



Connected Corridors

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- **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

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- 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

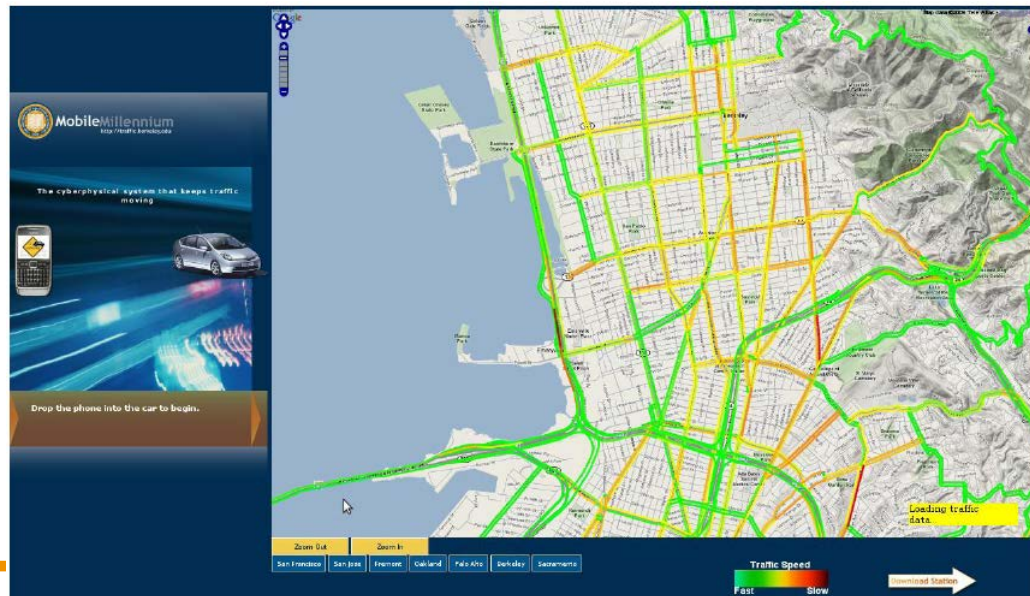
- California is a leader in.....traffic congestion;
- In 2009 for example, Californians lost:
 - nearly 80 million hours because of congestion;
 - equal to \$400 million in additional fuel costs; and \$3.5 million lost in wages and salaries *per day*.
- 2010 to 2060 = 37,309,382 to 52,693,583
- In the 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

