



UNITED STATES
DEPARTMENT OF TRANSPORTATION

ITS ePrimer

Module 5: Personal Transportation

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Intelligent Transportation Systems Joint Program Office
Research and Innovative Technology Administration, USDOT

Instructor



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Learning Objectives

1. Learn of capabilities, features, and limitations of ITS technologies for personal transportation
2. Understand deployment opportunities and constraints
3. Understand how ITS personal transportation applications impact the user and the transportation system in terms of mobility and accessibility
4. Understand emerging and future trends in ITS technologies for personal transportation



Webinar Outline

- Real-Time Travel Information
- Driver Assistance Systems
- Traveler Comfort and Convenience
- Personal Rapid Transit
- Vehicles, Internet and the Future



Real-Time Travel Information

Information types and impacts

Pre-Trip

- Trip departure time
- Mode of travel
- Route choice

En Route

- Change route
- Change mode (if alternate mode with parking available)
- Expected arrival times



Real-Time Travel Information

Dissemination

■ Web

- Every State DOT offers traveler information Web site
- Pre-trip information
- Wide geographic area coverage
- Images from CCTV cameras on real-time conditions

■ 511 Phone System

- More than 40 511 systems
- Highest usage under major events
 - Extreme weather
 - Major road closures



Real-Time Travel Information

Dissemination

Changeable Message Signs (CMS)

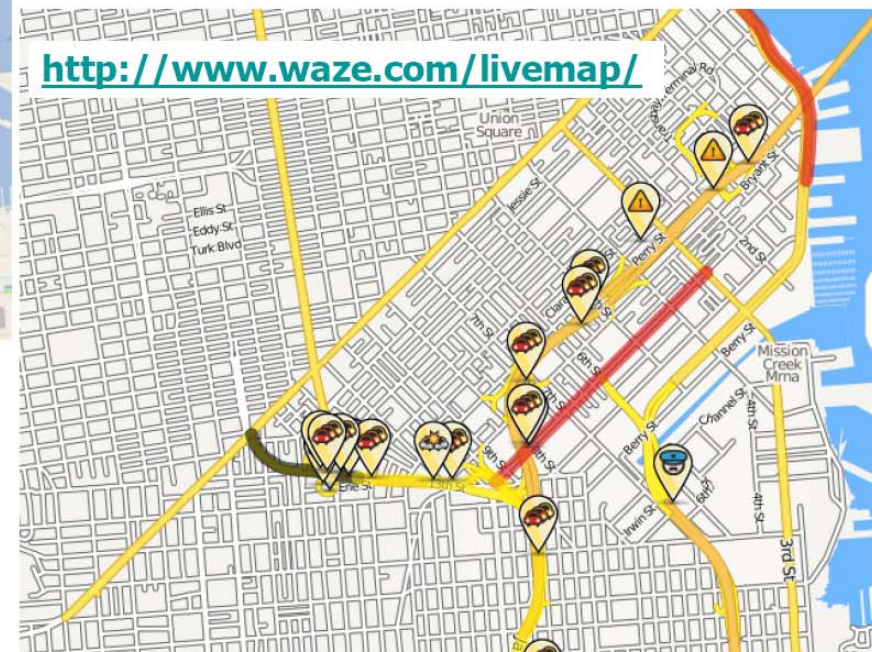
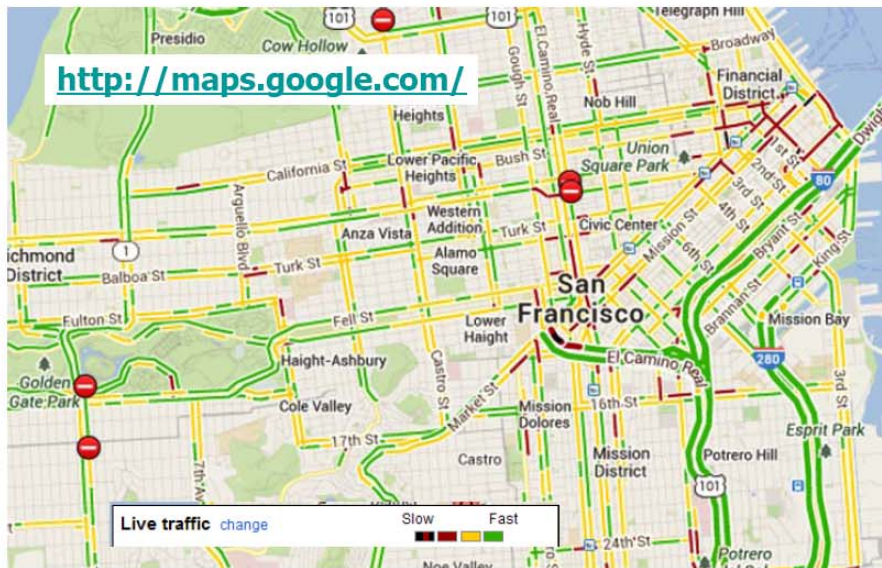
- Expected travel times to destinations
- Alerts on incidents, inclement weather, other events
- Location important (prior to decision point)
- Emergency Messages
 - AMBER Alert
 - LEO Alert
 - SILVER Alert



