Connected Corridors Program
MTC Briefing

Collaborating to improve mobility and sustainability in California’s transportation corridors
Mobility Management – A few variables

• ITS, ICM, ATM, ATDM…..
• Delay, Reliability, Safety, Air Quality, Cost, Equity…..
• Caltrans, Districts, CMA, AQB, Local Jurisdictions…..
• Pedestrians, Bicycles, Autos, Trucks, Buses, Light Rail …
• Freeways, arterials, local roads, tracks……
• Multiple languages, cultures, driving habits, laws ….
New Technologies, New Possibilities

• The intelligent Connected World
  – The Social Internet: A connected world where travelers participate in real time demand management and crowd sourcing of information
  – Smart Devices: Automobiles and Infrastructure capable of making decisions, improving safety and reducing environmental impacts

• Imagine:
  – A mobility management center facilitating active cooperation between travelers, vehicles, infrastructure and organizations
  – We could reach 30% of the users of a corridor, 50% of the vehicles, and most of the infrastructure management in real time.
  – 40% of the people and organizations who use a corridor helped plan out the commute each day in concert with the corridor managers
California Connected Corridors
Vehicles, Information & People (CC-VIP) Pilot

- Enable existing transportation infrastructure and vehicles to work together in a highly coordinated manner
- Deliver improved corridor performance (safety and mobility)
- Improve accountability
- Evolve Caltrans to Real-Time operations and management
- Enhance regional, local, and private sector partnerships
Corridor Management

• It is possible to manage:
  Supply, Demand and Incident/Event Management

• What’s Needed is
  • Real Time Data
  • Coordinated Real Time Decision Support Systems
  • Communications with Infrastructure, People and Vehicles

• Supply Management – Non Major Construction
  – Ramp Metering
  – Lane Management
  – Shoulder Usage
  – Speed Harmonization
  – Signal Timing Optimization
  – Signal Plan Coordination
  – Bus Prioritization
  – Transit Capacity
  – Cooperative driving (V to V)
  – Arterial Ramp Coordination
  – Parking Management

• Demand Management – Value Pricing (Tolling), Incentives, Information, Education, Accessibility
  – Mode Shift
  – Rerouting
  – Time Shift
  – Stay Home

• Incident/Event Management – Safer Automobiles, Improved Design, Better Integration
  – Reduce Accidents
  – Reduce Severity of Accidents
  – Better incident/event response
Overall deliverables for PATH/UC

- **System Engineering Documents for Ca Corridor Management Strategies**
  - Encompassing 10 Year Plan combined with implementation specific plans
  - Reviewed and accepted – Outreach and integration required
  - Recommended new technologies – Probes, Fusion, Crowd Sourcing
  - Policy items – Recommended new laws, skill sets, orgs and MOUs
  - Corridor level performance metrics

- **A real time decision support system**
  - Corridor level
  - Data fusion, estimation, prediction, control, exploration
  - Interfaces with California TMCs
  - Demand, supply and incident management
  - Micro, meso and macro simulation

- **One or more pilot studies**
  - In conjunction with Caltrans, local agencies, industry
  - UC/PATH provides vision, legitimacy, preproduction systems, analysis
  - UC/PATH partners for other aspects – Planning, coordination, communication and implementation
UC/PATH Goals for this year

- Mature Organization
- Concept of Operations – 10 Year and first pilot
- Overall Understanding of Ca Transportation landscape
- Research Agendas Fully Supporting Deliverables
- Working Software Platform with Demo capability
- Communications strategy including web site
- Contractual items and funding under control
- Sites and organizations selected for field tests

- Overall building an organization that:
  - Engenders respect
  - Is able to deliver results in an efficient manner
  - Is ready to begin field testing
Current organization of teams

Connected Corridors effort has been organized around clusters

– Clusters have grown from “in residence” expertise
– Additional topics which are not represented yet are currently being recruited (mostly internally)
– Development effort is organically growing from groups in the following areas of expertise:
  – Highway modeling / estimation and control
  – Arterial modeling and estimation
– Pilot plan aims at leapfrogging initiatives currently ongoing around the world
  – The Australia highway traffic control pilot
  – Incentivization experiments in the Netherlands
– Pilot aims at extending technologies and approaches beyond classical use of infrastructure (in particular through crowd sourcing, social networks and smartphones).
Current organization of teams

