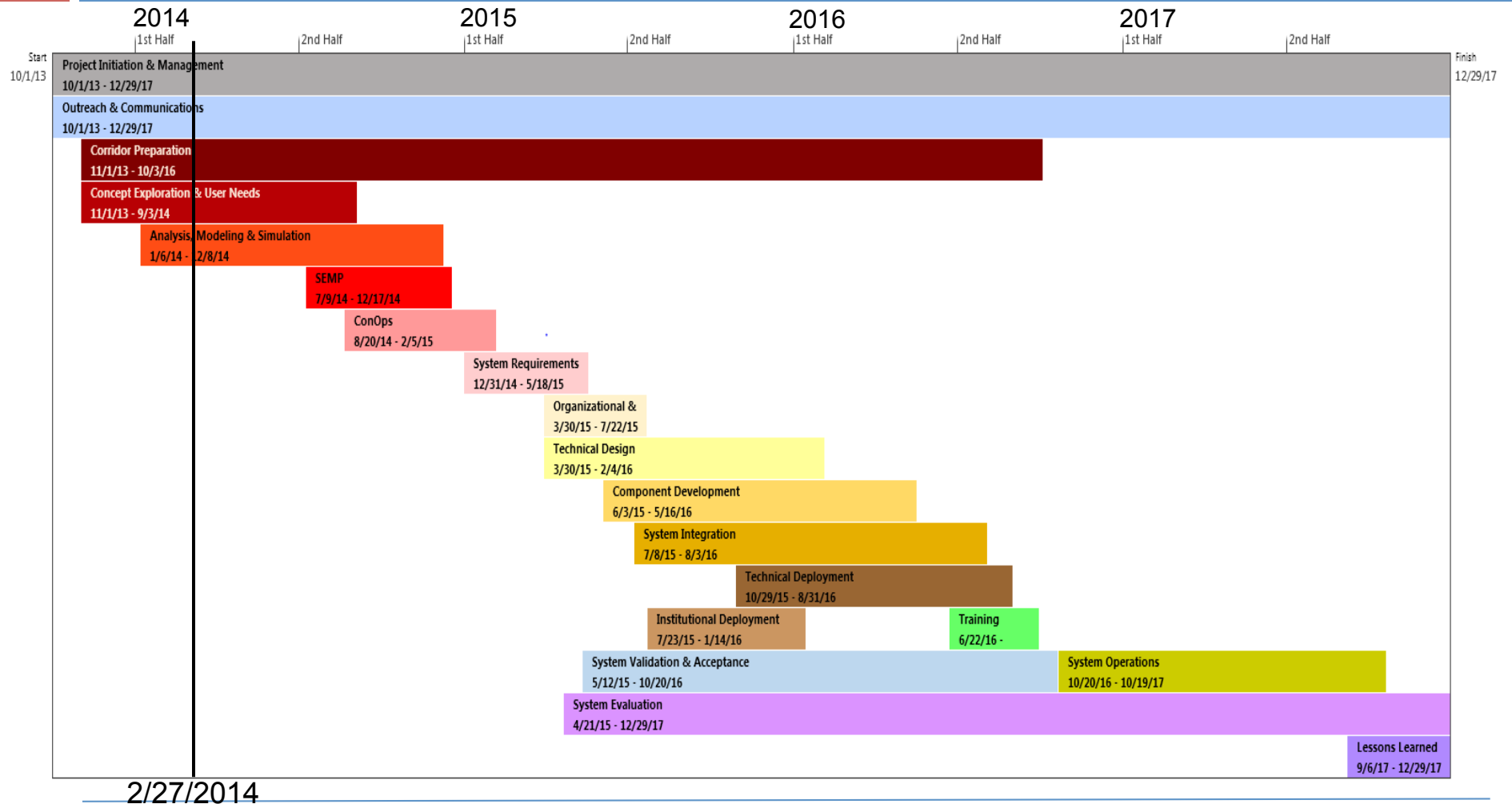 - Presentations to several LA Metro subcommittees late February/early March
  - Meeting with San Gabriel Valley Council of Governments on March 18
  - Meetings with City Councils, Technical Advisory Committees, and/or City Managers (to be confirmed)

- **Public announcement of the I-210 Connected Corridors Pilot**
  - Brainstorm/planning meetings just getting started
    - First meeting to be held March 12th
    - To include Caltrans District 7 Public Relations personnel & Project Manager, LA Metro, PATH
    - Will keep cities and county informed as planning progresses
    - Any ideas? → Please forward to Lisa Hammon

I-210 Pilot Project Milestone Schedule

	2014	2015	2016	2017
	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half

Start 10/1/13

Finish 12/29/17

Project Initiation & Management
10/1/13 - 12/29/17

Outreach & Communications
10/1/13 - 12/29/17

Corridor Preparation
11/1/13 - 10/3/16

Concept Exploration & User Needs
11/1/13 - 9/3/14

Analysis, Modeling & Simulation
1/6/14 - 12/8/14

SEMP
7/9/14 - 12/17/14

ConOps
8/20/14 - 2/5/15

System Requirements
12/31/14 - 5/18/15

Organizational &
3/30/15 - 7/22/15

Technical Design
3/30/15 - 2/4/16

Component Development
6/3/15 - 5/16/16

System Integration
7/8/15 - 8/3/16

Technical Deployment
10/29/15 - 8/31/16

Institutional Deployment
7/23/15 - 1/14/16

Training
6/22/16 -

System Validation & Acceptance
5/12/15 - 10/20/16

System Operations
10/20/16 - 10/19/17

System Evaluation
4/21/15 - 12/29/17

Lessons Learned
9/6/17 - 12/29/17

2/27/2014

Caltrans   M Metro   County of Los Angeles   City of Pasadena   City of Arcadia   City of Monrovia   City of Duarte   California PATH

Existing ICM Efforts (United States)

| Corridor	Corridor Type	Lead Agencies	Activities
I-15 Diego	Suburban	SANDAG	• ConOps and System Requirements developed in 2008 • Simulation evaluation in 2009-2010 • System launched October 2013 • Currently in evaluation phase
US-75 Dallas	Suburban & urban	DART	• ConOps and System Requirements developed in 2008 • Simulation evaluation in 2009-2010 • System launched in April 2013 • Currently in evaluation phase
I-80 Bay Area	Suburban & urban	MTC / Caltrans	• ConOps developed in 2010 • Groundbreaking in October 2012 • Expected to be completed Summer 2015
I-95 / I-395 Virginia	Rural, Suburban & Urban	Virginia DOT	• ConOps development initiated in 2012 • Currently developing deployment plan & partnerships

San Diego

- **Freeway - Arterial Integration**
  - I-15 north of San Diego
  - Center City Pkwy, Pomerado Rd, Black Mountain Rd, Kearny Villa Rd
  - Traffic-responsive on-ramp metering
  - I-15 HOT Managed Lane System
  - Traffic-responsive (plan selection) signal control
  - Arterial/ramp metering signal coordination

