Linking Planning and Operations Initiative – A Data Driven Approach

Chris Francis
Transportation Statistics

Data Symposium - Traffic Data,
Orlando, FL, Oct 23-24, 2014
Outline

- Emerging Transportation Scene
- Technology Enabled Transportation Solutions
- Ideas About IDEA
- About Linking Planning and Operations Initiative
Emerging Transportation Scene in the US

- **Globalization and 21st Century Economy**
  - Metropolitan Areas as Economic Engines (18 Mega Regions)
  - Connectivity/Market Accessibility is key
  - Innovative Strategies and Collaborative Set-ups needed

- **Impacts on Transportation Infrastructure**
  - Increase in population (439 mil to 597 mil by 2050)
  - Increased demand for transportation services
  - Congestion Delays, System Deterioration, Bottle-necked Modal Systems

- **Transportation Infrastructure Investments**
  - 2.4% of US GDP (China – 9%, India – 4.9%)
  - Infrastructure Deficit (state-of-good-repair/$225 billion/year)
  - Alternate Financing Mechanisms - P3s/Pricing
The Emerging Scene - How Can It Be Managed?

- **What Do People/Shippers Want?**
  - End-to-End Travel Solutions (on-time arrival/just-in-time delivery)
  - Travel Choices by time-of-day, mode, route
  - Traveler Information on mobile devices, in-vehicle, road-side

- **Need to have an “Integrated Approach”**
  - Institutional (common purpose & vision)
  - Functional (unified mission)
  - Information Sharing (collaborative decision making)

- **Need to develop “Synergy”**
  - Executive Leadership Level (Organized by Functions)
  - Program Management Level (Organized by Business Units)
  - Project Delivery Level (Organized by Jurisdictions)
What Needs To Be Done?

- **New Concepts and Network Management Strategies** –
  - Highway-centric – Active Traffic Management (ATM)
  - Multimodal - Integrated Corridor Management (ICM)
  - Network-based - Dynamic Mobility Applications

- **Technology – “The Enabler”**
  - Utilize Today’s Technologies – State-of-the-art & Disruptive
  - Harmonize Technologies - Transportation, Communication, Information
  - Develop Converged and Service Oriented Architectures

- **DATA – The Ultimate Driver**
  - Current State-of-Play – Disparate Databases and Systems
  - Desired State - Seamlessly Sharing Data/Information
  - Consolidated and Virtualized
## Transportation Infrastructure Investments

<table>
<thead>
<tr>
<th>Arterial Signal Systems</th>
<th>Freeway Systems</th>
<th>Rail Systems</th>
<th>Bus Systems</th>
<th>Parking Systems</th>
</tr>
</thead>
</table>

- **Current State-of-Play**
  - Modally Invested
  - Independently Managed
  - Competing for Resources
Integrated Transportation Infrastructure

- **Significant Congestion**
- **Management Systems**
- **Multi-Modal Capacity**

- **Desired State**
  - Common Vision
  - Collaboration
  - Shared Resource
Linking Demand & Supply

Source: USDOT – ATDM Framework
Systems Operation & Management

Source: USDOT – ATDM Framework
Technology Enabled Integrated Infrastructure

The Automated Road

- Satellite and radio communications for road infrastructure, drivers and network control.
- Integrated asset management communications and tolling system.
- Between vehicle sensors and communication systems (public/private transport).
- In-pavement demand responsive LED speed and guidance systems for vehicle to highway cooperation and network management.
- In-pavement sensors for traffic control, vehicle to highway communications, condition/weather and pollution monitoring.
- Inter-operable in-vehicle communications and guidance system to provide drivers with direction, weather, hazard and messaging information.
- In-vehicle sensors to provide vehicle location, performance information and incident management.
- Adaptable inter-operable communication and power system for lane control, vehicle guidance, traffic monitoring, driver information and condition monitoring.
- Facilitation of platooning of vehicles.
Supporting Technologies and Data Sources

- Vehicle Detection Systems
- CCTV Cameras
- Video Incident Detection Systems
- Full-Matrix DMS
- Fiber Optics Communications
- High-Speed Wireless Communications
- Roadside Wireless Networks
- Bluetooth Probe Readers
Technology Enabled Integrated Transportation Systems Operation - Building Blocks

- **Integrated Infrastructure**
  - Arterial Enhanced Signal Operations
  - Multi-Modal and Parking Information Systems

- **Integrated Traveler Information**
  - Personalized Multi-Modal Real-Time Trip Planning
  - Expanded Multi-Modal & Parking Information for 511

- **Integrated Decision Support**
  - Modeling and Decision Support
  - Performance Management

- Integrated Single Info Gateway (including kiosks)

- Highway Traffic Data
- Modal Data

Source: VDOT – ICMS Framework
Florida Preparing for Dynamic Mobility Applications

- E-payment
- Safety Messages
- Signal Phase and Timing
- Probe Data

“The Network”

- Real Time Network Data
- Situation Relevant Information

Opportunity for Innovation
Do We Have An IDEA?

