Applications and Data Environments Breakout Group IV: Regional Data Environment

Paul Pisano
Federal Highway Administration
Office of Transportation Operations

Randy Butler
Federal Highway Administration
Office of Operations and Freight

Karl Wunderlich
Noblis

Mobility and Environment Workshop - November 30, 2010

- Feedback materials provided in the breakout rooms
  - Application scorecards
  - 3 poker chips (for voting)
- Facilitators will brief assumptions about the data environment that applications can draw upon
- Facilitators will clarify application evaluation criteria
- Consider a set of (up to 12) IntelliDrive application concepts
  - Facilitators provide one slide that describes the application
  - Field questions and clarifying discussion
  - Individually, you rate the application (HIGH, MEDIUM, LOW) against the criteria on your scorecard

Today's Exercise (Part 2) Voting

- Once you have scored each application, each participant votes for the three most promising applications

  - "**Most promising**": strong potential for transformative impact, low deployment risk, and clear alignment with IntelliDrive program goals

  - BLUE = 3 points (top priority)

  - RED = 2 points (second-highest priority)

  - WHITE = 1 point (third-highest priority)

  - Deposit your chips in the voting bins identified for each application (also turn in your scorecards)

- Quick break (5 minutes) to tabulate the results

- Reconvene to consider results within each breakout

  - Discuss the implications of your group process

  - Identify a presenter from your group for the breakout report at 3 PM
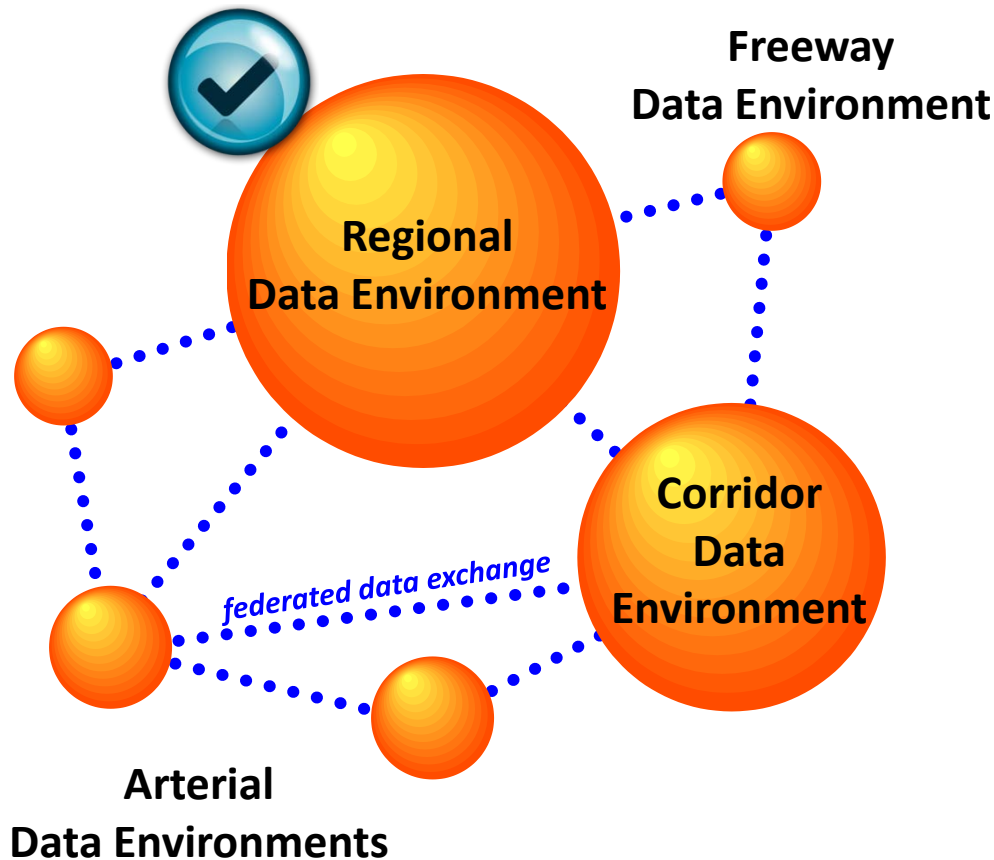
Exercise Ground Rules

- For today's exercise, these items can't be changed
    - Evaluation criteria
    - Data Environment assumptions
    - Application concepts (no altering or adding new ones)
- Policy-related issues are <u>NOT in play for discussion</u>
    - Intellectual Property, Privacy, Access/Security, Meta-data, Quality, Aggregation, Standards, Financial/Business Models….
    - If these topics come up, we will park the discussion until tomorrow, when we have special session to deal with these in turn