Real-Time Travel Information

Dissemination

Increasing use of mobile applications and social networking



Real-Time Travel Information

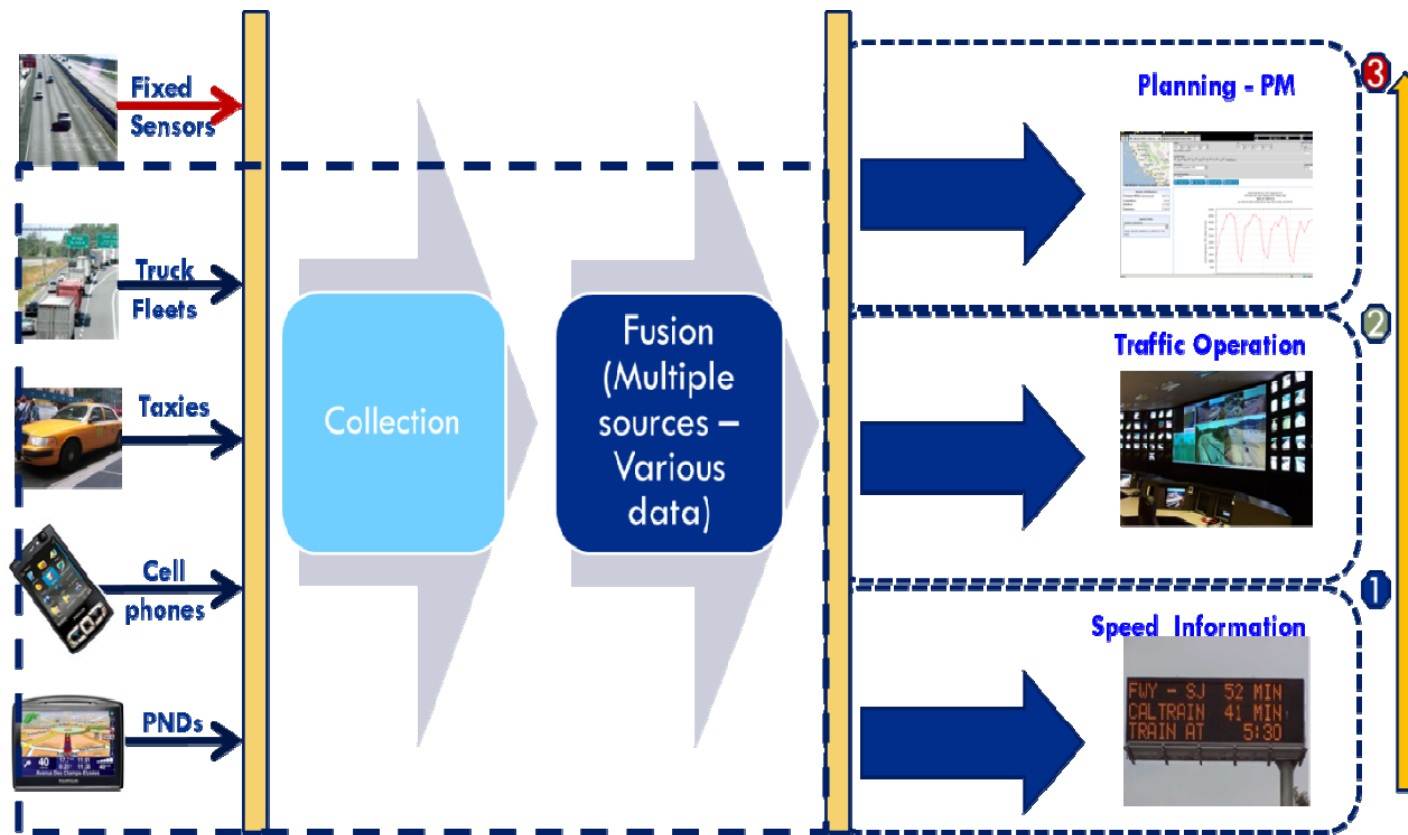
Data Sources

- Fixed sensors approximately 0.5 mile apart in each travel lane (e.g., loops, radar, video)
- Event information from incident management teams, police patrols
- CCTV
- Probe vehicles
 - ETC transponders
 - Cell phones
 - Bluetooth readers



Real-Time Travel Information

Data Collection-Fusion-Utilization



Real-Time Travel Information

Benefits

Improve Traveler Decision Making

- Make accurate and timely decisions
 - Routing
 - Time of departure
 - Mode
 - Not make the trip
- Sense of “self control” to traveler

Reduce Frustration and Irrational Behavior

- Improve perceived level of service

Real-Time Travel Information

Benefits

Spread or Reduce Peak Traffic Demand

