Integrated Corridor Management

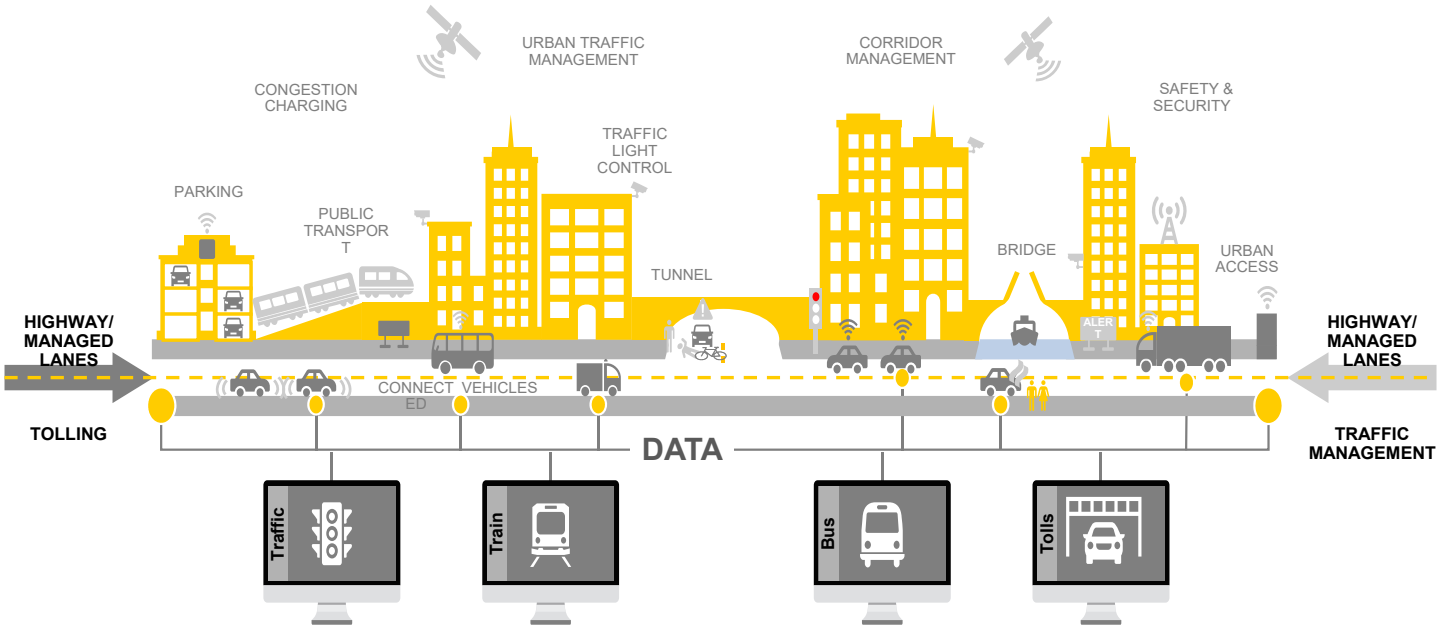
CO/WY ITE and ITS Rocky Mountain Joint Meeting
October 5, 2017

Kapsch ICM Activities

- Consulting
  - NCHRP ICM Scan
  - FDOT D5 – Orlando Regional ICM System ConOps & Requirements
  - Dallas ICM ConOps & Requirements
  - Montgomery County MD ICM ConOps & Requirements
  - Northern VA East-West Travel Shed ICM Planning Grant
  - I95/395 ICM Implementation Plan
- System Design
  - FDOT D5 – Orlando ICM Decision Support System
  - FDOT D5 – Response Plan Development
- Systems Integrator
  - Dallas ICM Demonstration Project
  - MDX (Miami) Information Exchange Network
  - CA I-210 ICM Demonstration (Fall 2017)

