Applying Connected Vehicle Concept for Next Generation Mobility Management
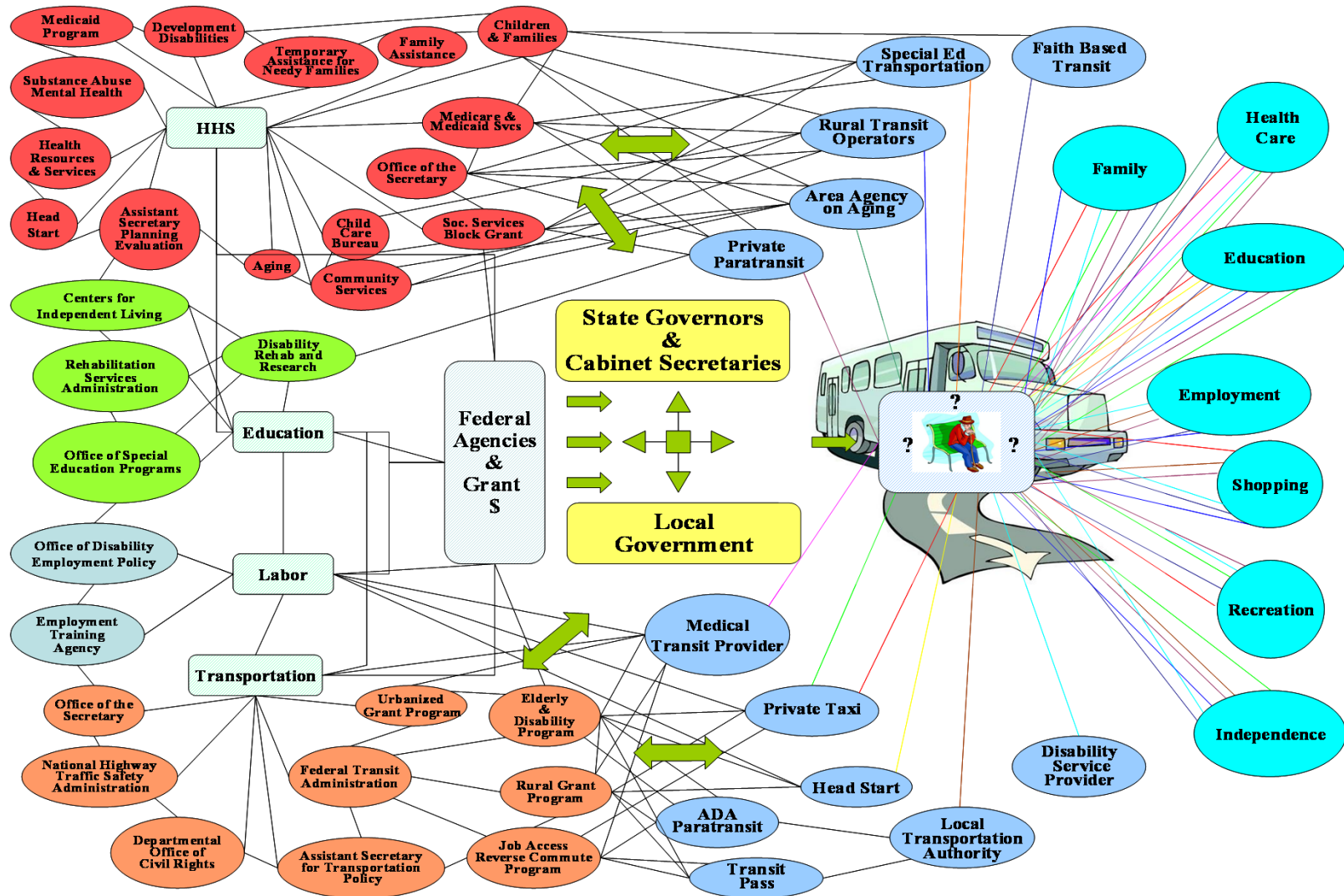
Yehuda Gross