Data Environment Assessment Scorecard Activity

IntelliDrive

Freeway
Data Environment

Regional
Data Environment

Corridor
Data
Environment

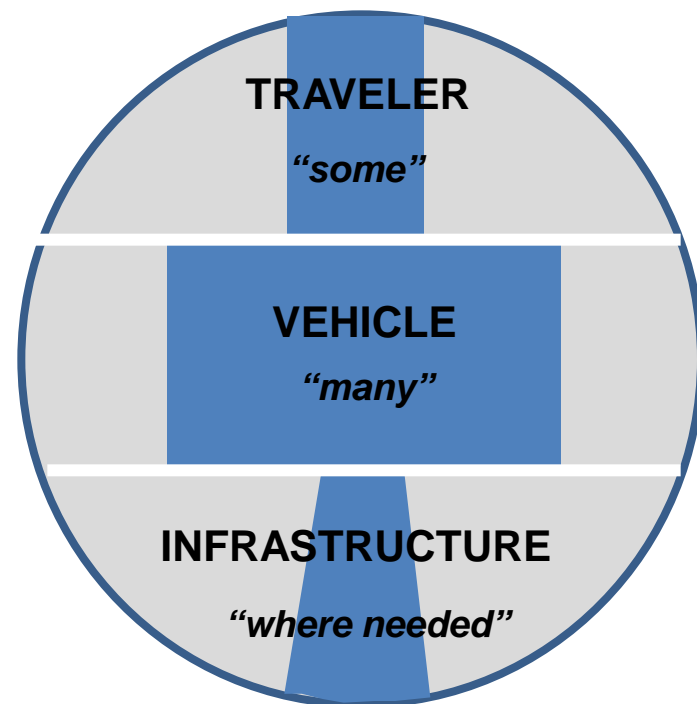*federated data exchange*

Arterial
Data Environments

- **Organizes multi-source data in a regional, state-wide, rural, multi-state or national data environment**
  - Vehicles (light, transit, freight, non-motorized, public safety)
  - Mobile devices
  - Roadside/wayside infrastructure
- **Federated with related data environments**
  - Can pull in federated data to assist in regional control decisions

- Spans a network of subsidiary sub-networks
  - Roadway sub-networks (e.g., arterial, freeway, or rural)
  - Parking facilities
  - Integrated transit sub-network (rail, bus and ferry sub-networks)
- Roadway facilities within the network may have access restrictions (e.g., HOV or Truck Only)
- Tolls may be collected on some or all lanes of these facilities
- Weather and incident-related closures are infrequent but significant events
- Regional network carries significant traveler demand and supports time-critical goods movement between intermodal facilities
- Directional passenger and freight demand patterns vary by time-of-day, day-of-week, and season
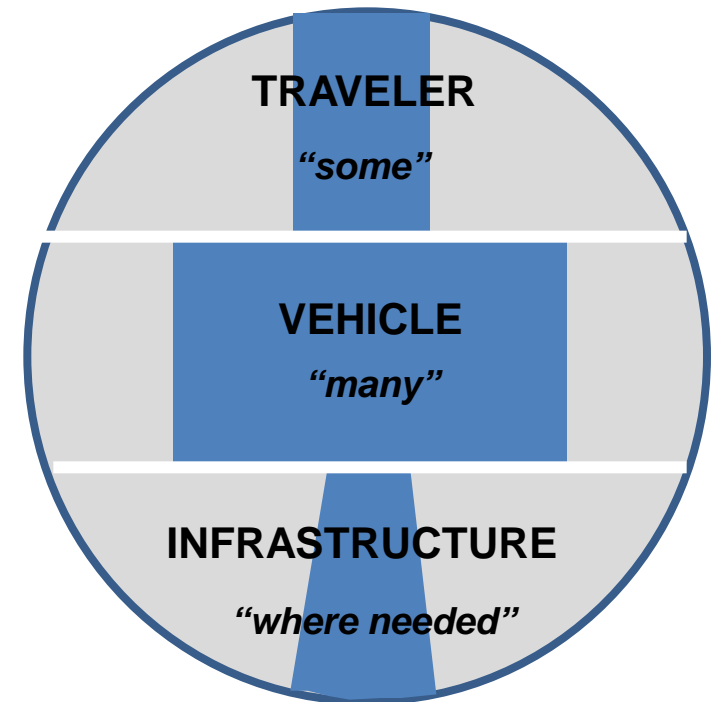
- Nearly all travelers carry GPS-enabled mobile devices
- Some travelers opt-in to configure their mobile devices to contribute data regarding position, time and trip characteristics
- Many light vehicles opt-in to contribute data, some broadcast HIA messages
- Many transit vehicles contribute position, passenger count, and other data, some broadcast HIA
- Many freight vehicles provide data on position, credentials and other data, some broadcast HIA
- Most emergency vehicles broadcast HIA and vehicle type data

