Regional Unified Model Architecture
Walt Fehr, ITS-JPO
Strategic Priorities

- Two Strategic Priorities reflect a sense of where the bulk of transportation research and innovation is heading. These priorities are not exclusive of other technologies or research areas.

  - **Realizing Connected Vehicle Implementation**
    - builds on the substantial progress made in recent years around design, testing, and planning for connected vehicles to be deployed across the nation.

  - **Advancing Automation**
    - shapes the ITS Program around research, development, and adoption of automation related technologies as they emerge.
Connected Vehicle Vision

- **Complete System**

- **Comprehensive Communication Security**
  - Common Cryptographic processes

- **Data Flow and Evolution**
  - Data from all, to all
  - Private data
Opportunity for a Common Experience

- Started with crash avoidance
- Extending to interaction with field devices and data to/from back offices
Common Architecture, Graphical Language

Things

People

The Stop Sign metaphor
Common Parts, Common Tools

- Architecture
- Concept of Operation
- Design Elements
  - Objects
  - Information Flows
Unified Implementation of CVRIA - Regional

- **Architecture**

- **Concept of Operation** – *Preserving privacy by design*

- **Design Elements** – Agreement on standards usage, common communication security practice
  - **Vehicle Situation Data, Field Situation Data**
    - Broadcast and bundle-based
    - Intersections and other roadside infrastructure installations
  - **Traveler Situation Data**
    - Multiple delivery media
  - **Peer-to-Peer Data Exchanges**
    - Maintenance, Management, Enforcement, Commercial
Vehicle Situation Data

- All mobile devices will have a location service that meets J2945.1 performance requirements
- Pooled signing certificates will be available
- USDOT will provide the clearinghouse
- As many vehicles as possible will transmit BSM’s
- As many vehicles as possible will make Vehicle Situation Data deposits
- USDOT vehicles will provide weather and electric vehicle data items
Field Situation Data

- Common style for creating and grouping MAP and SPaT data elements
  - USDOT will provide the clearing house and warehouse
  - USDOT will provide a tool for creating MAP and SPaT groupings
Traveler Situation Data

- Everyone will use the warehouse for data delivery
- USDOT will provide a tool for creating Traveler Situation Data deposits
Communication Security

- **Common communication security approach**
  - 1609.2 will be used between mobile objects and field and center objects
  - USDOT will provide the Security Credential Management System
Peer-to-Peer Date Exchange Applications

- **Common message sequence**
- **5.9GHz DSRC** roadside equipment needs to have adequate backhaul for Internet Protocol transport activities
- **Used for maintenance, management, enforcement, commercial types purposes**
Data Exchanges – *Preserving privacy by design*

- **Common Pattern** – based on the four phases of a peer-to-peer data exchange message sequence.
- **Common Communication Security** – build on crash avoidance experience.
- **Maintenance, Management, Enforcement, Commercial** – examples of all peer-to-peer data exchange activities.
- **Nonrepudiation** – accounting of contributions and uses.

The credit card metaphor
Proposed Progression for Interoperability

**Graphical Language**

- Designs and Tools, Certification
- Training, Resources

**Southeast Michigan 2014 Architecture**

- Unified CVRIA Architecture 2015 - Regional
- Unified CVRIA Architecture 2016 - National
- Unified CVRIA Architecture 2017 - Continental
Connected Vehicle Pilots

- Pilot deployments should use USDOT-sponsored research
- Well-defined, focused while part of the whole, with quantitative performance measures
- Share data and lessons learned while protecting privacy and intellectual property
- [www.its.dot.gov/pilots](http://www.its.dot.gov/pilots)
For More Information

www.its.dot.gov

Walton Fehr
Program Manager, Systems Engineering
ITS Joint Program Office
USDOT
walton.fehr@dot.gov