USDOT ITS Joint Program Office

Gwo-Wei Torng

Noblis, Inc.
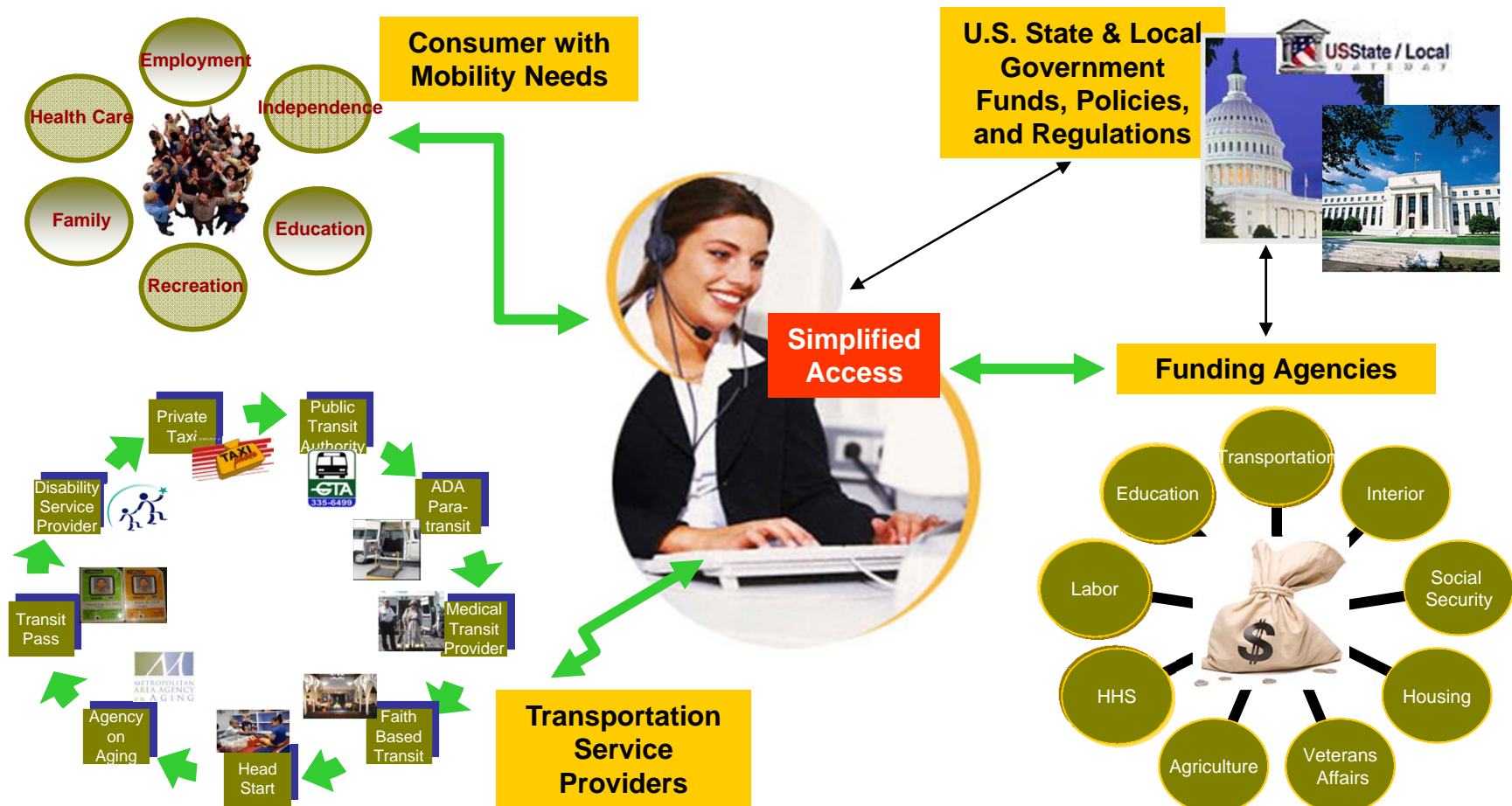
2011 National Rural ITS Conference