- Over space: alternative routes
- Over time
- Alternative modes
- Eliminating discretionary trips

Field Evaluation Results

- Traveler information users perceived time savings
- In-vehicle travel time savings are small



Parking Information

Public Agencies/Operators

- Maps with Parking Facilities
- Information on the Web: location/characteristics

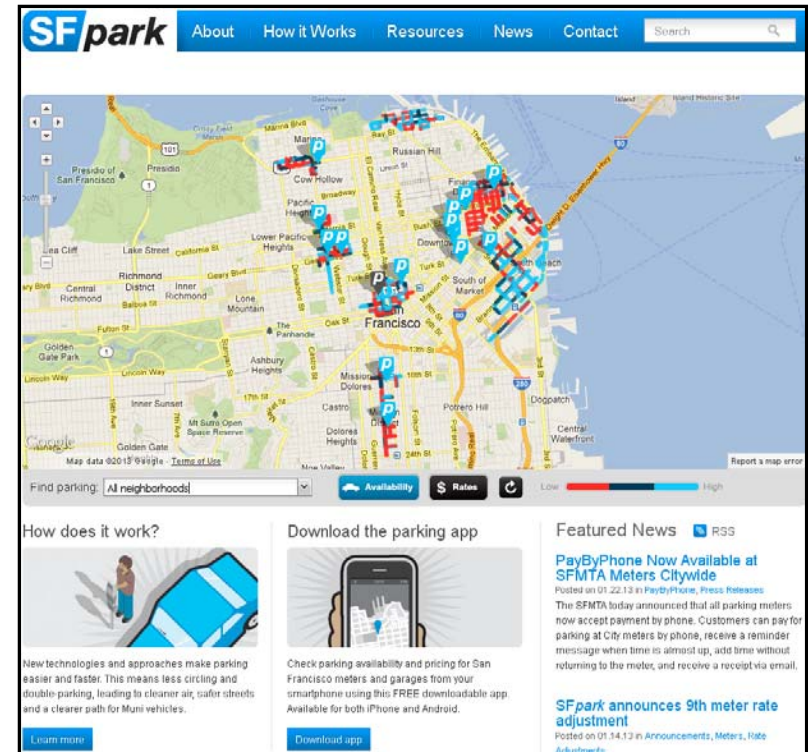
Parking Lots

Space Availability

Private Service Providers

Web/Mobile Applications

- Real-time Parking Availability
- Online Reservation/Payment



City of San Francisco: Parking Information Web site

<http://sfpark.org/>

Parking Information

Multimodal Information

- Driving Times
- Parking Availability at Transit Stations
- Transit Information
 - Departure/Arrival Times
- Influences Mode Choice
 - Travel Time Savings
 - Perceived Congestion