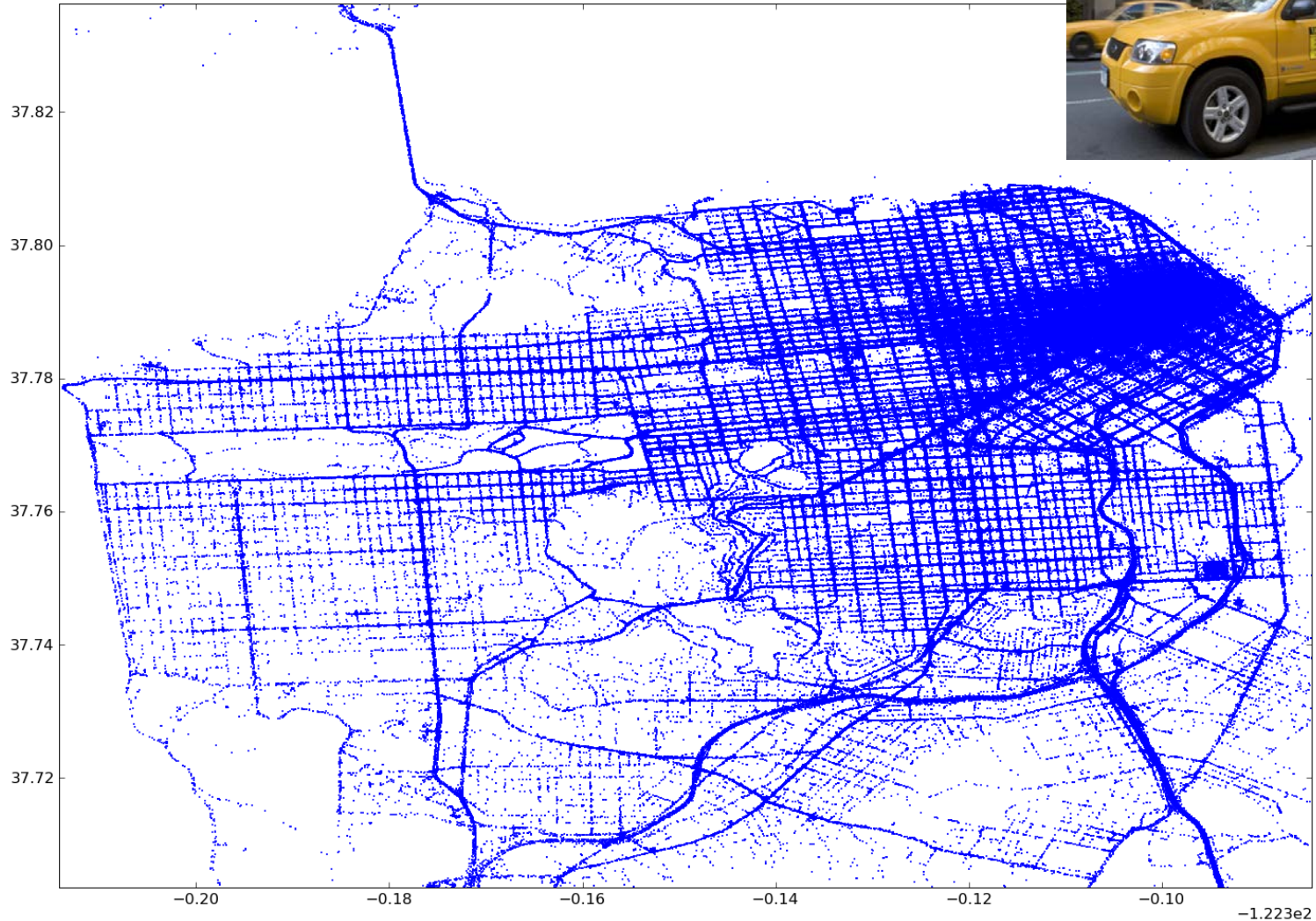
Mobile Millennium - An early instantiation of participatory sensing

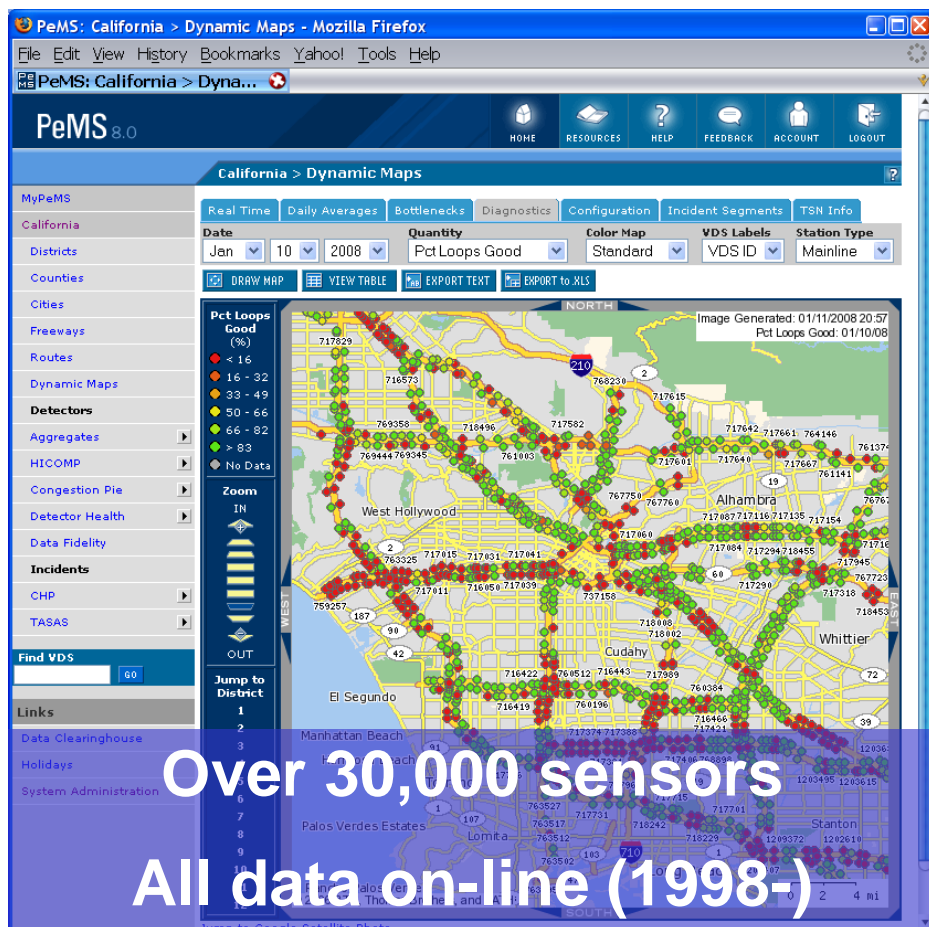
- Consortium: NSF, US DOT, Caltrans, Nokia, NAVTEQ, + 10 others
- Initially, 5000 downloads of the FIRST Nokia traffic app worldwide
- Today: gathers about 60 million data points / day from dozen of sources (smartphones, taxis, fleets, static sensors, public feeds)
- Provides real-time nowcast (soon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