- **Transit services**
  - MTS bus, NCTD bus, NCTD Sprinter Commuter Rail
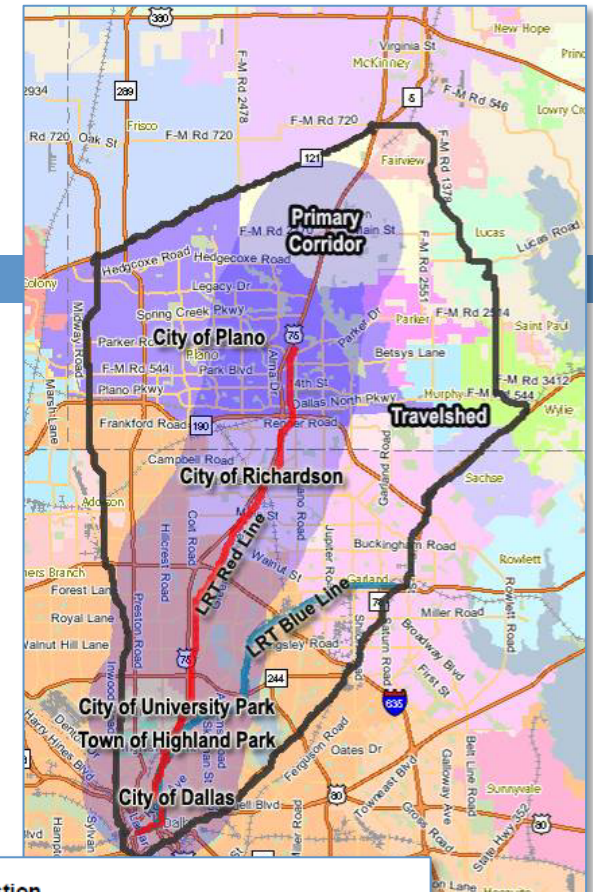 - Vehicle rerouting around incidents
  - Service increase in response to event/incidents
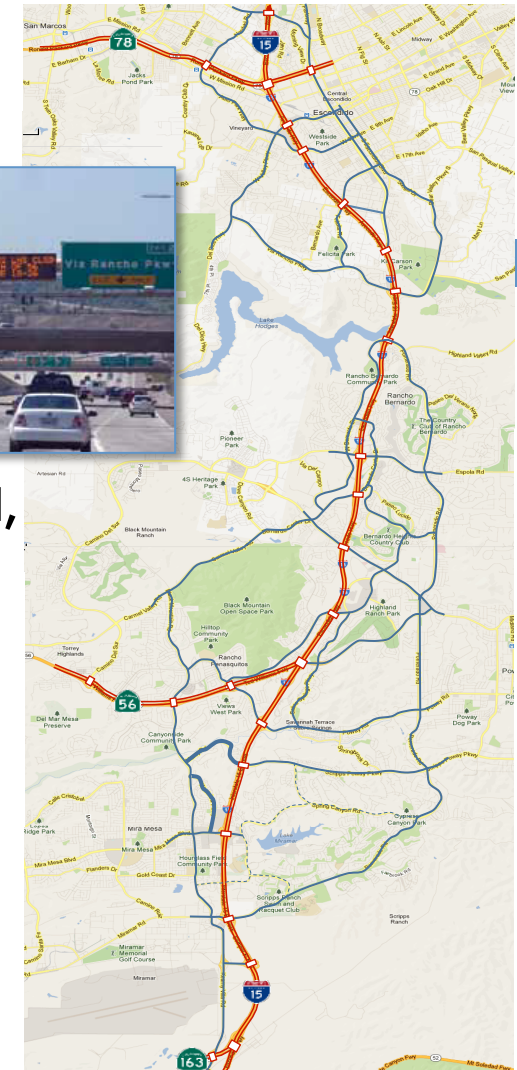
75 Dallas

- **Freeway - Arterial Integration**
  - 20-mile section of US-75
  - Frontage roads, Greenville Ave, Coit Road
  - Predefined diversion plans
  - HOV access restrictions during incidents
  - New signal timing plans for Greenville Ave
  - Event-specific timing plans
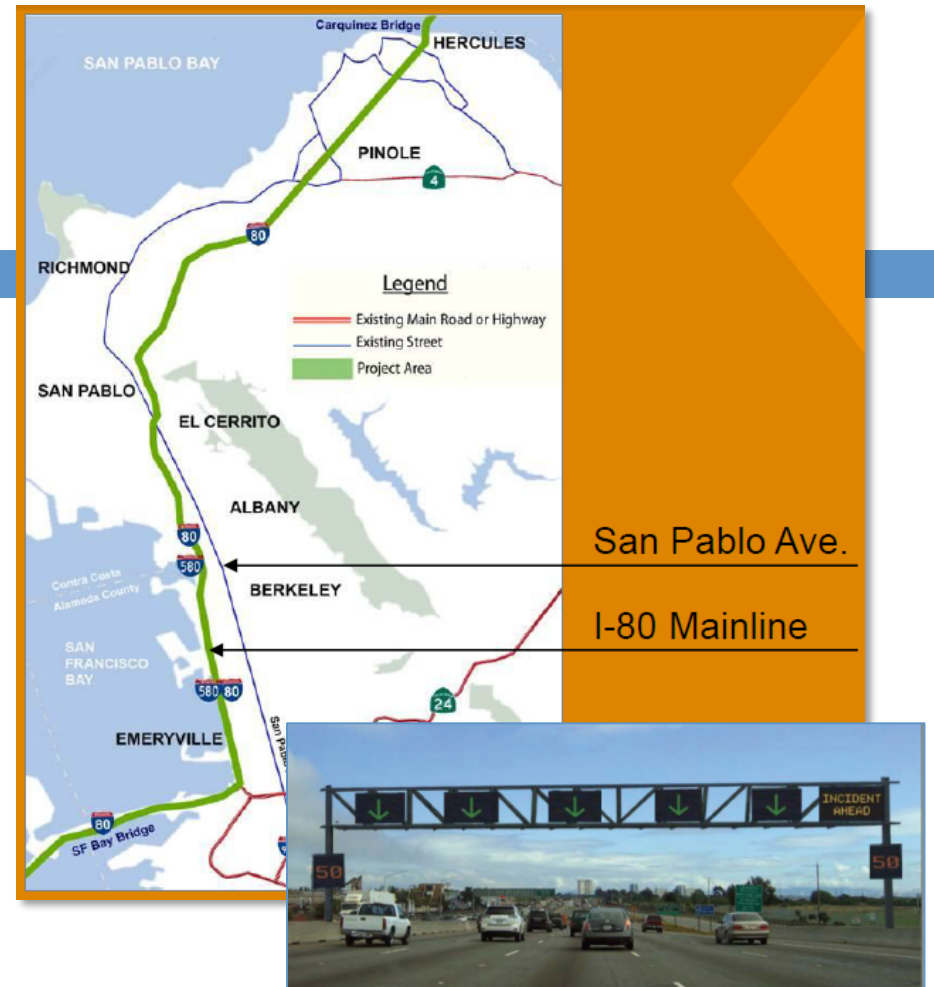
- **Transit services**
  - DART Light Rail, DART Bus