August 2011
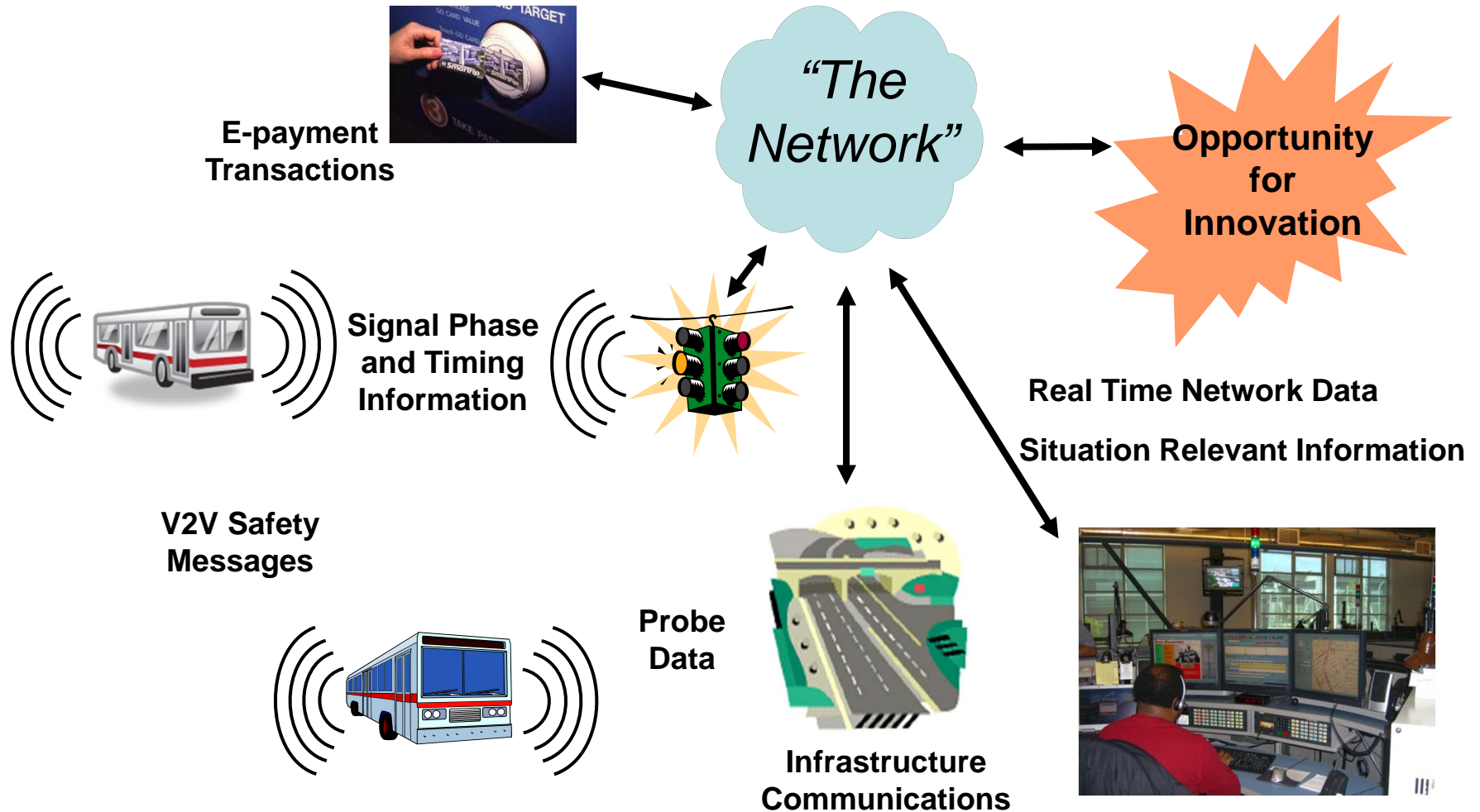
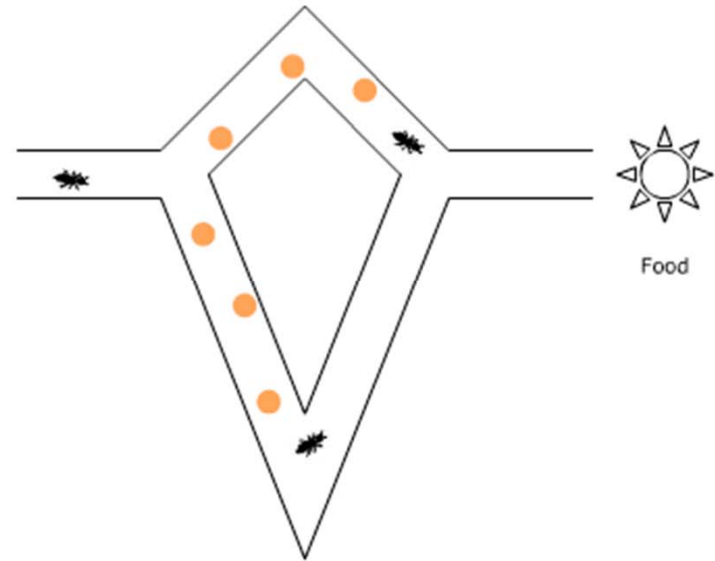# Mobility Management Challenge

Connected Mobility Management

Consumer with Mobility Needs

- Employment
- Health Care
- Independence
- Family
- Education
- Recreation

U.S. State & Local Government Funds, Policies, and Regulations

USState / Local

Simplified Access

Funding Agencies

- Transportation
- Education
- Interior
- Labor
- Social Security
- HHS
- Housing
- Agriculture
- Veterans Affairs

Transportation Service Providers

- Private Taxi
- Public Transit Authority
- Disability Service Provider
- ADA Para-transit
- Transit Pass
- Medical Transit Provider
- Agency on Aging
- Faith Based Transit
- Head Start

U.S. Department of Transportation

Connectivity Enables Coordination

E-payment Transactions

Signal Phase and Timing Information

V2V Safety Messages

Probe Data

Infrastructure Communications

"The Network"

Opportunity for Innovation

Real Time Network Data

Situation Relevant Information

U.S. Department of Transportation

Connectivity is the Key: Learning from Ants

Food

"It's important to remember that whatever the ant is doing, it's not rocket science." — Deborah M. Gordon

What is Connected Vehicle?

- Connected Vehicle is a suite of technologies and applications that use wireless communications to provide **connectivity**:

  □ Among vehicles of all types

  □ Between vehicles and roadway infrastructure

  □ Among vehicles, infrastructure and wireless consumer devices

All Roads, All Modes, All The Time!