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

Taxi data, 2009-08-[01-20]





- 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

- **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**

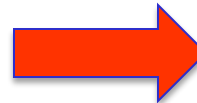
Accomplishments - Research

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 - real-time information; commuter sentiment analysis tools; & happiness



Social network tools

Accomplishments - Operations

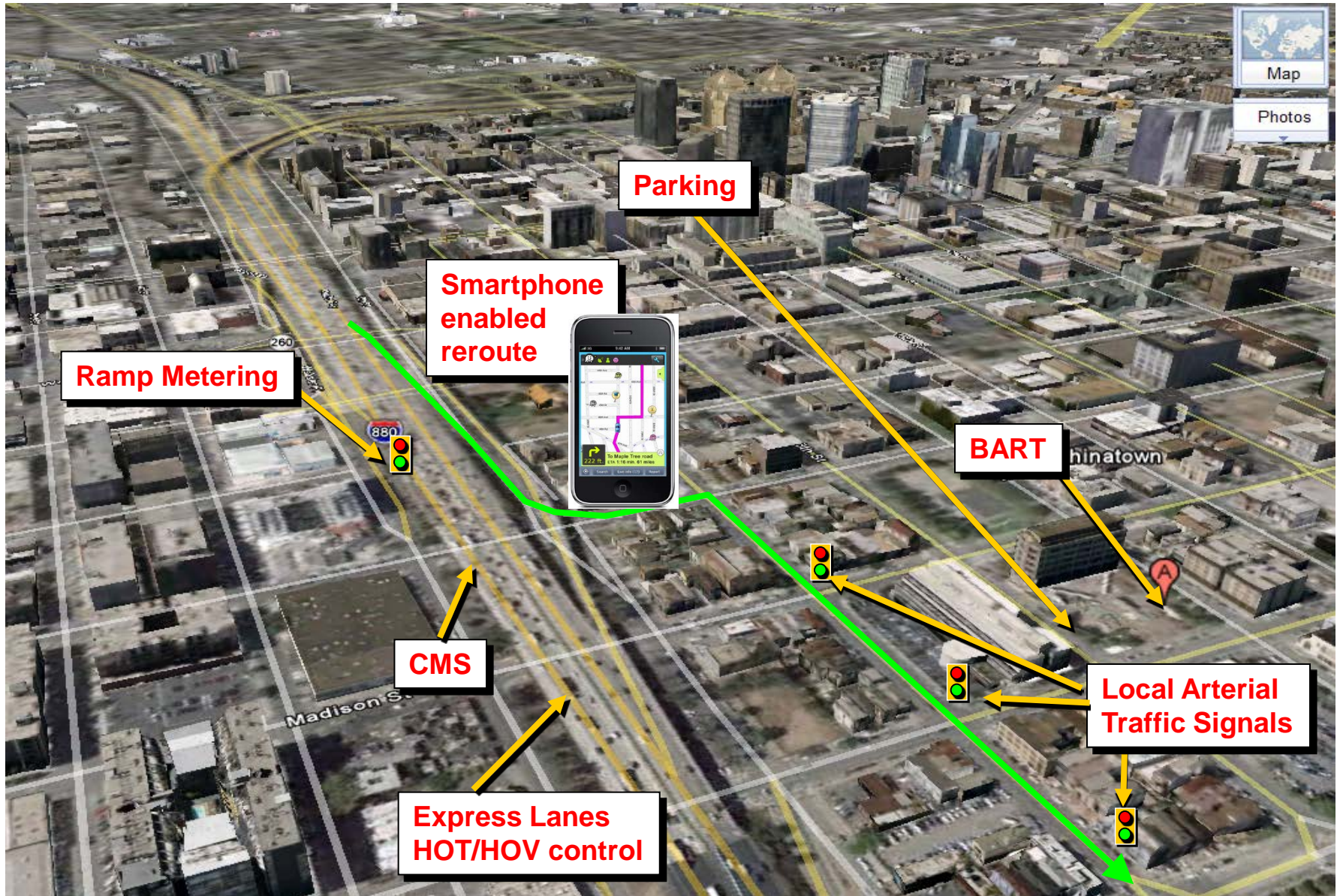