TRAVELER

"some"

VEHICLE

"many"

INFRASTRUCTURE

"where needed"

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Road Weather sensors, loop detectors, other roadside sensors as currently deployed (2010 baseline)**

- **Many signalized intersections act as advanced intersections**

    - DSRC-capable roadside equipment for 2-way communication with enabled devices and vehicles

    - Broadcast Signal Phase and Timing (SPaT) data via DSRC

- **Some transit and curbside parking facilities provide utilization data (spaces used/remaining), every minute**

TRAVELER

"some"

VEHICLE

"many"

INFRASTRUCTURE

"where needed"

Application Assessment Scorecard Activity

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Next, we're going to go through application concepts that utilize data from the regional data environment**

- **We will present each concept on a single slide**
  - You can ask clarifying questions, or offer suggestions about how data might be leveraged
  - But the concept itself cannot be altered, modified or enhanced in discussion
  - Please record notes or comments on each concept on your scorecard

- **You rate each application on three criteria (High, Medium, Low)**
  - **Potential Impact:** will this application have transformative impact?
  - **Deployment Readiness:** if we assume the data is available, can this application be developed, tested and widely deployed by 2025?
  - **Program Alignment:** does the application align with program objectives and is there a clear federal role in its development and deployment?

IntelliDrive

- **Multi-modal Real-Time Traveler Information**

- **Problem Addressed:**
  - Improve precision and accuracy traveler information with respect to travel times, cost, or availability on alternate routes or modes

- **Description**
  - Considers real-time and historical travel conditions for the traveler's trip (pre-specified origin, destination, and time of departure)
  - Suggests potential routes and modes (e.g., HOV, transit, tolled lanes) with travel times, travel time reliability, and costs for each alternative
  - Predicts travel times based on existing and expected traffic patterns, weather conditions, incident locations, and work zone locations and timings

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Drayage Optimization**

- **Problem Addressed:**
  - Reduce freight delays at key facilities that overbook their capacity to ensure uninterrupted operations within the terminal/warehouse

- **Description**
  - Optimize drayage operations so that load movements are coordinated between freight facilities
  - Individual trucks are assigned time windows within which they will be expected to arrive at a pickup or drop-off location
  - Early or late arrivals to the facility are dynamically balanced
  - Web-based forum for load matching provided to reduce empty moves

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Freight Real-Time Traveler Information with Performance Monitoring**

- **Problem Addressed:**
  - Uncertainties in traffic congestion and weather conditions pose a productivity and safety risks to freight traffic, result in negative environmental impacts

- **Description**
  - Enhance traveler information systems to address specific freight needs
  - Provide route guidance to freight facilities, incident alerts, road closures, work zones, routing restrictions (hazmat, oversize/overweight)
  - Tailored weather information, regulatory and enforcement information (speed limit reductions), "concierge" services and maintenance locations
  - Intermodal connection information, container disposition and schedule
  - Performance monitoring

PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING

Application #4: MAYDAY

- **Mayday Relay**

- **Problem Addressed:**
  - Run-off-the-road single vehicle crashes in rural areas are frequent, response can be delayed due to limited communications and infrequent patrolling

- **Description**
  - Enabled vehicles send a mayday message, including vehicle location, airbag status, g-loading (magnitude and direction)
  - Passing IntelliDrive-enabled vehicle receives the mayday message, and relays the message at a roadside hot spot
  - Message passed to 911 center for EMS dispatch, minimizing the time required to deliver medical attention to crash victims

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Multi-modal Integrated Payment System**

- **Problem Addressed:**
  - Unfamiliarity with fare payment methods and inconvenience are factors that deter some travelers from using transit more often

- **Description**
  - Utilize standards for an open architecture electronic payment system
  - Establish a transportation payment environment that reduces delays at toll plazas and parking payment kiosks, and reduces dwell times at bus stops
  - Promote ease of transfers across modes and increase customer convenience
  - Mine trip chaining patterns to improve service planning and operations
  - Support implementation of congestion-based transit fare pricing

PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Dynamic Transit Operations**

- **Problem Addressed:**
  - Traditional fixed route/fixed schedule transit is inherently inefficient for the traveler in low density, low ridership, and dispersed origin/destination areas