Monitor US 75 Congestion

Divert to Frontage Road — 1 lane blocked, Queue < 2 mile

Divert to Frontage Road and Greenville Ave — 2+ lanes blocked 2-4 mile queue

Divert to Frontage Road, Greenville Ave & DART Red Line

SF Bay Area

- **Freeway - Arterial Integration**
  - 20-miles section of I-80 from Bay Bridge to Carquinez Bridge
  - San Pablo Avenue
  - Coordinated ramp metering
  - Lane use management system (close lanes ahead of incidents)
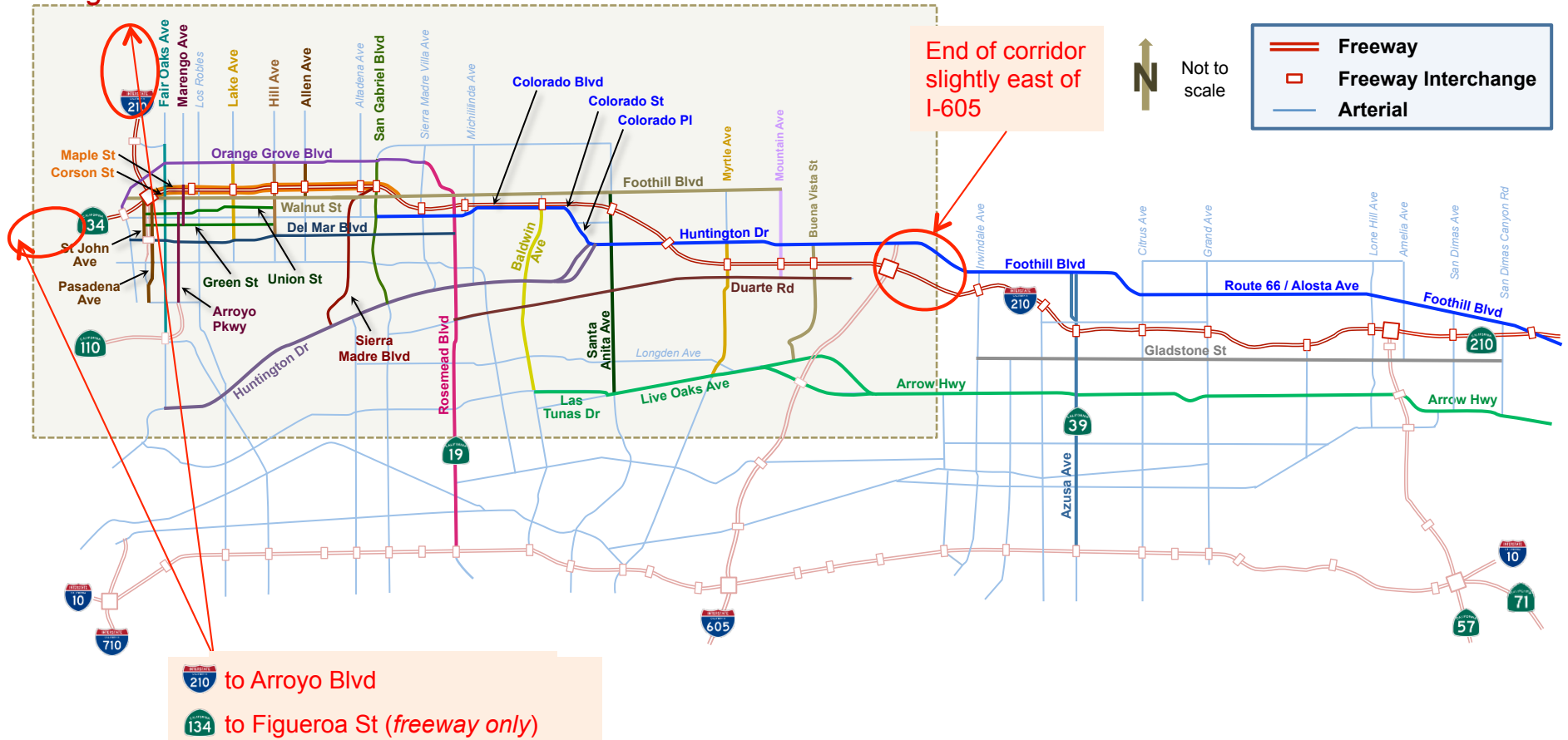 - Traffic signal flush plan
  - Trailblazer signs

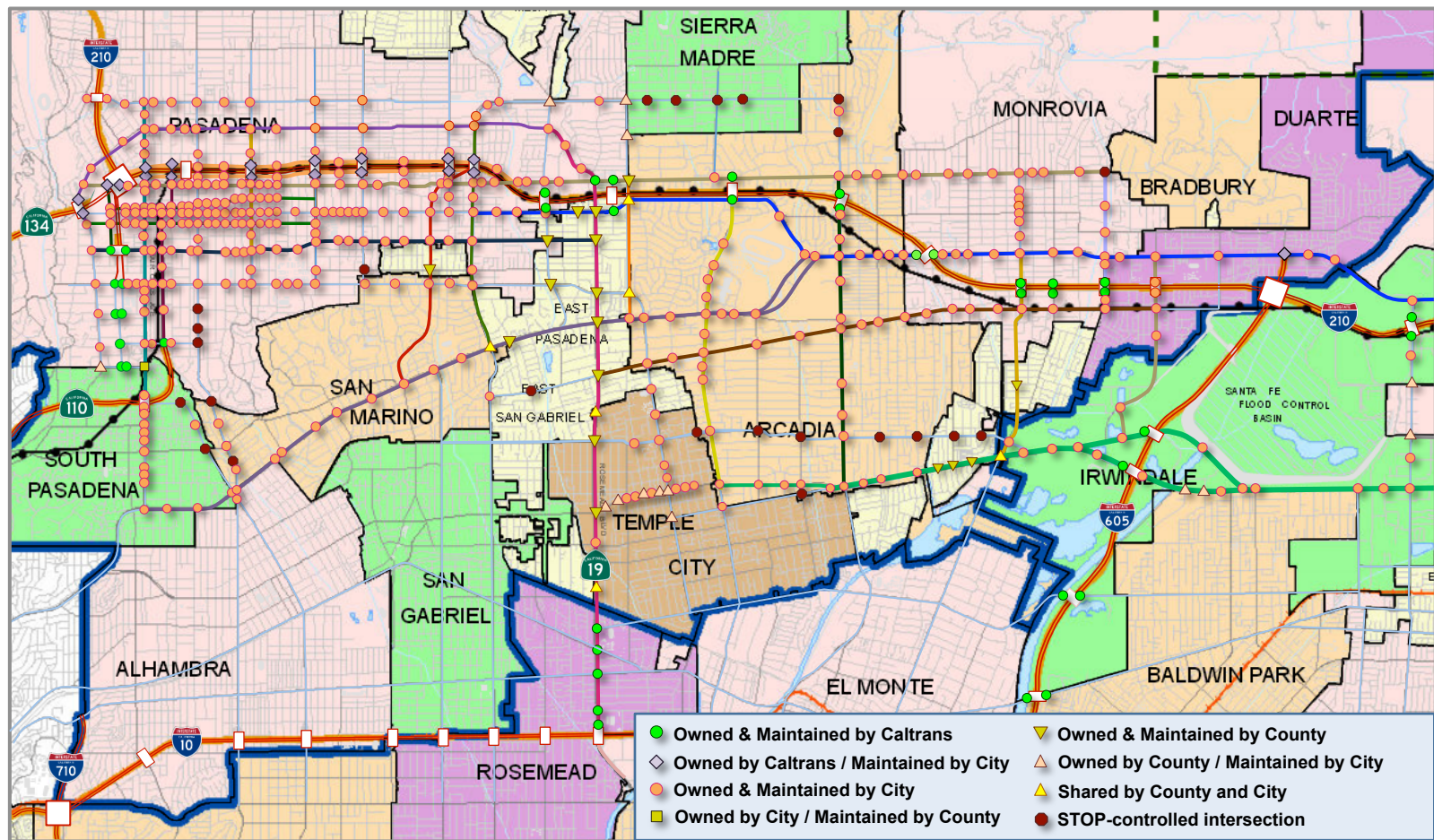- **Transit Integration**
  - BART, AC Transit bus network

San Pablo Ave.