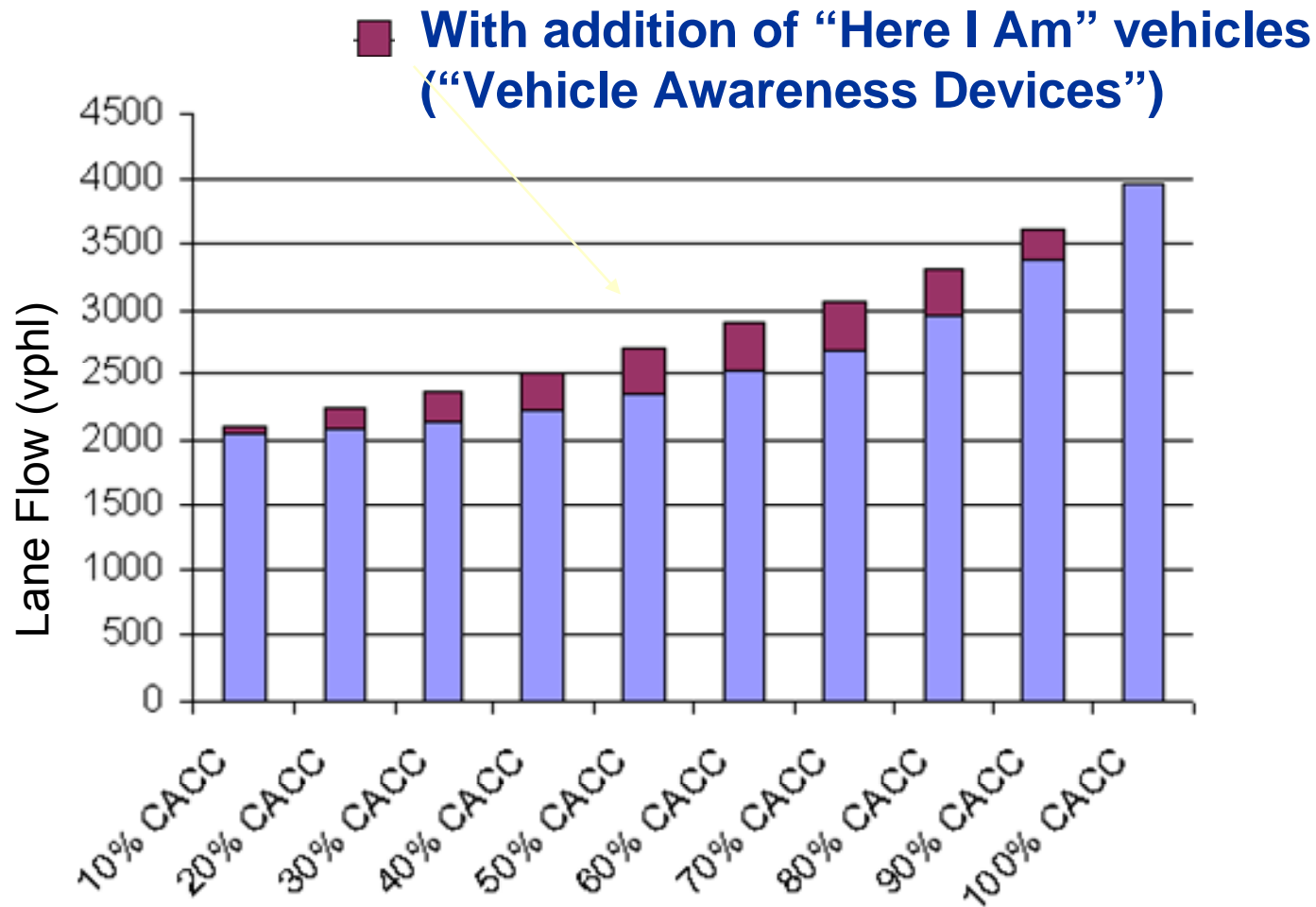
Driver Assistance Systems

- Night Vision
- Adaptive Cruise Control
- Collision Warning
- Collision Avoidance
 - Front collision
 - Lane keeping
- Precision Docking
 - Precise stopping at transit stops
 - Reduces passenger boarding and alighting times
- Driver Impairment Monitoring
- On-Board Monitoring for Commercial Vehicles