Drivers

Vehicles

Infrastructure

Wireless Devices

6

U.S. Department of Transportation 6
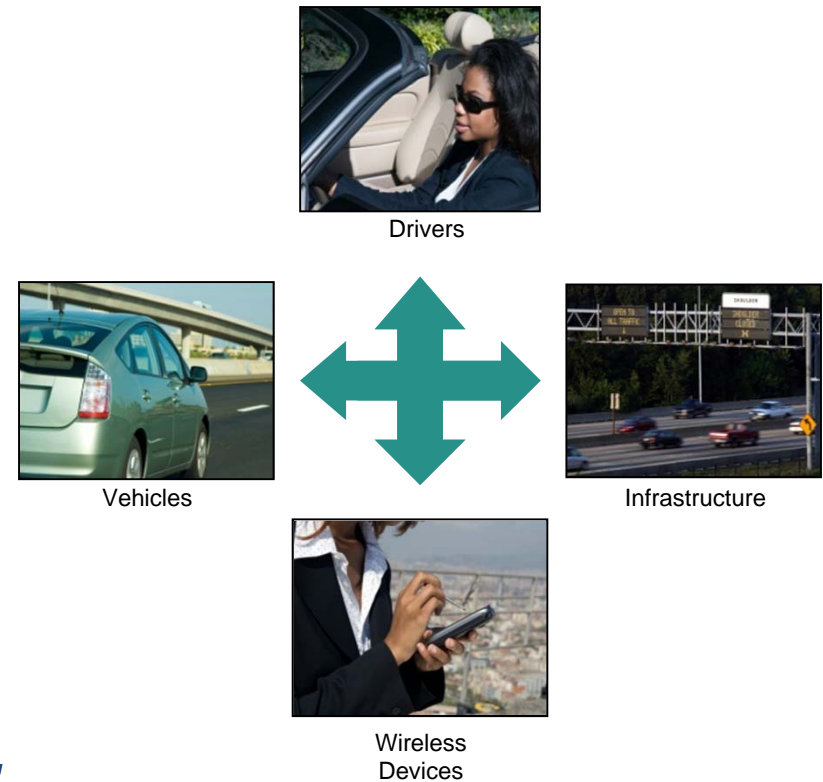
Three Connected Vehicle Application Areas

Safety

- 33,963 deaths/year (2009)
- 5,800,000 crashes/year
- Leading cause of death ages 4 to 34

Mobility

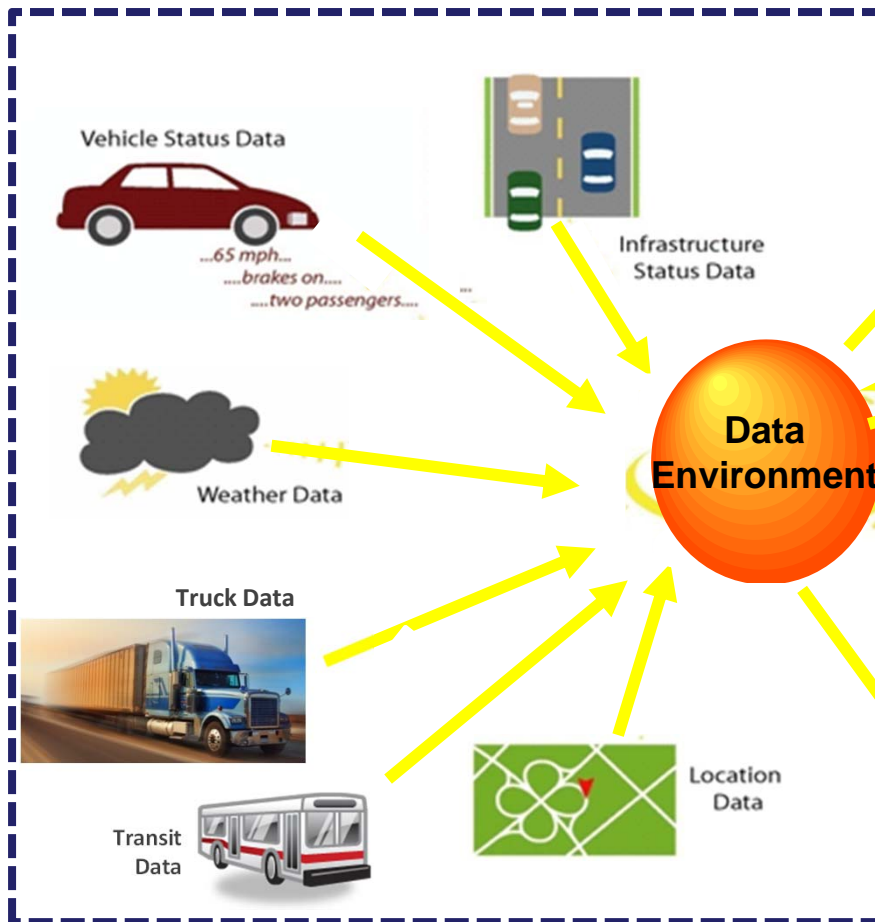- 4.2 billion hours of travel delay
- $78 billion cost of urban congestion