Core organization defined and staffed

Pilot corridor selected

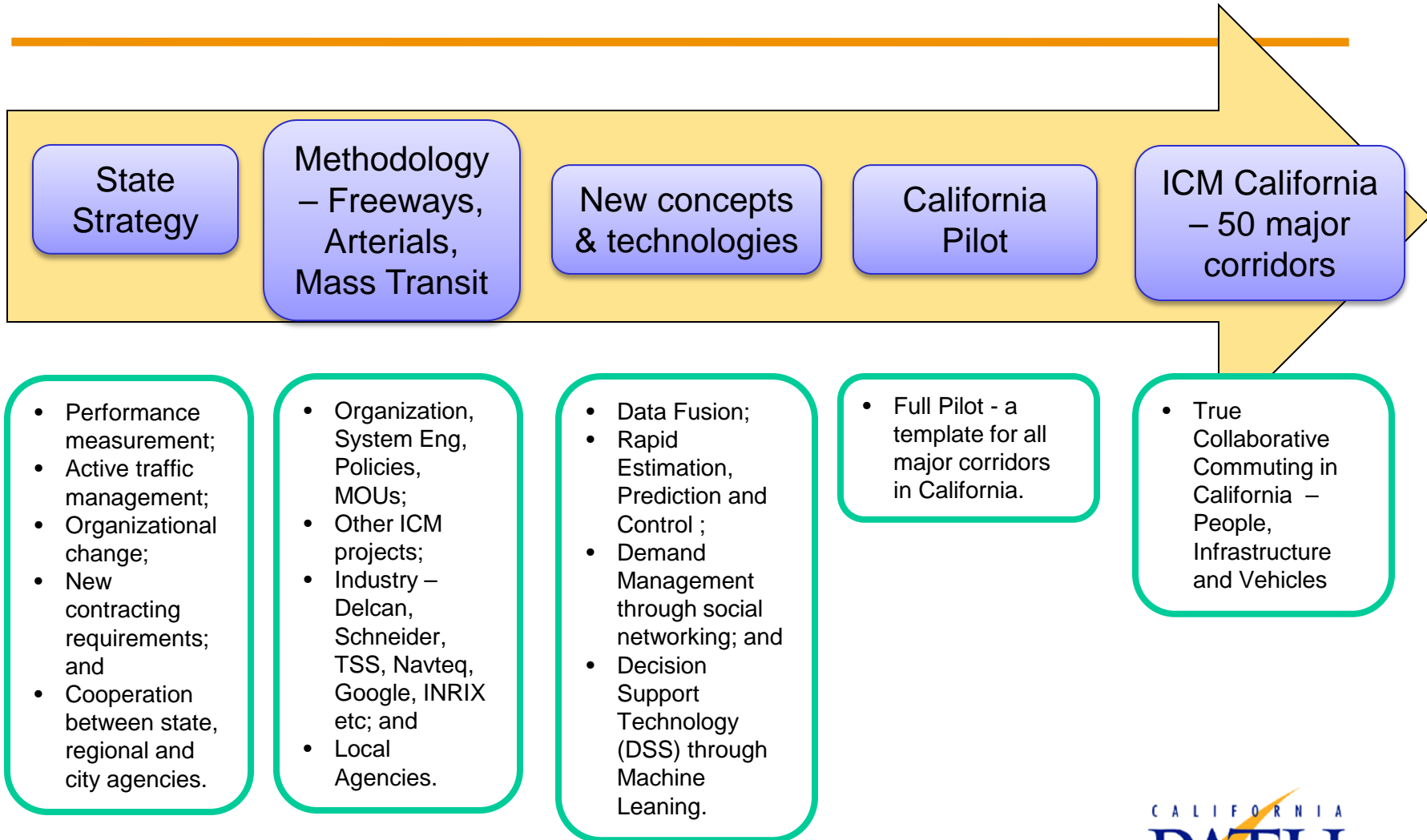
Concept of Operations in development

Industry and government partnerships in development

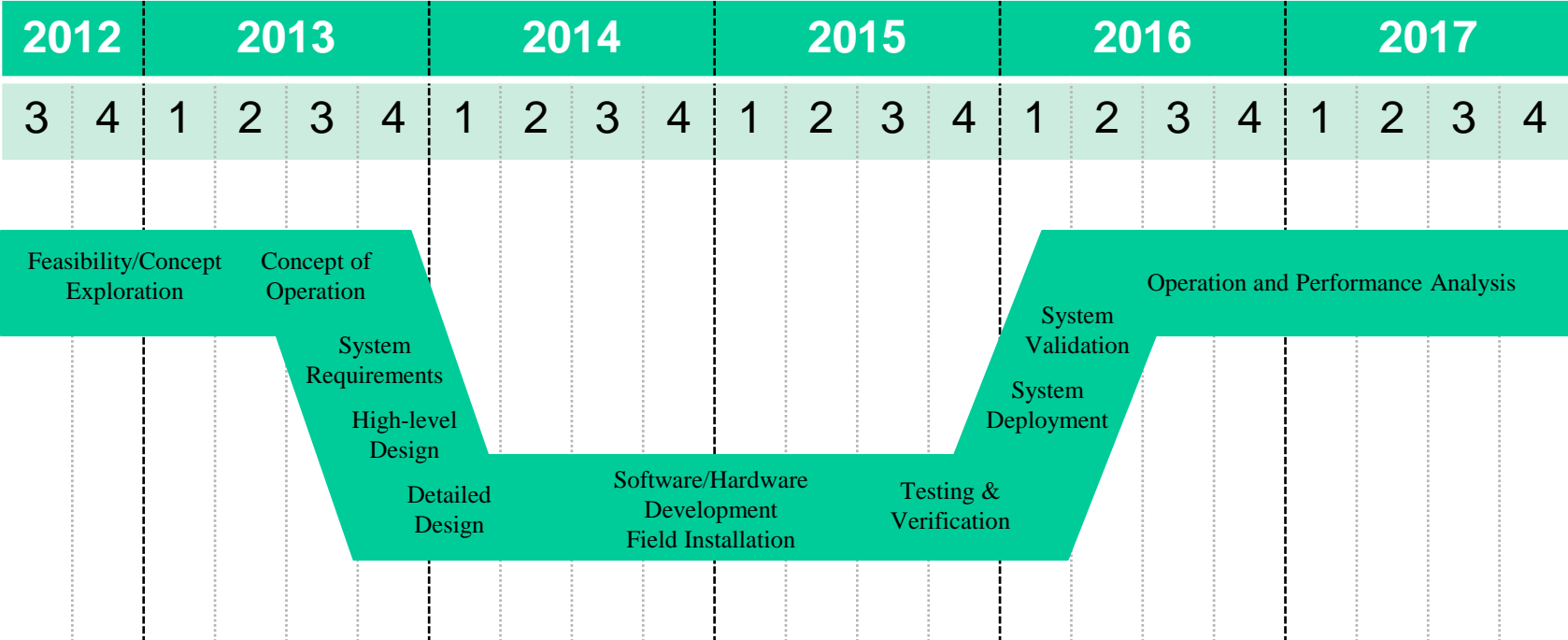