I-80 Mainline

I-210 Project Corridor Description

Arterial Traffic Control

Light-Rail, Transitway & Commuter Rail

Express Commuter Buses

Park & Ride Facilities

- - - Metro Silver Line	P 100 Existing LA Metro Lots	$ Parking Fee
- - - Metro Gold Line	P 100 Future LA Metro Lots (late 2015)	R Paid Reserved Parking
······ Gold Line Extension Phase 2A	P 100 Metrolink Lots	
······ Gold Line Extension Phase 2B	P 100 Caltrans Lots	
- - - Metrolink San Bernardino	P 100 Los Angeles County Lots	
—— Express Bus Lines	P 100 Other Park-and-Ride Lots	
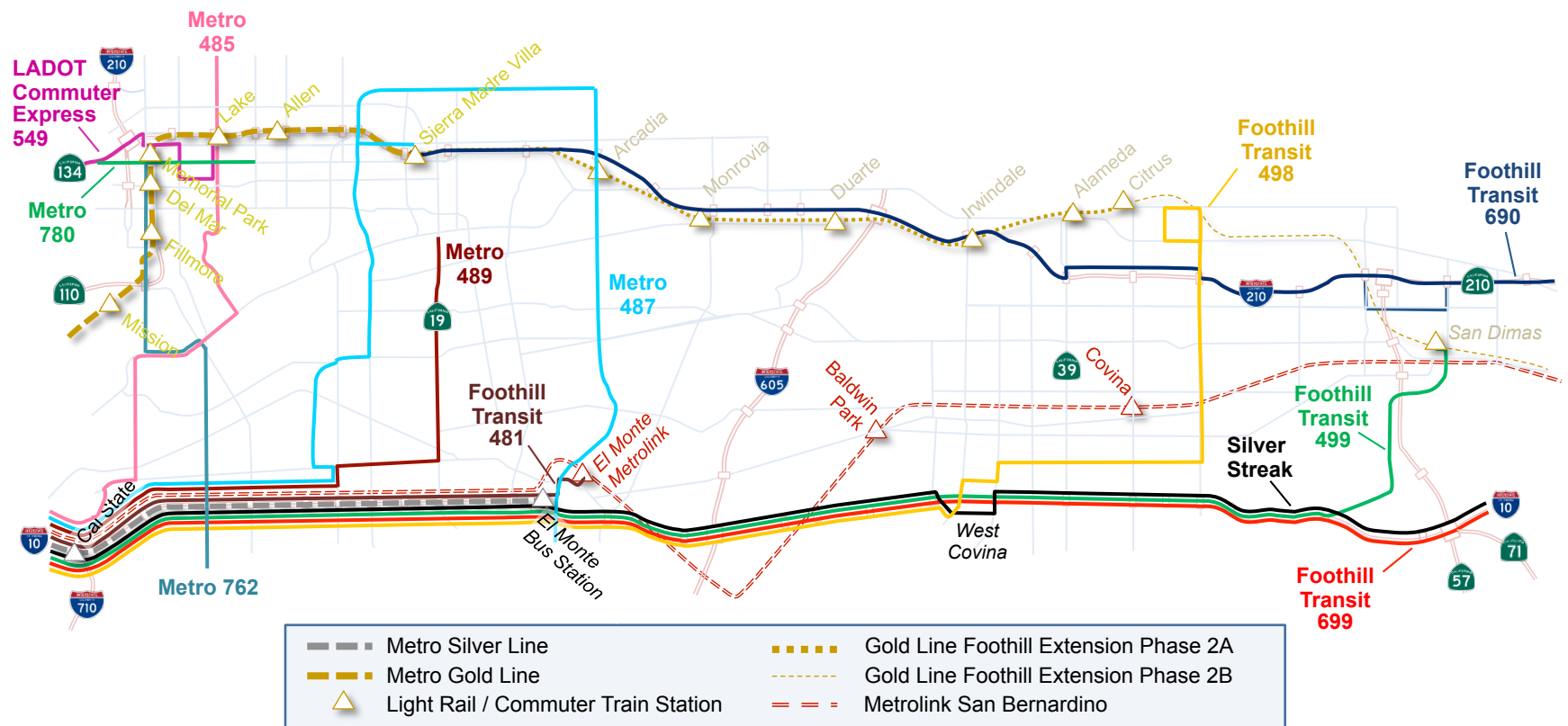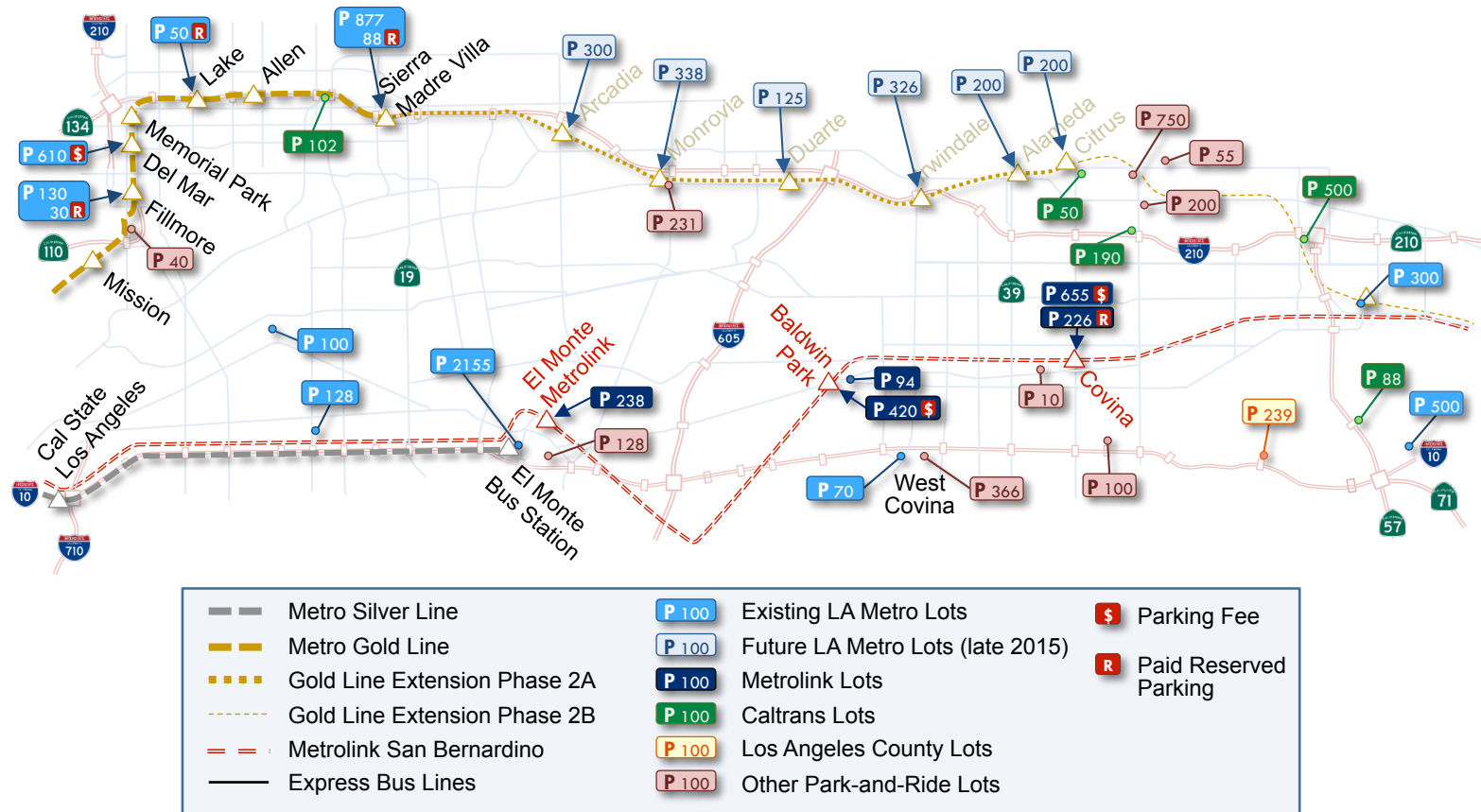
User Needs Workshop