Environment

- 2.9 billion gallons of wasted fuel

CO$_2$ CULPRITS

33% 33%

12% 22%

power plants
cars and trucks
major transportation
factories, home heating systems
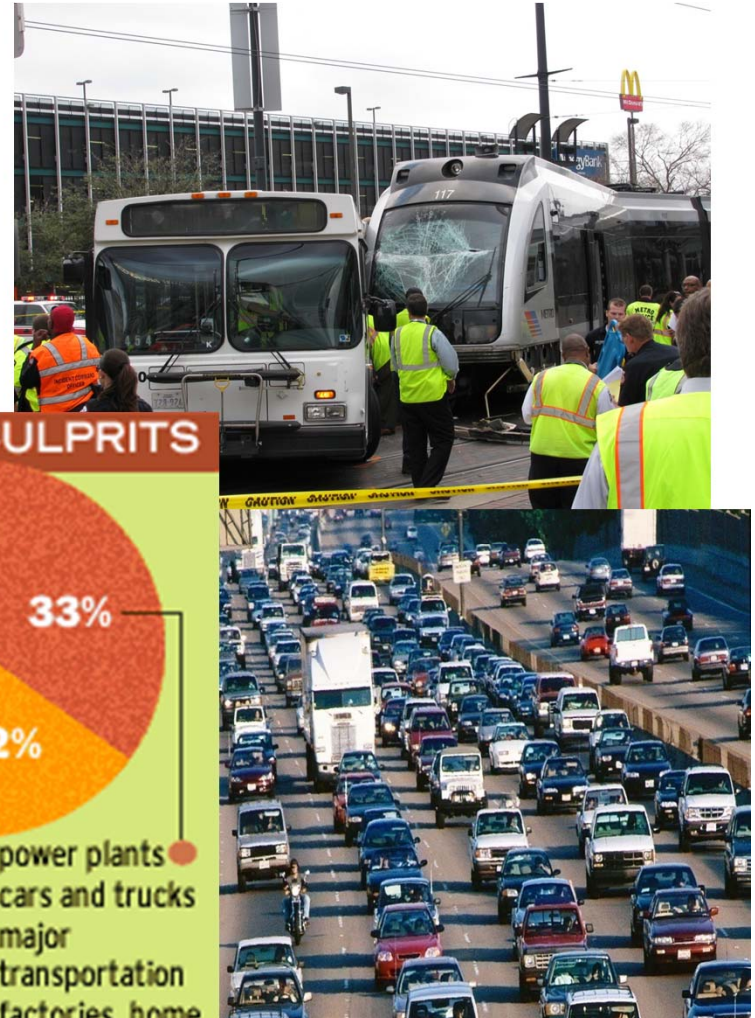