

Connected Corridors

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Agenda

- Connected Corridors:
- Related projects:
 - PCARI;
 - ERC;
 - SOPALE; and
 - NCHRP.
- Industry:
 - INRIX;
 - NOKIA;
 - TOM TOM; and
 - Bitcarrier.





What is Connected Corridors?

- A collaborative effort to research, develop, and test a framework for future corridor traffic operations in California and beyond;
- Funded by California Department of Transportation;
- \$20M for Phase 1 to 2016;
- Main aim to address and fundamentally change the way the State of California manages its transportation challenges for years to come.



Faculty Leadership

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- Alex Bayen
- Michael Cassidy
- Roberto Horowitz
- Adib Kanafani
- Alex Skabardonis
- Pravin Varaiya
- Joan Walker

Collaborators

- Mike Hansen
- Robert Cervero
- Elizabeth Deakin





Aims

- 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; and
- Enhance regional, local and private sector partnerships







Context

- California is a leader in.....traffic congestion;
- In 2009 for example, Californians lost:
 - nearly 80 million hours because of congestion;
 - equal to \$400 million in additional fuel costs; and \$3.5 million lost in wages and salaries per day.
- 2010 to 2060 = 37,309,382 to 52,693,583
- In the past we built our way out of congestion; we can't in future:
 - Costs are too high;
 - Land is too valuable; and
 - Livability is too important.





Background

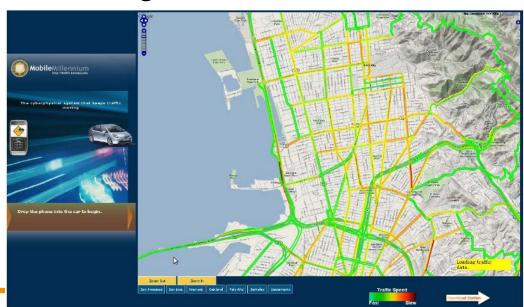




Mobile Millennium - An early instantiation of participatory sensing

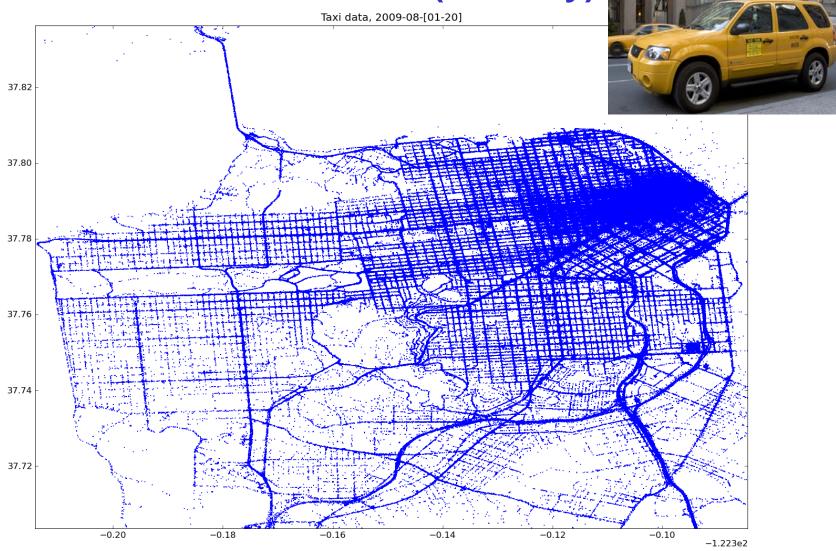
- Consortium: NSF, US DOT, Caltrans, Nokia, NAVTEQ, + 10 others
- Initially, 5000 downloads of the FIRST Nokia traffic app worldwide
- Today: gathers about 60 million data points / day from dozen of sources (smartphones, taxis, fleets, static sensors, public feeds)
- Provides real-time nowcast (soon forecast) of highway and arterial traffic, provide routing and data fusion tools.





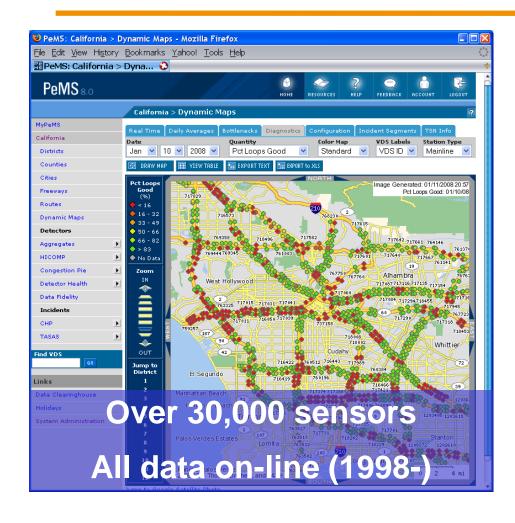


Example: 0.5% of Mobile Millennium data (one day)