- **Description**
  - Enable demand-responsive transportation services utilizing GPS and mapping capabilities of mobile devices
  - Travelers input a desired destination and time of departure tagged with their current location
  - Central system dynamically schedules and dispatches or modifies the route of an in-service vehicle by matching compatible trips together
  - Like a stock exchange, providers can bid/trade within a transparent platform

PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING

- **Emergency Communications and Evacuation**

- **Problem Addressed:**
  - In an evacuation, many people willing to evacuate are unable to leave, and coordinating efforts is limited by data scattered across multiple institutions

- **Description**
  - Integrate data across multiple agencies to identify and locate people who are more likely to require guidance and evacuation assistance
  - Provide a mobile-accessible database that contains information about who needs help, what kind of help, and where help is needed
  - Individuals who require assistance transmit a "help" message to and receive directions from the authorities
  - Enable dynamic dispatching and routing of available resources (e.g., vehicles) during the evacuation

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Universal Map Application**

- **Problem Addressed:**
  - Interoperability among proprietary map applications on current CAD/AVL systems increases cost and complexity of transit management

- **Description**
  - Pursue an open map concept to establish an universal map application supported by private transit CAD/AVL systems
  - Application processes RSS feeds from supporting agencies to incorporate incidents, detours, street closures, and other data on transit map applications
  - Transit agencies provide vehicle locations, passenger amenities, and service level to agencies scheduling street repairs or other road closures

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

- **IntelliDrive-Driven Mileage Based User Fees**

- **Problem Addressed:**
  - Projected reduced gas tax revenue for same vehicle miles traveled (VMT), while cost of providing transportation system increases with inflation

- **Description**
  - Integrate IntelliDrive and Mileage Based User Fees (MBUF) to eliminate redundant GPS, maps, driver interfaces, and communications in the vehicle
  - Accumulate miles driven in categories determined by policy and charge for the miles driven, ensure interoperability among jurisdictions
  - Considerations may include vehicle type, time of day, roadway type, jurisdiction, direction of travel, and geographic area of travel

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Real-Time Route Specific Weather Information for Motorized and Non-Motorized Modes**
- **Problem Addressed:**
  - improve mobility and safety of users of motorized and non-motorized modes of transportation (e.g., automobiles, transit, freight, bicyclists, and pedestrians) by providing real-time, highly localized weather and road condition
- **Description**
  - Fuse weather-related probe data generated by probe vehicles with weather data from traditional weather information sources
  - Develop highly localized weather and pavement conditions for specific roadways, pathways, and bikeways

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

- **Enhanced MDSS (Maintenance Decision Support System) Communications**

- **Problem Addressed:**
  - Reduce reliance on (potentially expensive) commercial wireless networks to communicate with snowplows or other maintenance vehicles
  - Keep treatment recommendations current

- **Description**
  - MDSS equipped maintenance vehicles utilize DSRC hot spots to download treatment recommendations and upload recent maintenance activities
  - In many rural areas access to commercial networks is limited and/or expensive
  - Utilize DSRC hot spots to reduce costs and improve communications latency for state DOTs

> **PARTICIPANTS: ON YOUR SCORECARDS, PLEASE RECORD NOTES/COMMENTS – CRITERIA RATING**

U. S. Department of Transportation
Research and Innovative Technology Administration

Voting

U. S. Department of Transportation
Research and Innovative Technology Administration

- Now that we've worked through all the applications, vote for the three most promising applications
  - "**Most promising**": strong potential for transformative impact, low deployment risk, and clear alignment with IntelliDrive program goals
  - BLUE = 3 points (top priority)
  - RED = 2 points (second-highest priority)
  - WHITE = 1 point (third-highest priority)
  - Deposit your chips in the voting bins identified for each application (also turn in your scorecards)
- We'll take a quick break (5 minutes) to tabulate the results
- One Bin, One Participant, One Chip rule
  - Do NOT dump all of your chips in a single bin
  - We want your individual priority of the top THREE applications

U. S. Department of Transportation
Research and Innovative Technology Administration

Quick Break

U. S. Department of Transportation
Research and Innovative Technology Administration

Exercise Results

- **Were similar or dissimilar applications selected during voting?**

- **Did the highest ranking applications align in the same quadrants of the impact/deployment readiness chart?**

- **Regarding the top 6 applications:**
  – **Are they highly overlapping? Or independent?**
  – **Do they require coordinated research?**
  – **Will they require coordinated deployment?**

- **Who would like to volunteer to report out the breakout group findings?**

U. S. Department of Transportation
Research and Innovative Technology Administration

Exercise Complete

U. S. Department of Transportation
Research and Innovative Technology Administration