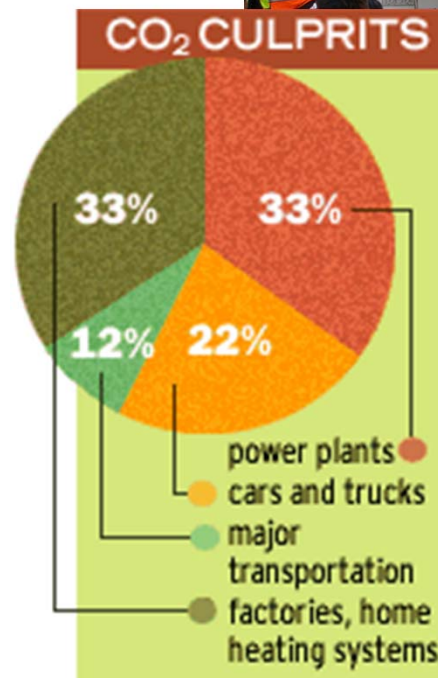
Connected Vehicle for Mobility
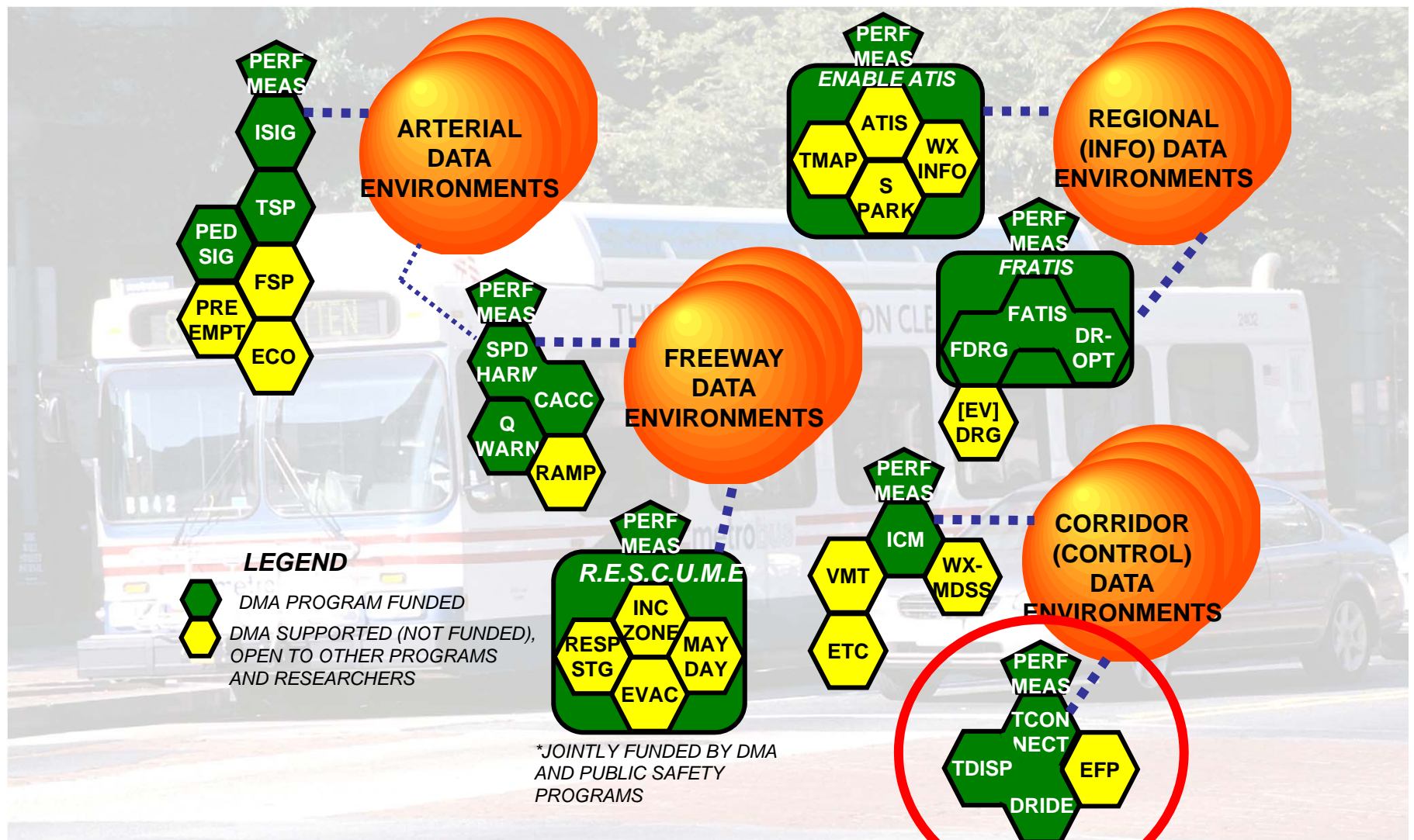
Gwo-Wei, so where are we going from here?
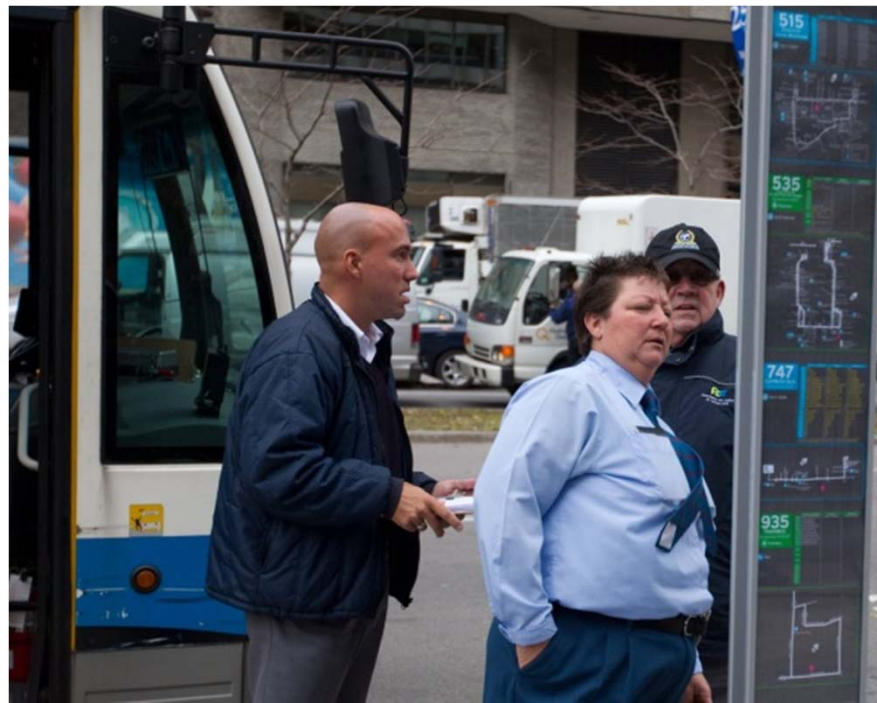
Courtesy: Montreal Gazette

