Partners for Advanced Transportation Technologies

USDOT and PATH

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PATH Directors

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California PATH

• In 2011, two major California transportation institutions merged into a single entity.

• California Partners for Advanced Transit and Highways
  – Established in 1986, under the Institute of Transportation Studies at UCB
  – Multi-campus, multi-disciplinary
  – Pioneer in Intelligent Transportation Systems

• California Center for Innovative Transportation
  – Established in 2001, under the Institute of Transportation Studies at UCB
  – Focus on accelerating the deployment of innovative transportation technologies

• Formed the California Partners for Advanced Transportation Technology
  – Multi-campus, multi-disciplinary
  – Research and deployment, system management and safety
California PATH

• Developing and deploying technologies to help solve the nation’s most pressing transportation issues
  – Congestion, mobility, system productivity, and safety
  – Multi-modal, corridor focus

• With ancillary work and benefits in:
  – Air quality/environment
  – Energy consumption
  – Cost effectiveness
  – Regional/statewide economic health
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- 40 full-time staff and academic researchers, 40 faculty and students.

- Soft funded program solely based upon projects, although Caltrans provides a small level of base management support.

- Strong foundation in basic research and demonstration through technology demonstrations.

- Now, after merger, a strong record on transportation technology deployment.
  - Transferring academic research and privately developed technology to practitioners and the traveling public.
  - Making the case to stakeholders
    - Evaluations, business cases, FSR’s, presentations, etc.
  - Removing the barriers
    - Change management, changes to specs, legislative proposals, etc.
California Has Been Quietly Progressing...

- Californian’s agree to a $20B transportation bond in 2006
- The California Transportation Commission is on-board
  - They demand science based reasoning for project selection
  - They consider the use of technology as a cost effective investment
  - They allocate over $100M to ITS projects
- $4.5B for Corridor Mobility Improvement (CMIA)
- Corridor System Management Plans required on all CMIA corridors
  - Over 50 CSMPs; over 25 use microscopic traffic simulations
  - Simulations and other scientific assessment point to most cost effective investments – typically ITS
California Has Been Quietly Progressing...

- Investing in data production and acquisition.
  - The lack of reliable data is the single biggest issue in monitoring and managing transportation performance.
    - 60% increase in detection systems since 2004
    - Development and deployment of data archiving tools
    - Development and deployment of alternative sensors networks
    - Understanding the value of mobile data sources
    - Understanding, purchasing, and using 3rd party data

- Investing in more efficient modeling tools for transportation investment planning.
  - Current models are slow, time consuming, and costly

- Investing in more efficient methods for real-time operational improvements.
  - Tools to allow operators to run real-time scenarios? Develop active playbooks?
California Has Been Quietly Progressing...

• Investigating how crowd sourcing might change the face of transportation management.
  – Will this make transportation management better or worse?
  – Taking a proactive position to ensure the best possible outcomes.

• Understanding what role will connected vehicles will play in improving the safety and mobility of California corridors.
  – How shall California prepare and what demonstrations are necessary in to convince stakeholders and travelers in the most vehicle dependent state?

• California is interested in the deployment of the next generation ICM in a yet-to-be selected California corridor.
  – What does this look like?
  – What is the mix between investment in infrastructure, vehicle, and community?
  – Integration of conventional tools, newly developed technology, and the use of social networking tools for self management.
How is PATH Assisting California?

• Assisting California in determining where best to invest
  – Developed the very first Corridor System Management Plan (CSMP) on I-880 in the San Francisco Bay Area
  – Promoting and assisting the use of microscopic traffic simulation and other scientific techniques to determine the most cost effective transportation investments
  – Evaluating current CSMP’s and micro-simulation as a sustainable business process
California PATH

- Addressing California’s data deficiencies
    - Online system providing graphical and map based traffic data in real time.
    - Provides diagnostics, imputation for missing values, speed calculations, etc.
  - Understanding the value of probe data through Mobile Century, Mobile Millennium
    - First use of crowd sourced cell phones to collect speed data, great public excitement.
    - Development of real time traffic estimation and fusion models (not control).
  - Data Quality and Hybridization
    - What are the quality standards and data formats government require to purchase data?
    - Fusing 3rd party data with legacy data – Hybridization.
    - Information and control?
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- Developing more efficient modeling tools
  - Newly developed macro modeling tool called TOPL – Tools for Operational Planning
    - Modeling that took months or years to establish and calibrate now takes weeks or days
    - Scenarios that took days to run now takes minutes or seconds
    - Provides predictions of traffic conditions given changes to ramp metering, lanes, etc.
    - Designed to assist corridor managers in making decisions, web based for easy access.
    - Open Source.

- Conducting work on the Connected Vehicle Program
  - CICAS- SLTA
  - Upgrading California test facility in the San Francisco Bay Area
  - Attempting to promote Connected Vehicle demonstration in California
  - Team California
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- Designing next generation corridor management (ICM 2.0)
  - Connected Corridors – Cooperative Corridor Management
  - Vehicles, Infrastructure and People
  - Develop a single system facilitating among:
    - Travelers
    - Vehicles
    - Infrastructure
    - Organizations
  - Traveler collaboration.
ICM 2.0 - People as Part of the Solution

Factors

- Human Factors (93%)
- Road Environment Factors (34%)
  - 57%
  - 27%
  - 3%
  - 3%
  - 1%
  - 2%
  - 6%

- Vehicle Factors (12%)
Research and Deployment Areas

• The social internet – A connected world
  – People can participate, in real-time, in demand management, psychology and crowd sourced intelligence. First and last mile problem, demand management, multi-modal travel choices.

• Big data – New sources, new combinations
  – Probe data, visual data, ubiquitous sensors, texts, tweets, etc. Significant fusing of data to provide information from small amounts of data (arterials, rural highways, ramps). Knowledge and control.

• Cloud computing – Unlimited storage, computational power, and data distribution
  – Simulation, system management, routing, real-time control, predictive and control actions methods that were not possible are now possible.
Research and Deployment Areas

- Smart Devices – Automobiles and infrastructure capable of making decisions
  - Better coordination, incident reduction.

- Real-time control of complex systems – New strategies combining multi-modal productivity and demand management
  - Made possible by cloud computing, big data, smart devices and the social internet. Prediction, learning, adapting, control. Real-time, reliable control of complex corridors.

- Organizational dynamics – Risk management in corridors (personnel requirements, policy modifications, laws)
  - People and organizations will always be part of the process and they must evolve to enable the management of complex systems. Risk management, decision support systems, legal items, finance.
Thank You!
Questions?