Pre-Workshop Meetings

I-210 Pilot Project Definition

Operational Scenarios

Define Integration

Define Incidents and Strategies Approach

Define Users and Identify Users Needs

Define Performance Metrics

User Needs Workshop

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- If we have time, logistics (marketing, MOUs/Agreements, resources,)

Pre-Workshop Meetings Summary

- **Pilot Project**
  - Project is needed, if nothing else to improve coordination and collaboration
  - Start with incident and event management with freeway-arterial integration
  - Incorporate transit/parking as feasible

- **Integration Development**
  - May be challenging with different TCS/ATMS and software modifications needed
  - Arcadia offers to use its TransSuite for beta testing at sample segment
  - System should be transparent, allowing all direct users to see same things
  - Concerns include staff support resources, increased communications costs, and review turnaround time

- **System Operations**
  - Automated response system with direct user override capabilities by location and by strategy option and by jurisdiction (liability could be an issue)
  - Performance metrics should include at least travel time and public perception
  - Must take into consideration local residents and local traffic, businesses, bicycles and pedestrians, schools and school traffic, and senior citizen pedestrians
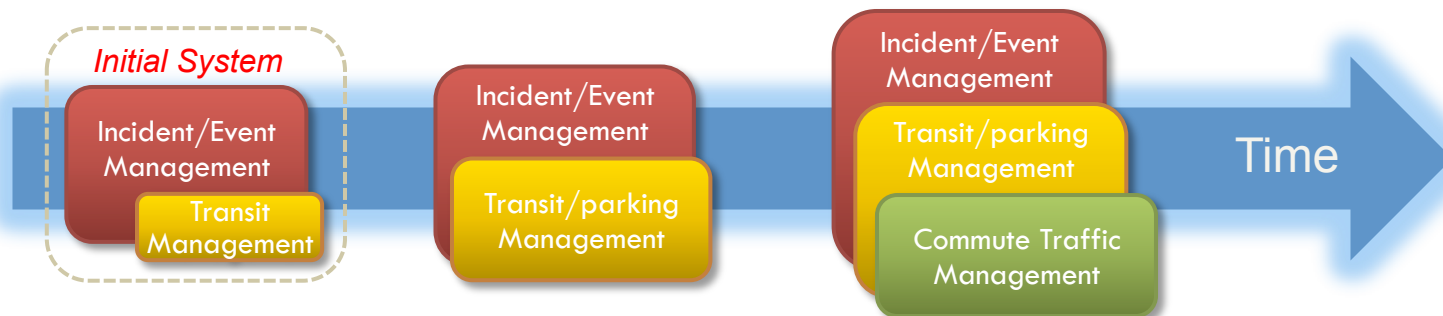
I-210 Pilot Project Definition

☐ **Development and deployment of an ICM system to promote coordinated operations along the I-210**

Initial System

| Freeway Operations | Arterial Operations | Transit Operations | Parking Management | Travel Demand Management |

☐ **Initial primary focus on managing incidents/events, with gradual expansion to transit, parking and demand management**

Initial System

Incident/Event Management — Transit Management

Incident/Event Management — Transit/parking Management

Incident/Event Management — Transit/parking Management — Commute Traffic Management

Time

Key I-210 Pilot Project Components

- **Traffic & Transit and System Monitoring**
  - Adequate monitoring (freeway, arterials, transit)
  - Monitoring of control devices (signal status, ramp metering data, etc.)
  - Travel demand monitoring (origin-destination patterns)