Leverage Multi-Source Data

- Leverage high-quality data integrated from mobile and fixed sources to develop multiple applications (mode-specific and multi-modal)

VEHICLES

FREIGHT
LIGHT VEHICLE
TRANSIT

INFRASTRUCTURE

TRAVELERS

DATA ENVIRONMENT

a

MODE-SPECIFIC APPLICATIONS
(e.g., for transit vehicles)

b

MULTI-MODAL APPLICATIONS
(e.g., for travelers)

c

CROSS-MODAL APPLICATIONS
(e.g., for system managers)

10
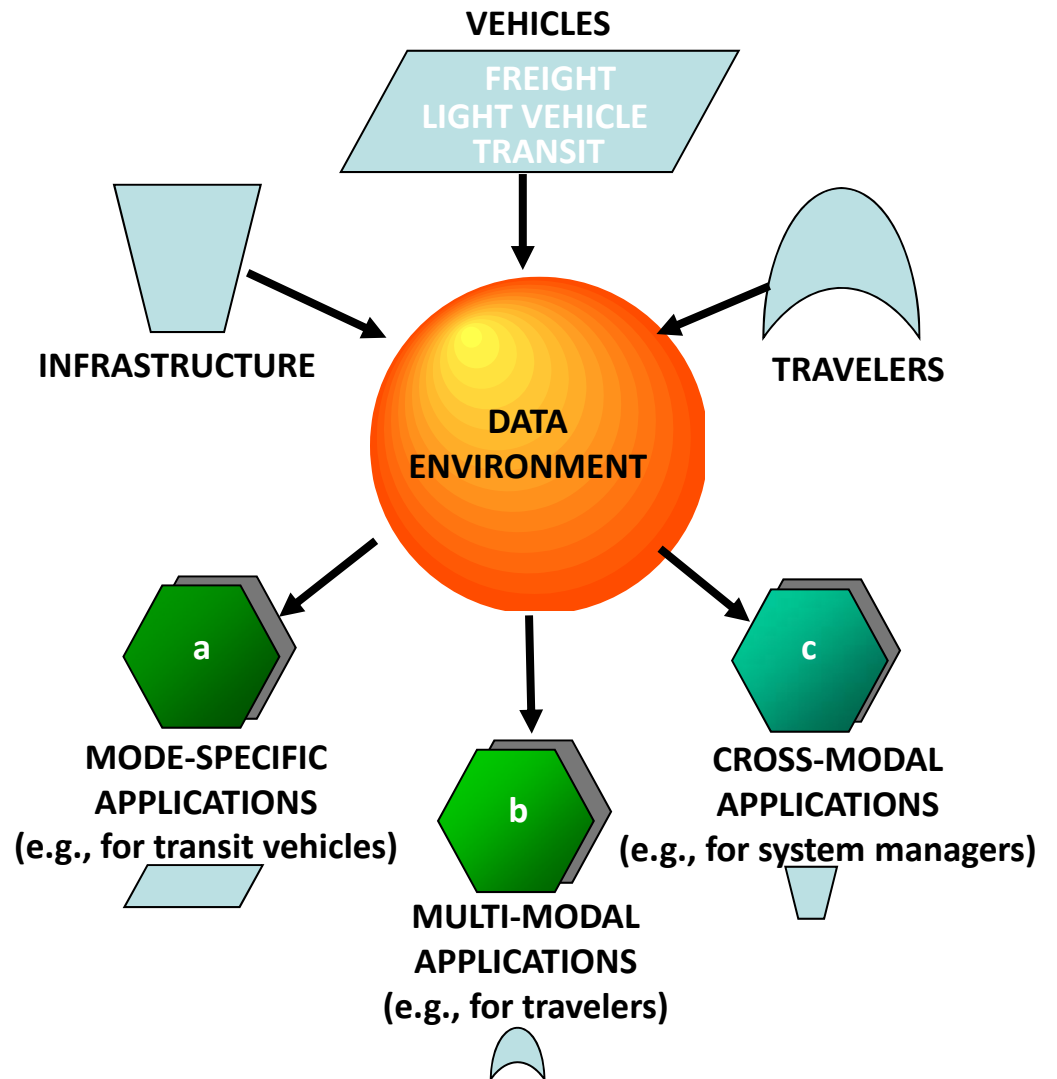
Priority Transit Mobility Applications

Dynamic Transit Operations

- Dynamic scheduling, dispatching and routing of a vehicle by matching compatible trips

- Traveler provides desired destination & departure time tagged with their current location through personal mobile device

- Considers various modal options, including demand responsive service, fixed-route service and private service, such as taxi

- Considers real-time traffic conditions and vehicle capacity

- May replace some late night or mid-day fixed-route service

Connection Protection

- Requires transit inter-modal and inter-agency coordination

- Uses real-time and historical data to examine the arrival status of a transit vehicle and transmits a "hold" message to another vehicle if the lateness falls within a pre-determined threshold

- Transfer requests may be initiated by transit riders

- Monitors the situation and provides connection protection status to travelers

Dynamic Ridesharing

- Uses dynamic ridesharing technology, personal mobile devices, and voice activated on-board equipment to match riders and drivers along their route

- Allows trip-by-trip ridesharing (dynamic as opposed to preset carpooling).

- Can take into account individual ridesharing preferences and constraints

- May include technology to verify the number of people in a vehicle for HOV enforcement and toll discounts

Smart Emergency Communication and Evacuation

- Use Connected Vehicle communications to improve evacuation efficiency

- User pre-registration into a central database prior to emergency,

- Updated user needs status/location during an evacuation,

- Dynamic dispatching and routing of vehicles during an evacuation with real-time, up-to-date information.