ICM technical sub-areas

Highway estimation
- Calibration
- Imputation
- Estimation
- Prediction
- Data fusion (TO1/TO2)
- Fault detection

Highway control
- Modeling
  - Ramp metering
  - Incentivized reroutes

Arterial estimation
- Probe based estimation
- Sensor based estimation

Arterial control
- Queue control
- Signal synchronization

Arterial - highway coordination
- Ramp - signal coordination
- Synchronization
- Reroutes

Demand management
- Incentivization
- OD imputation / filtering
Maturity of the science (incl. simulations)
Maturity of production system implementation

ICM technical sub-areas

- Highway estimation
  - Calibration
  - Imputation
  - Estimation
  - Prediction
  - Data fusion (TO1/TO2)
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- Arterial control
  - Ramp - signal coordination
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  - Reroutes

- Arterial - highway coordination
  - Incentivization
  - OD imputation / filtering

- Demand management
Experience with piloting

ICM technical sub-areas

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Demand management
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Connected Corridors Ecosystem

UC System/PATH

Regional Orgs
- MPO
- Toll Authorities
- Local Jurisdictions
- CHP
- CMA
- Governors Associations
- Air Quality Districts
- County Transportation Commission

Caltrans
- Headquarters
- Districts
- Nokia (Navteq)
- Telenav
- Inrix
- Automobile Manufacturers
- Google
- Facebook
- Waze
- Roadify

Connected Corridors

Consultants
- Cambridge Systematics
- Iteris (BTS)
- System Metrics
- TSS
- Delcan
- Novavia
- Others

Travelers

Employers

USDOT
- FHWA
- RITA
- Others
Connected Corridors Schedule

Connected Corridors SEMP Implementation Timeline

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- **Highway and Arterial Management Pilot**
  - Feasibility/Concept Exploration
  - Concept of Operation
  - System Requirements
  - High Level Design
  - Detailed Design
  - Software/Hardware Development Field Installation
  - Unit/Device Testing
  - System Validation
  - System Deployment
  - Subsystem Verification
  - Operation and Performance Analysis

- **Route Management Pilot**
  - Feasibility/Concept Exploration
  - Concept of Operation
  - System Requirements
  - High Level Design
  - Detailed Design
  - Software/Hardware Development Field Installation
  - Unit/Device Testing
  - System Validation
  - System Verification & Deployment
  - Subsystem Verification
  - Operation and Performance Analysis

- **Integrated Traveler Management Pilot**
  - Feasibility/Concept Exploration
  - Concept of Operation
  - System Requirements
  - High Level Design
  - Detailed Design
  - Software/Hardware Development Field Installation
  - Unit/Device Testing
  - System Validation
  - System Deployment
  - Subsystem Verification
  - Operation and Performance Analysis

(Includes Site Selection, Instrumentation, Decision Support and Evaluation)
Connected Corridors – Synergy and Integration

• Intelligent Infrastructure
  – Management Mechanisms (Freeway and Arterial Coordination)
  – Highway Estimation – Fusion of loop and probe data
  – Arterial Estimation – Flow and Machine learning algorithms

• Intelligent Vehicles
  – Probe Data from moving vehicles
  – Vehicle to server to vehicle
  – Automated Vehicle Control

• Intelligent Travelers
  – Collaborative Commuting
  – Transit Work in LA
  – Sentiment Analysis of text messages
  – Incentivization Studies
  – First and last mile mode shift studies

• Intelligent Systems
  – Decision Support for whole corridors over multiple metrics
  – Real Time Play Books
  – Corridor level management strategies (supply and demand)

• Corridor Management Implementation
  – Support for numerous CSMP initiatives
  – 680 Planning Studies
  – Simulation support and quality assurance

• Safety
  – Decision Support to provide safety metrics

• Data
  – Quality Metrics for Probe Data
  – Business Case for State Data Purchase

• Education, Outreach, Regulations and Policy Issues
  – Monthly newsletter on Corridor Mgmt in Ca
  – Sponsoring visiting practitioners

Air Quality Decision Support Map (880/980)
Thank You!
Questions?
How might we work together?