Driver Assistance Systems

Lane Capacity vs. CACC Market Penetration



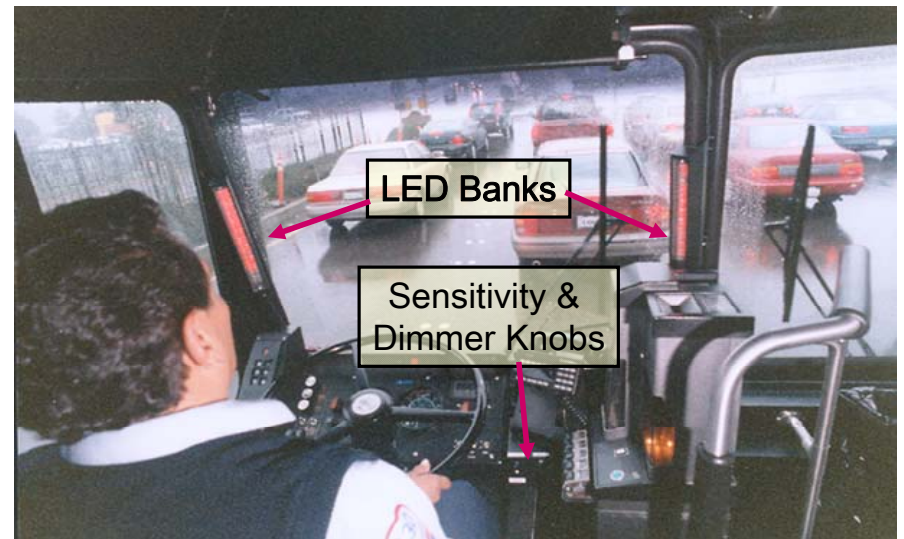
Driver Assistance Systems

Collision Warning (CW)

Available/Planned in Private Automobiles

Operational on Transit Systems

- Forward CW
 - Samtrans (San Mateo Bay Area)
- Rear Impact CW
 - Ann Arbor Transit
- Lane Change/Merge CW
 - Pittsburgh Transit



Traveler Comfort and Convenience

Electronic Toll Collection (ETC)

- Toll paid through transponders without stopping
- ETC increases toll lane capacity 4 times
- ETC transponders may operate across states/facilities
- ETC mandatory for congestion pricing implementation