Freeway Performance Measurement System (PeMS)



- Real-time Archive Data Management System;
- Collects detailed traffic data in real-time
- Processes these values in real-time, performing:
 - Diagnostics
 - Imputation for missing values
 - Speed calculations
 Aggregations over space and time
 - Many analysis functions
- Reports



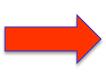
TOPL (Tools for Operations Planning)

- Tools to analyze and design:
 - a) Major traffic corridor operational improvements:
 - ramp metering; incident management; traveler routing and diversion; toll and commuter lane (HOT) management; arterial signaling control; demand management; pricing; etc.
 - b) Major traffic corridor infrastructure improvements:
 - Additional lanes, extend ramps capacity, add HOT
 - c) Quickly estimate the benefits of such actions



Accomplishments - Research

Probe & Hybrid Data - can inform decisions; 'data fusion' improves accuracy and coverage; 'big data' can locate the severity and extent of traffic jams in real-time.



Transportation system management and traffic control

Incentives – work to reduce congestion by changing behavior



Demand management

Connected Commuting - realtime information; commuter sentiment analysis tools; & happiness



Social network tools



Accomplishments - Operations

Core organization defined and staffed

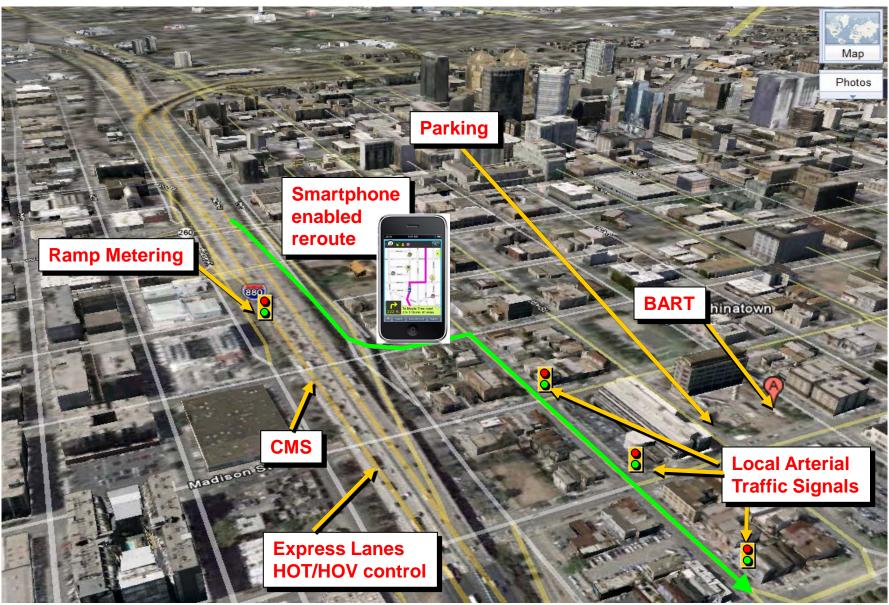
Pilot corridor selected

Concept of Operations in development

Industry and government partnerships in development



The next big thing in California: ICM



Integrated Corridor Management

State Strategy

Methodology

– Freeways,
Arterials,
Mass Transit

New concepts & technologies

California Pilot ICM California

– 50 major

corridors

- Performance measurement;
- Active traffic management;
- Organizational change;
- New contracting requirements; and
- Cooperation between state, regional and city agencies.

- Organization, System Eng, Policies, MOUs;
- Other ICM projects;
- Industry –
 Delcan,
 Schneider,
 TSS, Navteq,
 Google, INRIX
 etc; and
- Local Agencies.

- Data Fusion;
- Rapid
 Estimation,
 Prediction and
 Control:
- Demand
 Management
 through social
 networking; and
- Decision
 Support
 Technology
 (DSS) through
 Machine
 Leaning.