Project database

15
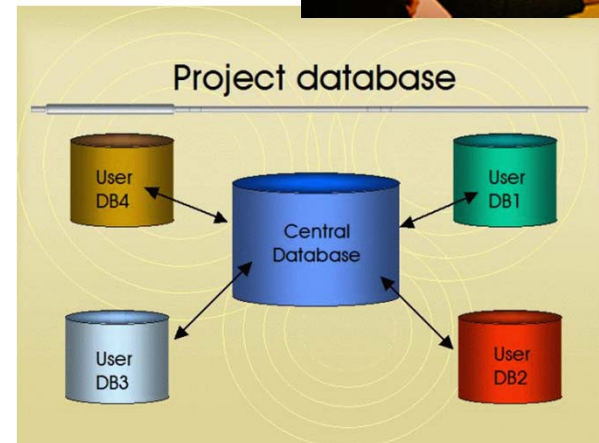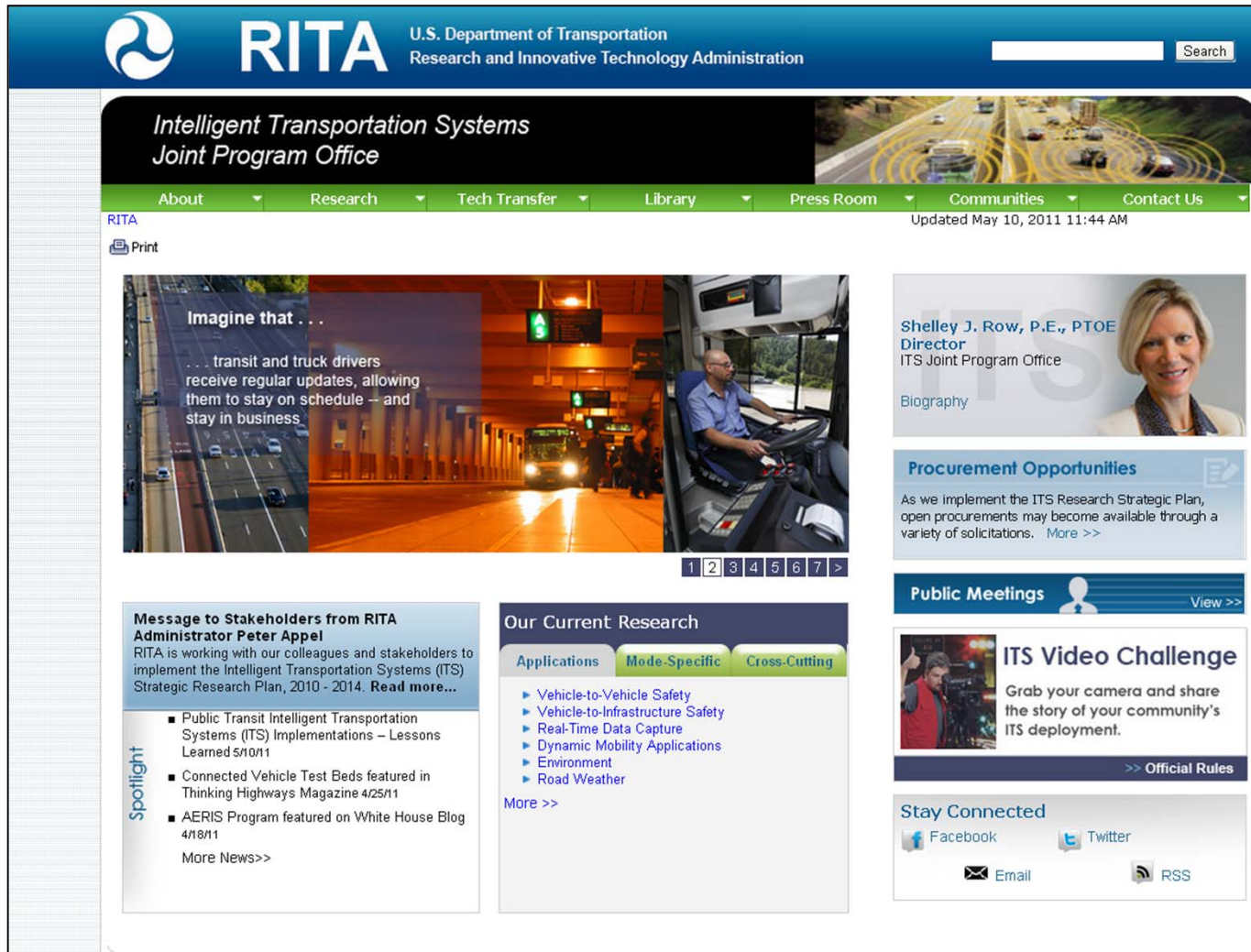
Connectivity Enhances Mobility Management

- Learning from the ANTS

http://link.brightcove.com/services/player/bcpid2715
57392?bctid=1681718043

16

For More Information…..