Integrated Data Exchange Architecture (IDEA)
IDEA Elements

**Data Acquisition**
- Multi-agency partnership (DOT, transit service providers, toll agency, etc.)
- Data monitoring and archiving

**Data Processing**
- Static and real-time data collection and processing
- Feed into modeling/simulation

**Data Sharing**
- Data sharing protocols
- Dissemination for traveler information system

**Data Integration**
- Methodology and tools for data integration/fusion (consistency and quality)
- Innovative data storage, accessing and analytics methods
Multimodal Transportation Data

Network
- Highway
  - Freeway
  - Arterial
- Transit
  - BRT
  - LRT
  - Commuter rail
- Rail
  - Passenger
  - Freight
- Seaports
- Aviation

Control Systems
- ATMS
- Signal
  - Coordinated signal
  - Arterial signal priority
- HOV/HOT Lanes
- TIM Infrastructure
- Traveler Information System

Traffic Flows
- O/D Pattern
- Mode Usage
- Volume
- Speed
- Congestion/queuing/bottlenecks
- Incidents

Land Use
- Socioeconomic Demographic Data
- Parking/Rest Stops
- Sea Ports/Airports
- Intermodal Logistics Centers
- Warehouses/Distribution Centers
Transportation Databases for Project Development Today

Data Elements
- Traffic Data
- ITS System Information
- ITS Comm
- Travel Data
- Real-Time Traffic Data
- Weather Data
- Road Network Characteristics
- Funding/Grants Info

Sources
- OSD/Regions
- Traffic Engineering Division
- ITS Arch. Database
- ITS Device Information
- Traffic Data
- ITS Comm
- ESS/External Sources
- VDOT ITS
- Devices/Ext. Sources
- SW Comm Master Plan
- TMPD

Multiple Sources of Unlinked Information

Source: VDOT – Data Integration Initiative
Transportation Databases for Project Development Tomorrow

Multiple Sources of Linked Information

Source: VDOT – Data Integration Initiative
Integrated Transportation Database for Systems Management and Operations

Transportation Databases

- ITS Assets
- Traffic & Crash Data
- ITS System Information
- Intermodal Freight
- Travel Data
- Real Time Traffic Data
- Road Network Characteristics
- Weather Data
- Funding Sources/Budget

Applications
- Project Planning & Development
- Project Deployment
- Asset Management
- Transportation Analysis & Strategy Formulation
- Program Management

Source: VDOT – Data Integration Initiative
Linking Planning & Operations Initiative

- Development of an Integrated Transportation Systems Management Practice
  - Connecting Agency Functions, Programs and Projects

- Enhancing System Efficiencies
  - Adopting an All-Roads-All-Modes Approach

- Achieving Economies of Scale
  - Incorporating ITS and Operational Elements early on in the Planning and Project Development Processes
An Integrated Approach

Institutional
• Shared Vision
• Collaborative Goals
• Resource Arrangement

Functional
• Business Programs
• Relationships & Procedures
• Consolidate Service

Information
• Data & Information Sharing
• Performance Measures
• Analysis Tools
Synergy for Collaboration and Coordination

Data, Tools and Performance Measures

Integrates Planning Approach

- Multi-Level Collaboration
  - Executive Leadership Level
  - Program Management Level
  - Project Delivery Level

- Institutional Coordination
  - Functional Coordination, Partnership, Training, and Education

- Regional Considerations
  - Coordination with regional partners

- ITS/Ops in Transportation Plans Corridor Studies Projects

- Regulation and Policy
  - Policies, Plans Programs, ITS Architectures
Linking Planning and Operations

Key Features

- **Linking Demand and Supply**
  - Closing the GAP, Network Management, Risk Assessment

- **Going beyond Projects and Programs**
  - Cross-functional Integration – Institutional, Business, Technical

- **Information Sharing and Knowledge Management (KM)**
  - Data Business Plans, Big Data Analytics, SOAs, KM Practices

- **Infrastructure and Human Capital Management**
  - Transportation and Agency

- **Step Up!!!**
  - Bold, Innovative, Inspiring
  - Consistent, Predictable, Repeatable
Thank You!

NEW DATA TECHNOLOGY, NEW CAPABILITIES

Passive data collection has captured considerable attention from transportation planners over the last several years. These new technologies, including the ability to compile data from large numbers of mobile devices, are starting to transform the travel planning landscape, and non-urban areas may reap the greatest benefit. For the first time, cellular data allows less-populated areas to develop travel models based on actual, current, local data rather than purely synthetic models.

chris.francis@dot.state.fl.us
850-414-4929