The Potential of Transportation Technology

New Uses for Technology in Transportation

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Caltrans Improves Mobility Across California
Why should we invest in technology?

To Improve:
- Performance
- Cost-effectiveness
- Quality
- Safety
- Environmental mitigation
So... What’s the Problem?!
Mobility

Congestion Management Research for Improved Mobility
Congestion Management
Research Approach

- Incident Management
- ICM – Integrated Corridor Management
- Travel Demand Management
- Cutting Edge Technologies
Incident Management
Responder System

In Incident Response:
A picture is worth a thousand words
Congestion Management
Integrated Corridor Management (ICM)

To provide the institutional guidance, operational capabilities, and ITS technology and technical methods needed for effective Integrated Corridor Management Systems.

To demonstrate effective corridor management systems and strategies through successful coordination among corridor agencies, ITS technology deployment, and proactive implementation of corridor operations.
Congestion Management
Travel Demand Management

- High Occupancy Vehicle (HOV)
- High Occupancy Toll (HOT)
Congestion Management
Active Traffic Management

- Full motorway lighting
- Comprehensive CCTV camera system
- Driver information signs
- Digital enforcement technology
- New lightweight gantries
- New emergency roadside telephones
- Emergency refuge areas
- Hard shoulder running
- Signals
- Sensors
Travel Demand Management

Smart Parking

- Increases Transit Ridership
- Decreases Congestion
- More Effective Land Use
- Reduced Emissions
- Improved Air Quality
- Better Land Use Decisions
- Conserve Natural Resources
Travel Demand Management
Smart Truck Parking

- Increase Safety
- Improve Mobility
- Better Infrastructure Preservation
- Improve Air Quality and Reduce Greenhouse Gas Emissions
Travel Demand Management
Traveler Information

Provides up-to-the-minute information on:

- Traffic Conditions
- Incidents
- Driving Times
- Transit schedule, route and fare
- Carpool/ Vanpool
- Bicycling
Travel Demand Management
Travel Times on Changeable Message Sign

- May 2005 – Caltrans started to display travel times on two CMS in Bay Area
- Currently we have 100 CMS displaying travel times throughout the State
- Travel times are updated every minute
US 101 Commuter Travel Time Information System
Congestion Management
Cutting Edge Technologies

Vehicle Infrastructure Integration (VII)

- In Vehicle Signage
- Optimized Traffic Signal Control
- Traveler Information
- Ramp Metering
- Electronic Toll Collection
- Intersection Collision Avoidance
Simple VII Block Diagram

- Driver
- On Board Equipment
- Road Side Equipment
- 5.9 GHz DSRC
- Vehicle Data
- Backhaul Network
- Subscriber Applications

Driver Display

End User
SAFE TRIP-21
The Connected Traveler Project

- Use consumer handheld devices to collect and provide timely, accurate, reliable traveler information
- Accelerate testing and implementation of Vehicle Infrastructure Integration (VII) applications
- Transit/modal integration
- Demonstrated at ITS World Congress in 2008
A True Partnership

Total Project Budget: $12.4 million

- Caltrans - Infrastructure owner/operator + $4.2M
- USDOT/RITA - Federal Government + $2.9M
- Nokia - H/W Data Collection/Processing + $2.5M
- Navteq - High accuracy vectored maps + $2.0M
- UC Berkeley – Research, Data Integration + $0.8M
- Nissan – Vehicle expertise - $30K
Mobile Millennium:
mobility tracking using cellular phones

MOBILE CENTURY - Using GPS Phones As Traffic Sensors in a Privacy Preserving Environment

UC Berkeley – CCIT – Nokia – Navteq
Safety

- Balsi Beam
- Cooperative Intersection Collision Avoidance Systems
Workers are our most valuable resource

- $33 Million in workers compensations
- 173 CT Fatalities
- 103 injured on foot in work zones (10 year)

Safety is no Accident
Cooperative Intersection Collision Avoidance Systems (CICAS)

The Project consists of these technologies:

- **Vehicle-based** – sensors, processors, and driver interfaces within the vehicle
- **Infrastructure-based** – roadside sensors and processors to detect vehicles and hazards, messaging signs, and interfaces to communicate various warnings to drivers
- **Communications systems**—Dedicated Short-Range Communications (DSRC) to communicate warnings and data between the infrastructure and vehicles
Infrastructure

- Construction Analysis for Pavement
- Rehabilitation Strategies (CA4PRS)
- Quieter Pavement
CA4PRS

Construction Analysis for Pavement Rehabilitation Strategies

- Optimize construction scheduling and traffic management planning for highway rehabilitation projects
- Evaluate various “what-if” scenarios for the combinations of design, construction, and traffic operations

- Balancing competing objectives
  - Better Performance
  - Faster Delivery
  - Cost Savings
  - Work-Zone Mobility and Safety

Received 2007 Global Road Achievement Award from IRF, 2007

http://www.dot.ca.gov/research/roadway/ca4prs/
Quieter Pavements

- Reduce Tire-Pavement Noise without compromising other pavement performance and durability
- Improve mixture properties and construction quality
- Develop innovative surface treatment materials/methods
- Develop implementation policy for when, where, and how to use quieter pavements
- International Collaboration with the Danish Road Institute

http://www.dot.ca.gov/hq/esc/Translab/ope/ QuieterPavements.html
Caltrans leverages limited state research funding by successfully competing for federal grants:

- Integrated Corridor Management ($0.5M)
- Smart Truck Parking ($5.4M)
- SafeTrip-21: Connected Traveler ($2.9M)
- SafeTrip-21: Smart Parking ($1.0M)
- Cooperative Intersection Collision Avoidance Systems ($3.4M)
- National Cooperative Highway Research Program ($3.5M)
- University Transportation Centers ($4.5M)
It Starts With Research!

We need TECHNOLOGY CHAMPIONS!