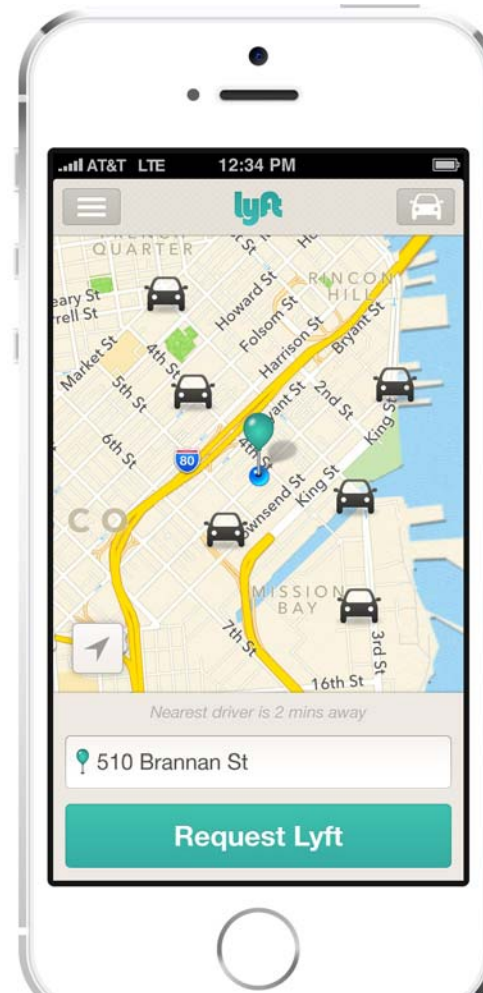
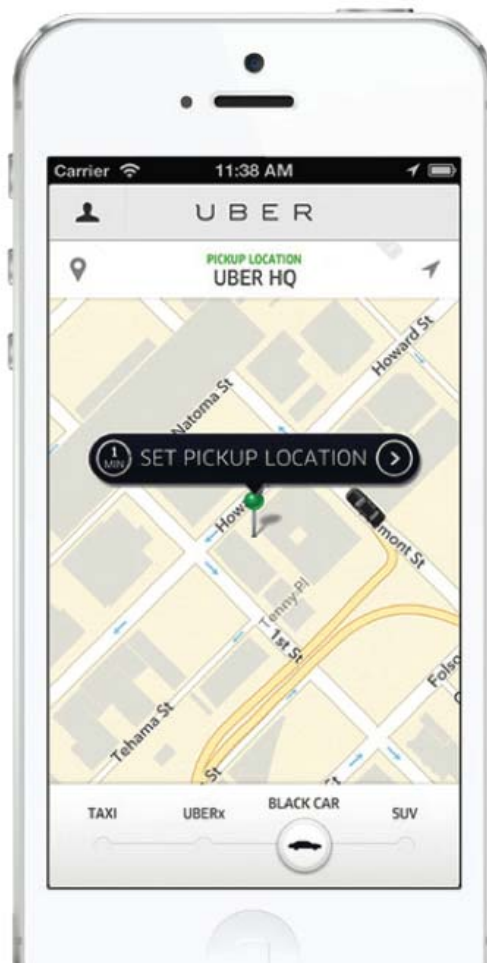
Open Road Tolling (ORT): toll collection at highway speeds