- Full Pilot a template for all major corridors in California.
- True
 Collaborative
 Commuting in
 California –
 People,
 Infrastructure
 and Vehicles



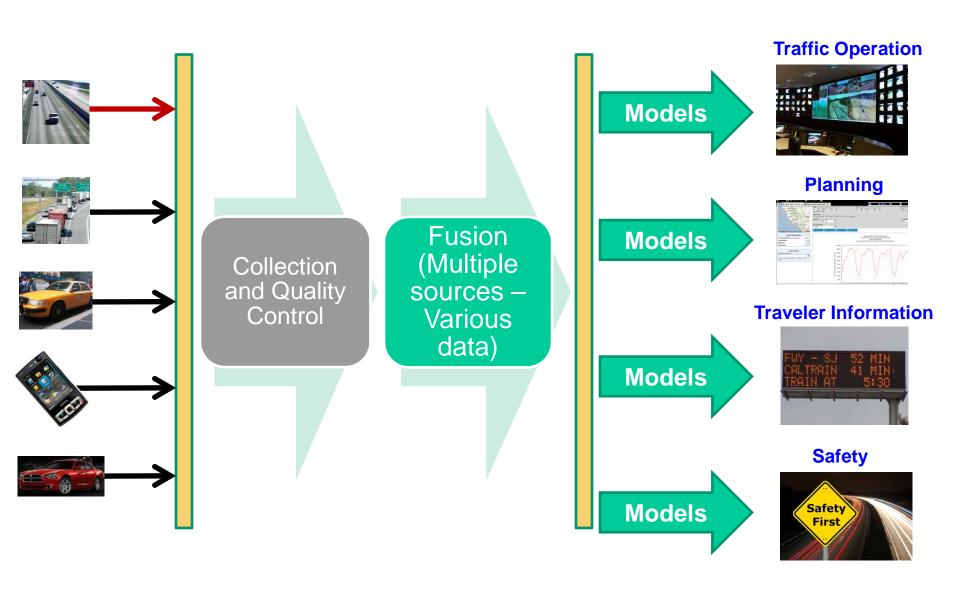
Connected Corridors - timeline

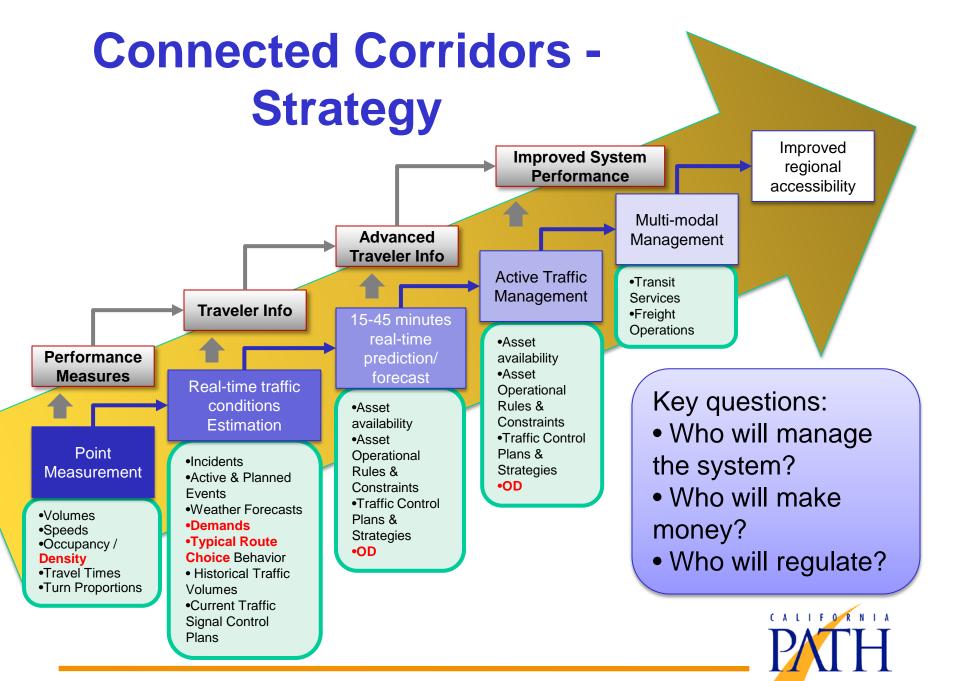
20	12	2013				2014				2015				2016				2017			
3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
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						etailed Software/F Design Field Inst			pment Ver			Testing & Verification									



Hybrid Data









Related Projects

- Philippines California Advanced Research Institutes approximately \$4M – Mobile Millennium Manila;
- NSF Engineering Research Center pre-proposal submitted July 30th – consortium led by SUNY, Buffalo – Reinventing the Transportation System;
- NASA Simultaneous Optimization of Passenger Airside and Landside Environments (SOPALE);
- NCHRP:
 - Planning for Transportation System Management and Operations" for inclusion in the Transportation Research Board Proposal Request NCHRP 20-07 (Task 345); and
 - 08-95 B-07 Using Cell Phone Data to Improve Travel Demand Models.



Simultaneous Optimization of Passenger Airside and Landside Environments (SOPALE)