What is Integrated Corridor Management

Holistic and Collaborative Traffic Management

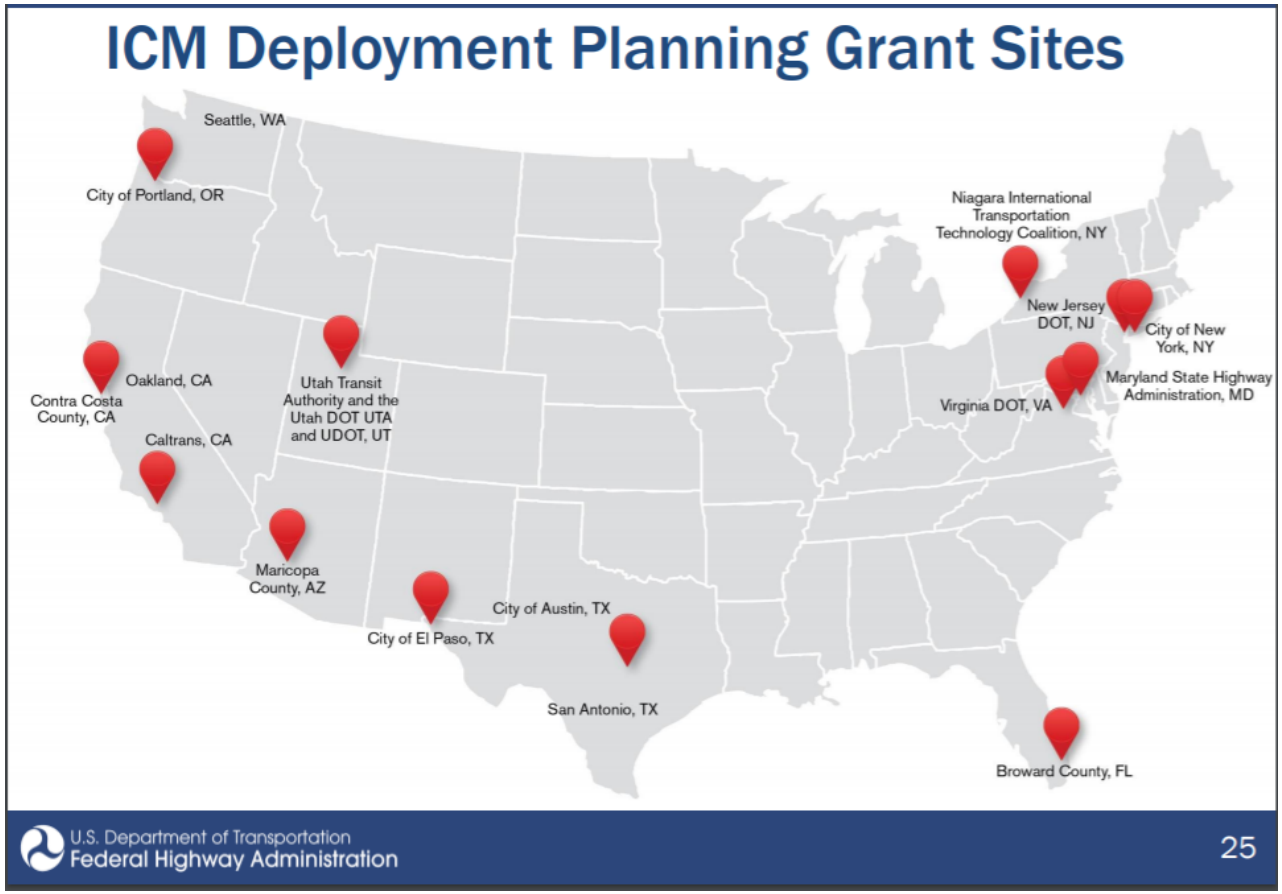


Strategic Areas of Focus

- Demand Management
- Load Balancing
- Event Response
- Capital Improvement

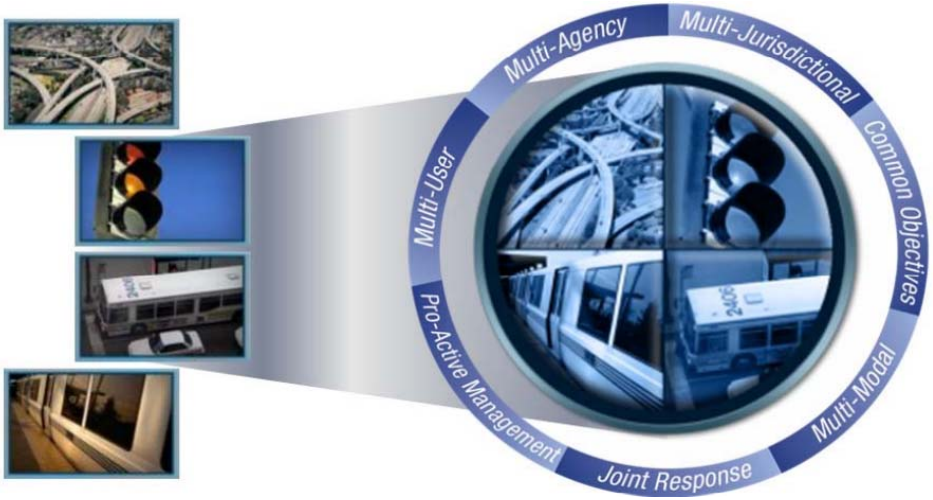
ICM Grant Sites – Round 1

ICM Deployment Planning Grant Sites – Round 2



ICM Benefits

- Simulation has shown potential Benefits-Cost Ratio of around 15:1
- USDOT Evaluation of ICM Demonstrations
  - Sample sizes too small to provide statistically significant results
  - Many anecdotal benefits
    - Better information between agencies
    - Improved traveler information



Six Categories of Lessons Learned

1. Integration and Capability Maturity
2. Planning for ICM
3. Performance Metrics
4. Technology Best Practices
5. Don’t forget post-deployment activities
6. Be Adaptable

Lesson #1 - Three Degrees of Integration

Institutional

Coordination to collaboration between various agencies and jurisdictions that transcends institutional boundaries.