- Higher capacity
- Improved safety
- Reduced fuel and emissions



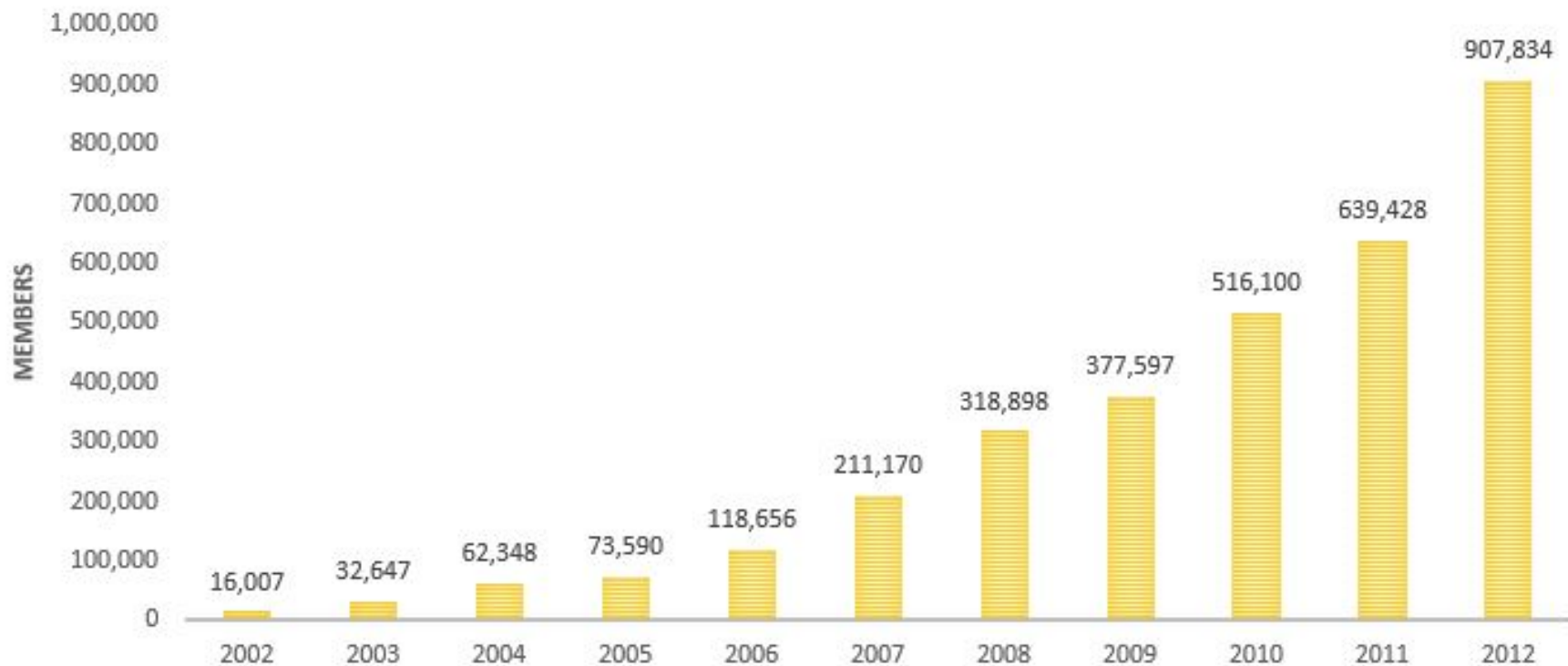
Traveler Comfort and Convenience

Mobile applications for ride-share services



Traveler Comfort and Convenience

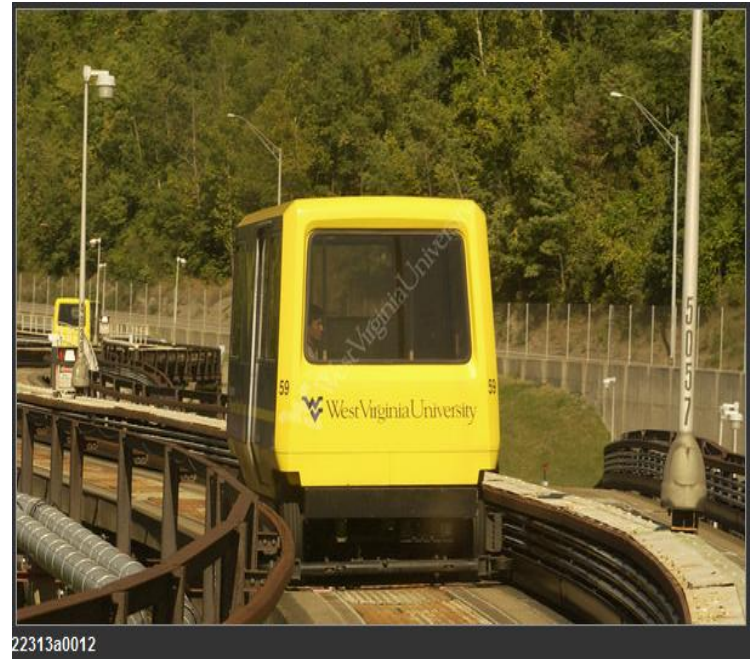
Carsharing: North American Member Growth



Personal Rapid Transit (PRT)

Concept: Alternative to Conventional Transit in Low Density Areas

- Small driverless vehicles (up to 15 passengers)
- Dedicated tracks/Off-line Stations
- High Capacity (2 seconds Headways)
- Point-to-Point Service/Passenger Comfort
- Limited Implementations



Morgantown PRT system, West Virginia. Courtesy of West Virginia University.



Vehicles, Internet, Phone, and the Future

Cooperative Vehicle-Infrastructure Systems

Vehicle-to-vehicle (V2V)

- Communications
 - DSRC
 - Mobile Devices
- Applications
 - Active Safety Systems
 - Reduce crashes by 80%
 - Driver Alerts (Queue Warning)

Vehicles, Internet, Phone, and the Future

Cooperative Vehicle-Infrastructure Systems

Vehicle-to-Infrastructure (V2I)

- SPaT (Signal Phasing and Timing) Message
- Applications
 - Safety
 - Mobility
 - Improved traffic signal control
 - Dynamic route advisory
 - Environment
 - Speed advisory for minimum fuel/emissions

Vehicles, Internet, Phone, and the Future

Dynamic Speed Advisory
(source: BMW)

V2I Example:
SPaT message