The next big thing in California: ICM



Integrated Corridor Management

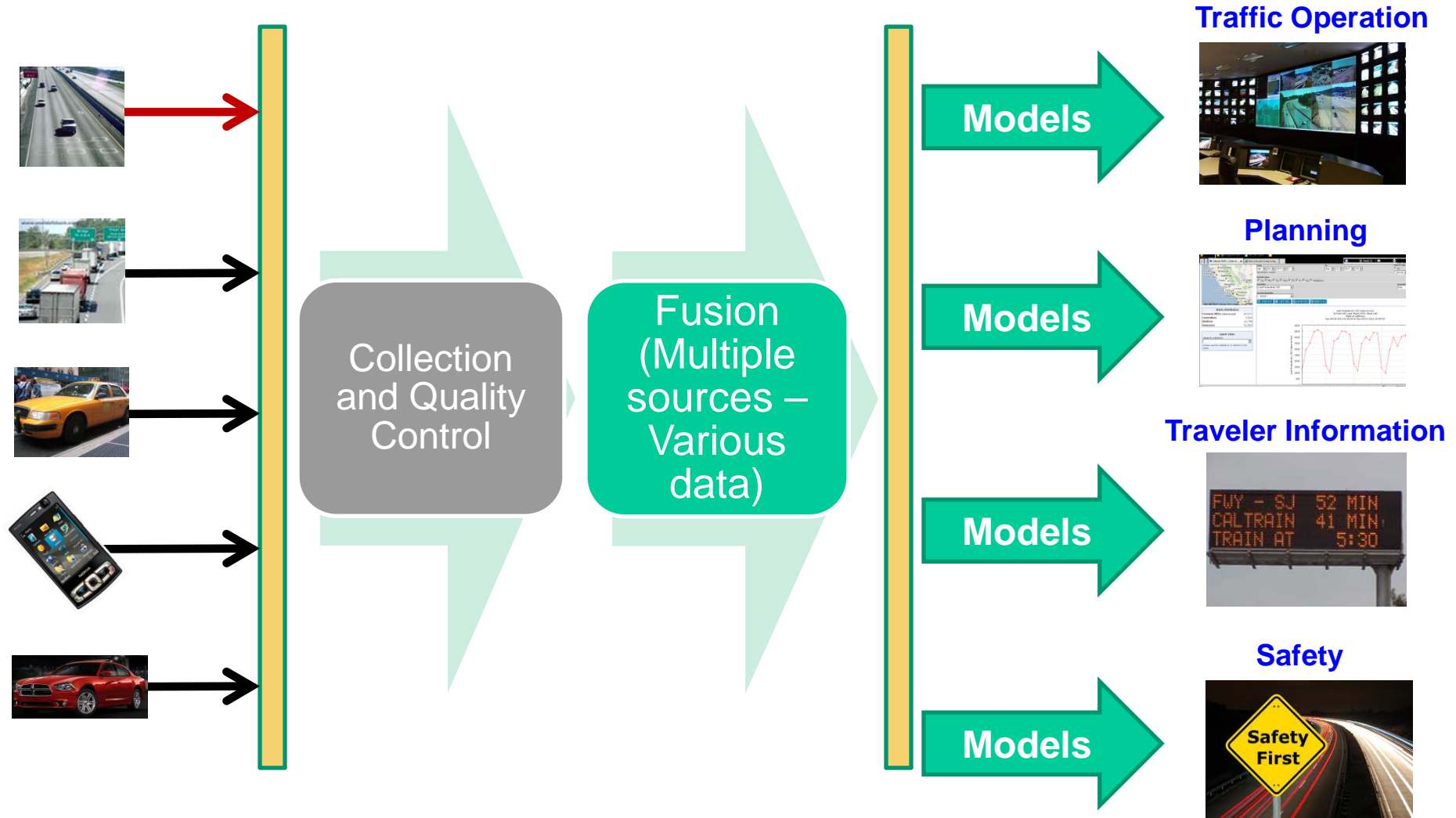


Connected Corridors - timeline

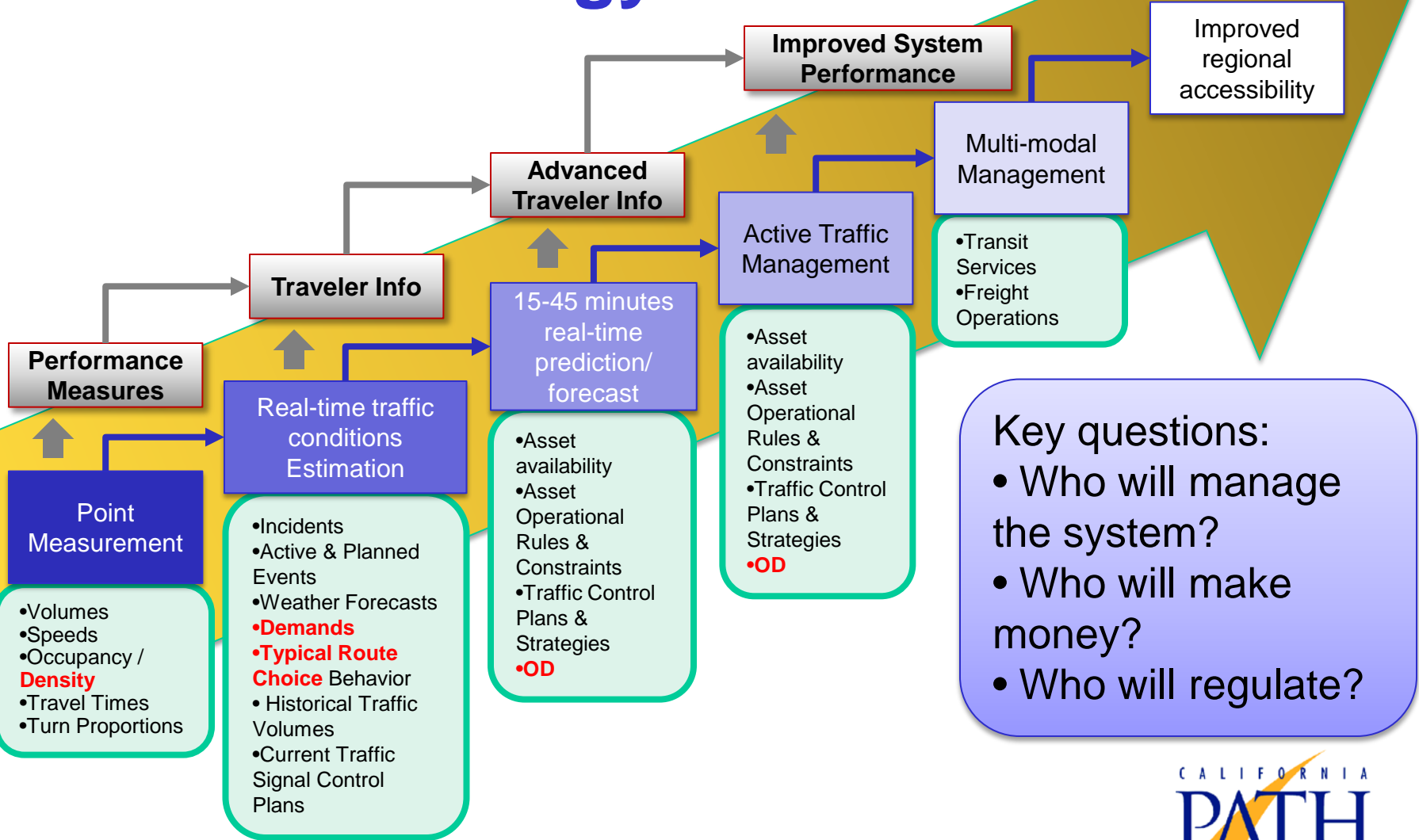




Hybrid Data



Connected Corridors - Strategy