- **Decision Support System (DSS)**
  - Identification of events/incidents
  - Development of strategies to respond to events/incidents
  - Use of simulation modeling/analytical tools to perform evaluations
  - Make estimates and predictions
  - Select best strategy to implement
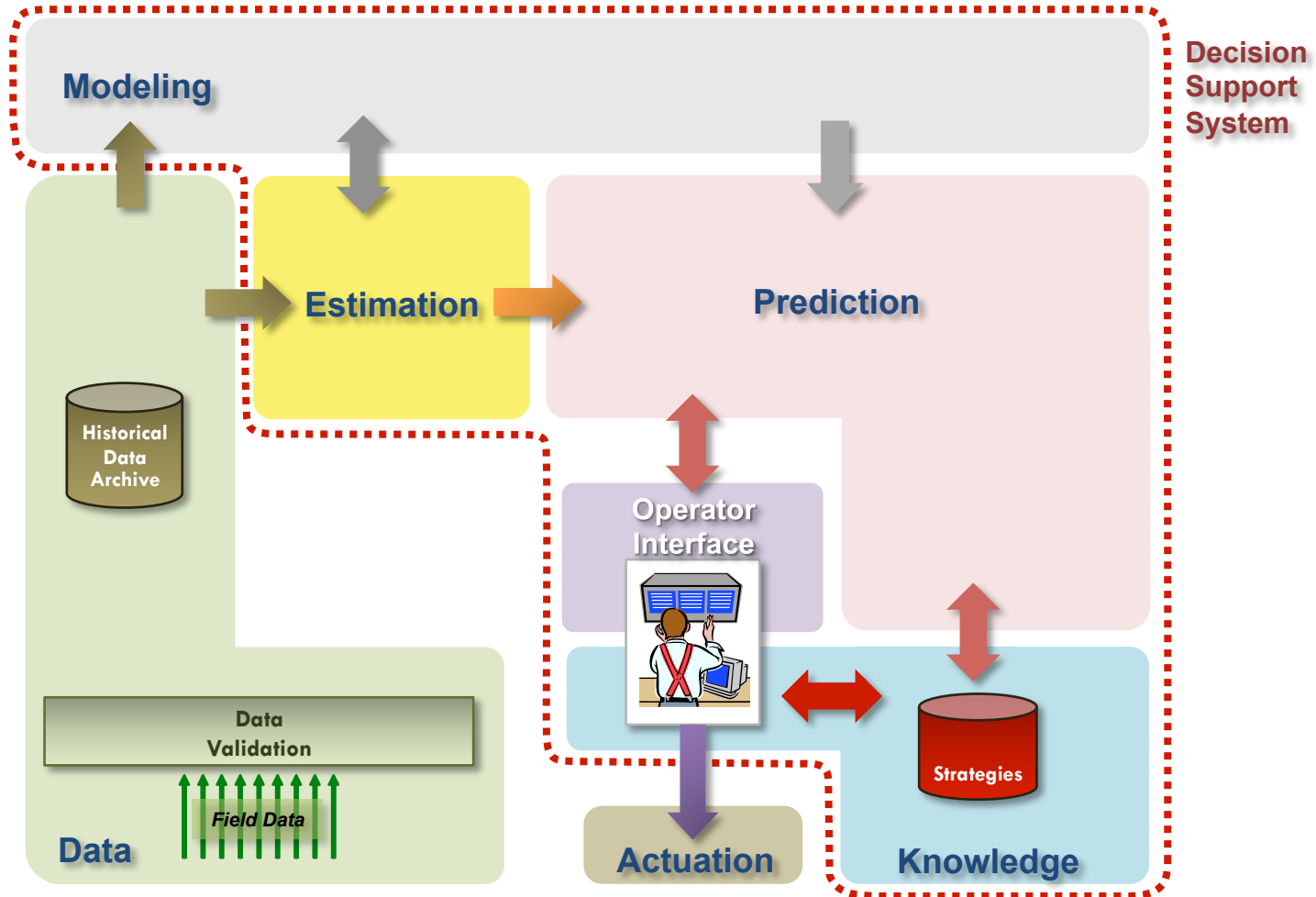 - Process for approving/implementing recommended strategies

- **System interfaces**
  - Traffic monitoring system
  - Communications to system operators
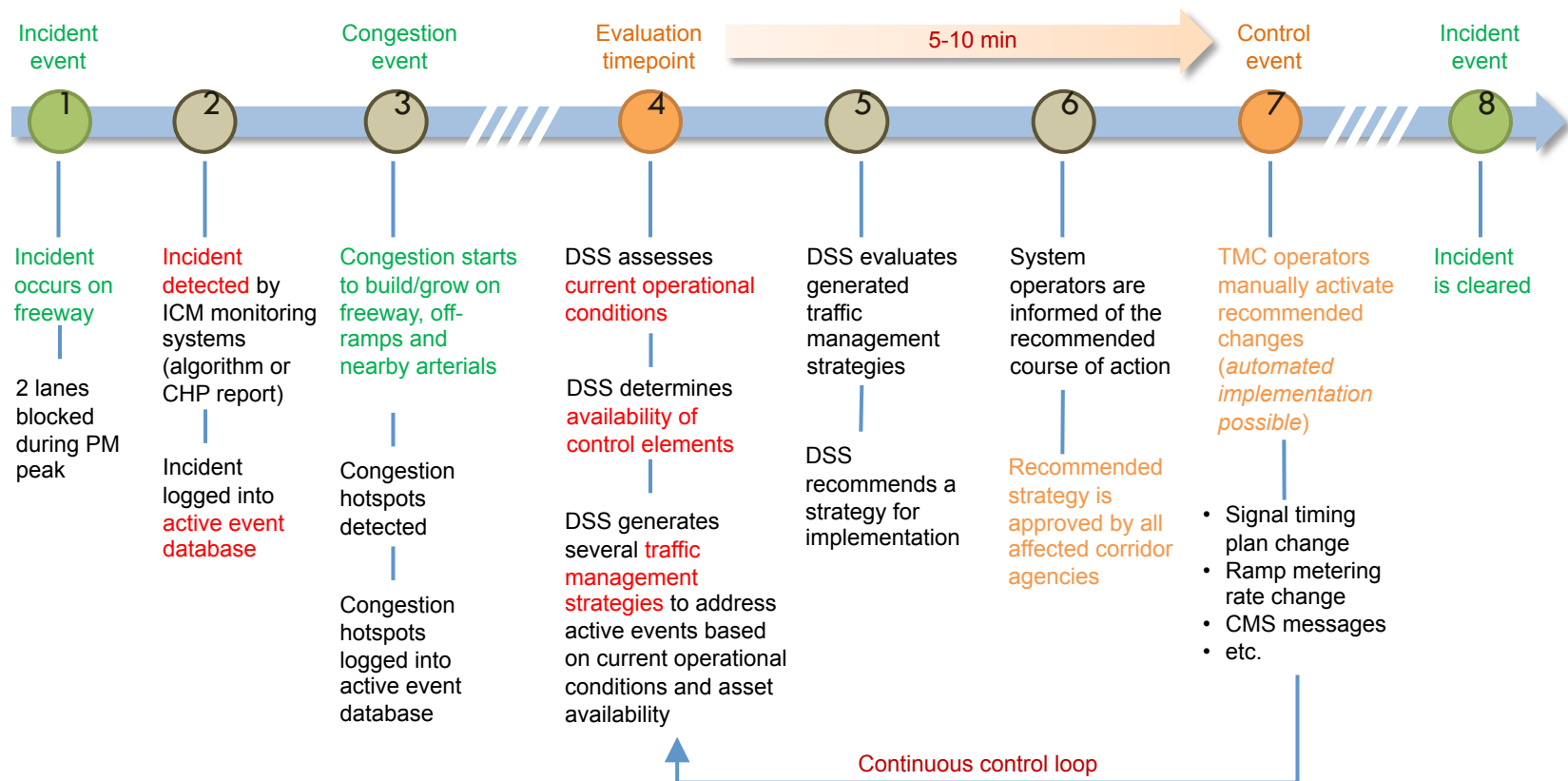 - Traveler information systems