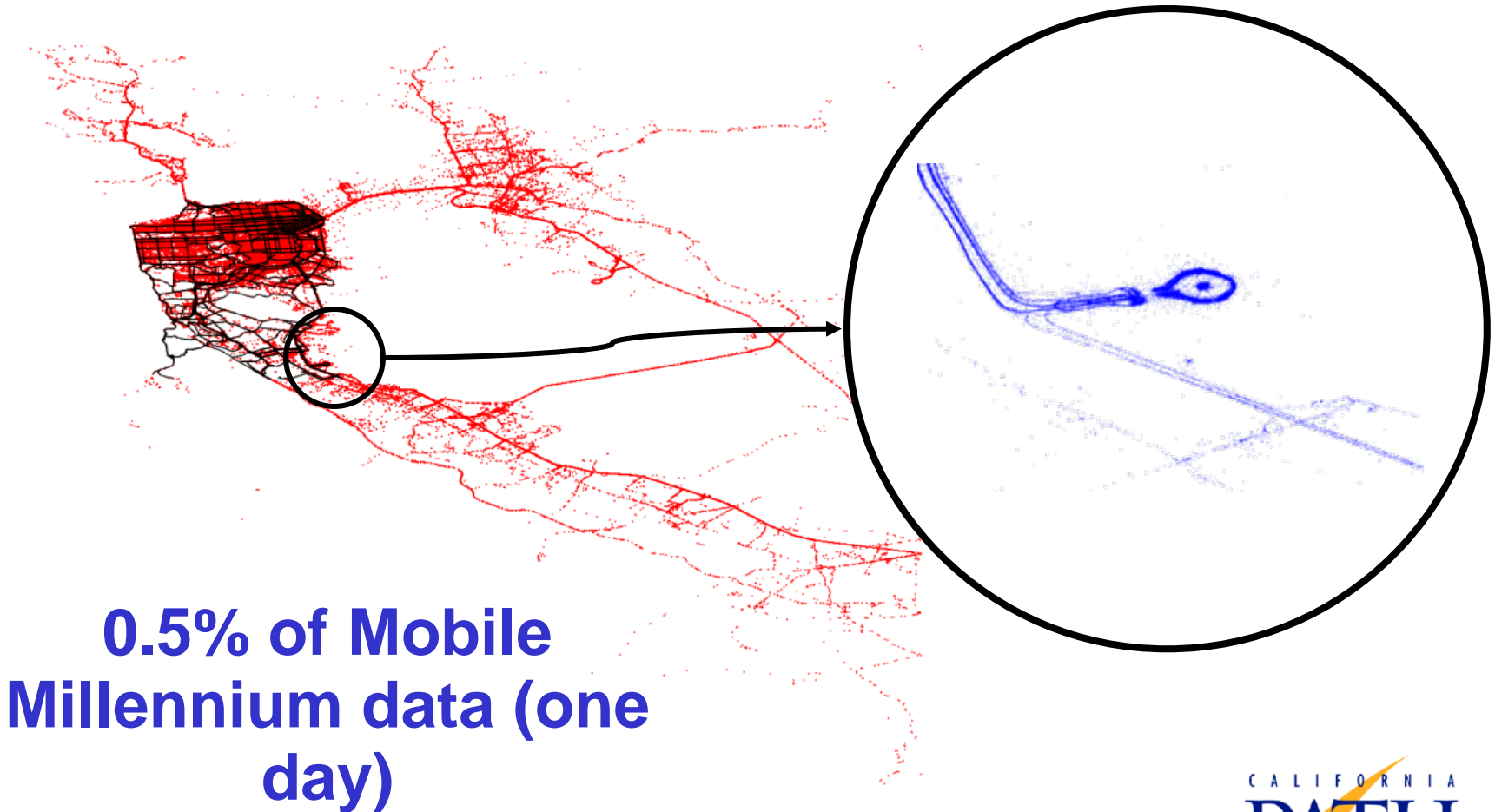


Key questions:

- Who will manage the system?
- Who will make money?
- Who will regulate?

- **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)



**0.5% of Mobile
Millennium data (one
day)**