Potential System Components (Example)
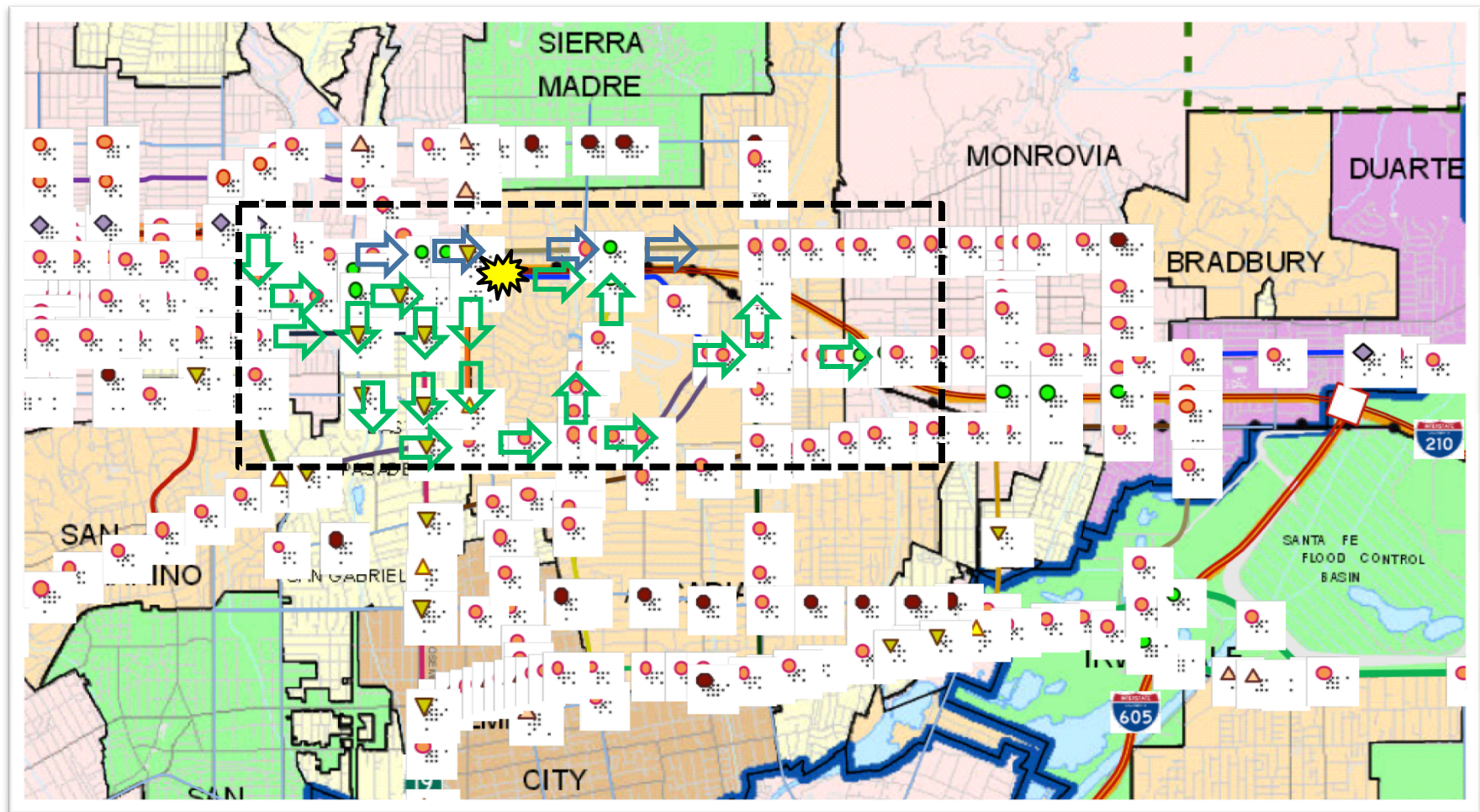
Operational Scenario (Incident Response Example)

□ **Freeway or arterial incident management (incident response)**

| Incident event | | Congestion event | | Evaluation timepoint | | | | Control event | | Incident event |

5-10 min

Continuous control loop

1 — Incident occurs on freeway

2 lanes blocked during PM peak

2 — Incident detected by ICM monitoring systems (algorithm or CHP report)

Incident logged into active event database

3 — Congestion starts to build/grow on freeway, off-ramps and nearby arterials

Congestion hotspots detected

Congestion hotspots logged into active event database

4 — DSS assesses current operational conditions

DSS determines availability of control elements

DSS generates several traffic management strategies to address active events based on current operational conditions and asset availability

5 — DSS evaluates generated traffic management strategies

DSS recommends a strategy for implementation

6 — System operators are informed of the recommended course of action

Recommended strategy is approved by all affected corridor agencies

7 — TMC operators manually activate recommended changes (*automated implementation possible*)

- Signal timing plan change
- Ramp metering rate change
- CMS messages
- etc.

8 — Incident is cleared

Operational Scenario (Incident Response Example)
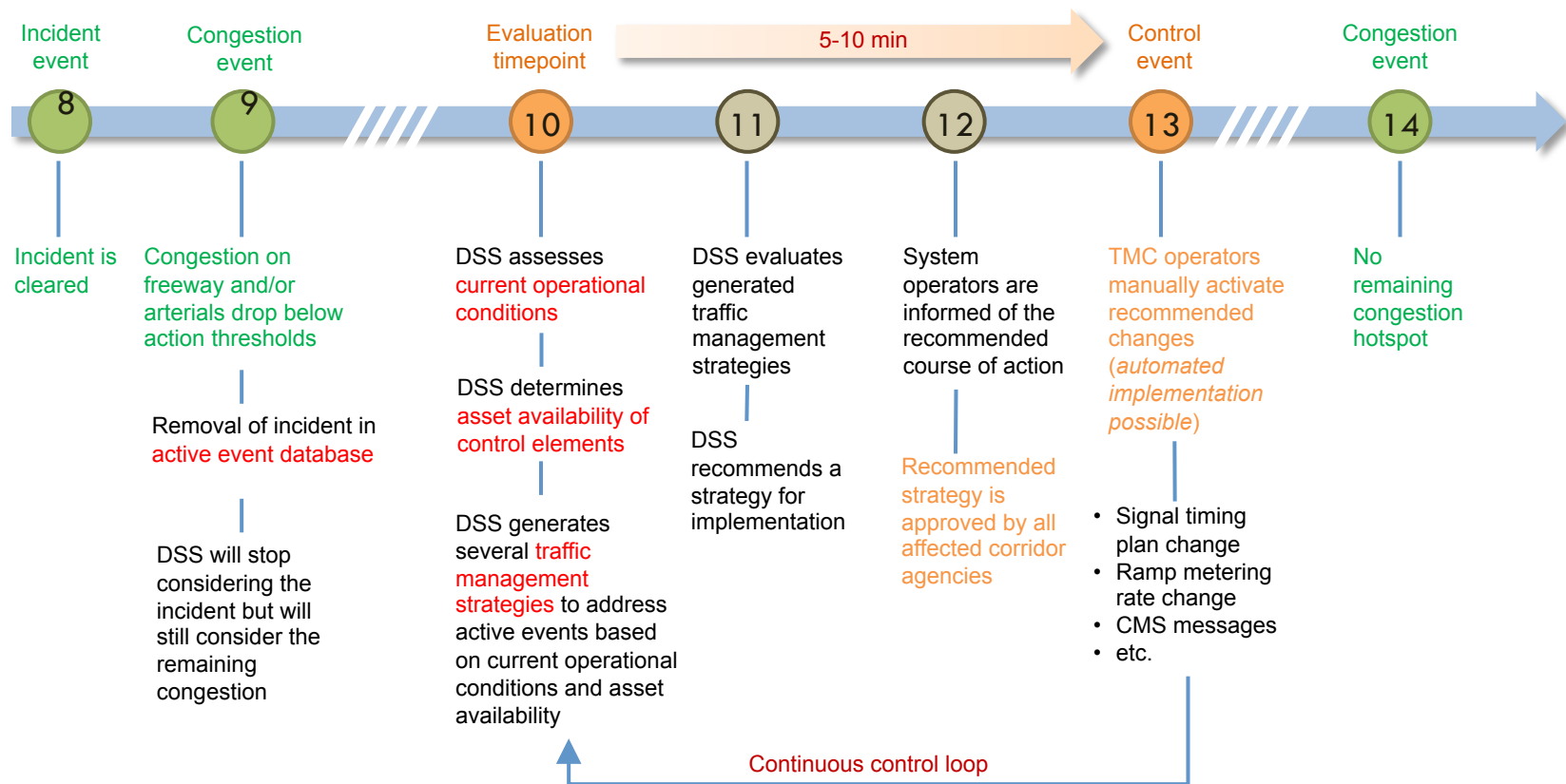
Operational Scenario (Post Incident Example)

☐ **Freeway or arterial incident management (post incident)**

Incident event — 8
Congestion event — 9
Evaluation timepoint — 10
5-10 min
Control event — 13
Congestion event — 14

Timeline points: 8, 9, 10, 11, 12, 13, 14

8 — Incident is cleared

9 — Congestion on freeway and/or arterials drop below action thresholds

Removal of incident in active event database

DSS will stop considering the incident but will still consider the remaining congestion

10 — DSS assesses current operational conditions

DSS determines asset availability of control elements

DSS generates several traffic management strategies to address active events based on current operational conditions and asset availability

11 — DSS evaluates generated traffic management strategies

DSS recommends a strategy for implementation

12 — System operators are informed of the recommended course of action

Recommended strategy is approved by all affected corridor agencies

13 — TMC operators manually activate recommended changes (automated implementation possible)

- Signal timing plan change
- Ramp metering rate change
- CMS messages
- etc.

14 — No remaining congestion hotspot

Continuous control loop

Define Integration

- **Freeway – Arterial System Integration**
  - Caltrans Freeway Ramp Metering
  - Caltrans Ramp Intersections
  - Caltrans Traveler Information (CMS, TMT)
  - Local Arterial Intersections
  - Local Traveler Information (CMS, if any)

- **Transit/Parking System Add-on Integration**
  - Parking Management (available spaces, parking reservation, 2900+ spaces)
  - Metro Gold Line (finish late 2015) and I-10 Silver Line (station departure times)
  - Bus transit

- **Traveler Information**
  - Dedicated I-210 Pilot website (and possibly mobile device App)
  - 511 and agency website integration
  - Media and 3rd party feed

Define Integration

Freeway – Arterial System Integration

Define Incidents and Strategies Approach

☐ **Define incidents/events categories**

Location(s)	*Event Type*	*Lanes Blocked*	*Impact*
Arterial Arterial I/S Freeway ramp Freeway mainline HOV Lane	Stall/Collision Scheduled Closure Police Activity Emergency Event Hazmat Spill Other	1 Lane 2 Lanes 3 Lanes ... or % Capacity	Minor Major Long

☐ **Develop response strategies to defined incident categories**

- Develop multiple response options (play book of 3-5 options, from low impact to high impact) for each category or type of incident

- Develop process for best option selection (modeling, analysis, testing, etc.)

Define Strategies Approach

- **Download selected response option to all integrated ATMS/TCS**
  - Local agency TCS (via IEN? - DSS interface with IEN needed)
  - Caltrans ATMS (via direct or IEN? - development needed)

- **Lead agency will be one where incident/event occurs on their facility**
  - If local agency, coordinate with Caltrans for evaluation and appropriate response plan
  - If Caltrans, coordinate with the direct adjacent local agency(s); other agencies notified of action taken

Review

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Define Users

- **Direct Users (participants – access system/devices)**
  - Operators
  - Maintenance support staff

- **Indirect Users (view conditions and information only)**
  - Supervisors, Managers (if different from Operator)
  - Executives (City Managers)
  - Emergency Responders (Safety Director, Law Enforcement, Fire, etc)
  - Others (SGVCOG staff, Metro staff, 3rd party vendors?)

Identify Users Needs

- **Indirect Users (view conditions and information only)**
    - ❑ DSS website for status viewing and for traveler information
    - ❑ DSS Mobile device App (I-210 Pilot) dedicated for status viewing and traveler information
    - ❑ Traveler information integrated with other system (e.g. 511)

- **Direct Users (participants – access system/devices)**
    - ❑ Automated selected response option implementation with manual override
    - ❑ Manual override of option (e.g., individual intersection, ramp, by corridor segments)
    - ❑ Does not allow for wholesale override? (entire agency system)

Identify Users Needs

- Database for historical data and manage access and control
- System selection of conditions category or type
- Simulation modeling results and shared viewing
- Detailed decision support system recommendations
- Response strategy options and selection
- *Download selected option plans to devices instantly (central control)*
- *Manual override control by location and by corridor segment*
- *View roadway and control devices conditions for monitoring*
- *Indicated control devices not working (repair needed)*
- *Produce traveler information to dedicated site(s)*
- Assess impact of strategy deployment
- Assess key performance measures
- Publish information
- Produce management reports including before/after comparison
- Document lessons learned

Define Performance Metrics To Use

- **Higher traveler satisfaction rates**

  - Public perception

- **Mobility/Reliability/Productivity**
  - Travel Time, Delay
  - Travel Time Reliability
  - Volumes, Lane-Mile-Hours

- **Safety and Network Utilization**
  - Reduced Incident Congestion Duration
  - Reduced Collisions, Injuries, Fatalities
  - Percent Utilization of DSS Recommendations

- **Air Quality**

  - Reduced greenhouse gas emissions, vehicle operating cost, VHT

Next Steps

☐ **Compile and Summarize Today's Workshop Results**

☐ **Prepare the Concept of Operations (ConOps)**

☐ **Perform Analysis for Funding Requests**

Additional Project Discussions

Marketing Needs

MOUs/Agreements

Infrastructure and Resource Needs

Marketing Needs

☐ **Project Information**

- ◻ Fact Sheet / Brochure

- ◻ Overview Presentation

- ◻ Work Plan (Schedule)

- ◻ Concept of Operations (to be completed)

☐ **Project Website**

☐ **Mobile Device App**

☐ **Other**

MOUs/Agreements

❑ **Keep it simple and general**

◻ Provide details on required resource commitments

◻ Provisions for separate document (agreement required) for operations details and commitments

Infrastructure and Resource Needs

- **Infrastructure (Central Control) Needs**
  - Communications
  - Field Devices Upgrade
  - Controllers and Firmware
  - Performance Measure Devices
  - Intersection Modifications (turn lanes) & Signal Elements
  - Other (crosswalks, trailblazer signs)

- **Development Engineering Support Resources Needs**
  - Staff resources (consultant services)

- **O&M Resources Needs**

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- ✓ **Get you more familiar with project details and goals**

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- ✓ **Reach consensus on performance metrics (to measure success)**

- ✓ **If we have time, logistics (marketing, MOUs/Agreements, resources,)**

Thank you for your participation