Operational

Multi-agency and cross-network operational strategies to manage the total capacity and demand of the corridor.

Technical

Sharing and distribution of information, and system operations and control functions to support the immediate analysis and response.

ICM Capability Maturity Model

Source: ICM Scan Tour- NCHRP20-68A_12_02

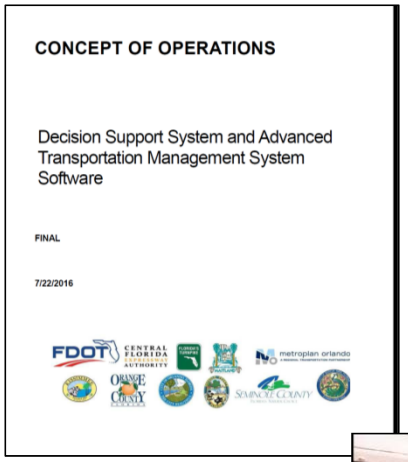
		Level 1 Silo	Level 2 Centralized	Level 3 Partially Integrated	Level 4 Multimodal Integrated	Level 5 Multimodal Optimized
Institutional Integration	Inter-agency Cooperation	Agencies do not coordinate their operations	Some agencies share data, but operate their networks independently	Agencies share data, and some cooperative responses are done	Agencies share data, and implement multi-modal incident response plans	Operations are centralized for the corridor with personnel operating the corridor cooperatively
	Funding	Single Agency	MPO tracks funding	Coordinated funding through MPO	Cooperatively fund deployment projects	Cooperatively fund deployment and operations and maintenance of projects
Technical Integration	Traveler Information	Static information on corridor travel modes	Static trip planning with limited real-time alerts	Multimodal trip planning and account based alerts	Location-based, on-journey multimodal information	Location-based, multimodal proactive routing
	Data Fusion	Limited or Manual	Near real-time data for multiple modes	Integrated multi-modal data (one-way)	Integrated multi-modal data (two-way)	Multi-source multi-modal data integrated and fused for operations
Operational Integration	Performance Measures	Some ad-hoc performance measure based on historic data	Periodic performance measures based on historic data	High-level performance measures using real-time data	Detailed performance measures in real-time for one or more modes	Multi-modal performance measures in real-time
	Decision Support System	Manual coordination of response	Pre-agreed incident response plans	Tool selection of pre-agreed plans	Model based selection of pre-agreed plans	Model based creation of incident response plans

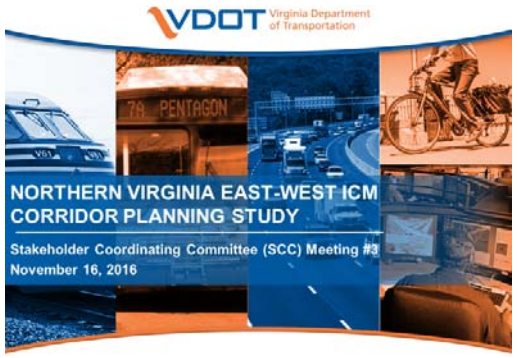
Lesson #2 – Proactive Planning for ICM

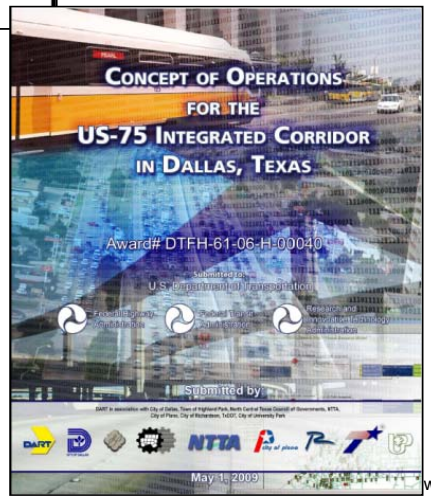
Stakeholder Collaboration and Concept of Operations

- Full commitment of regional partners and stakeholders
  - Project Champion and Project Leader
  - Identify critical resources
  - Prepare regional agreements and policies in advance
  - Agreement for long-term funding and O&M

- Systems Engineering-Centric Process
  - Analyze Issues to Identify Corridor Needs
  - Define Vision to Address Needs
  - Determine Goals to meet Vision
  - Develop Objectives based on Vision







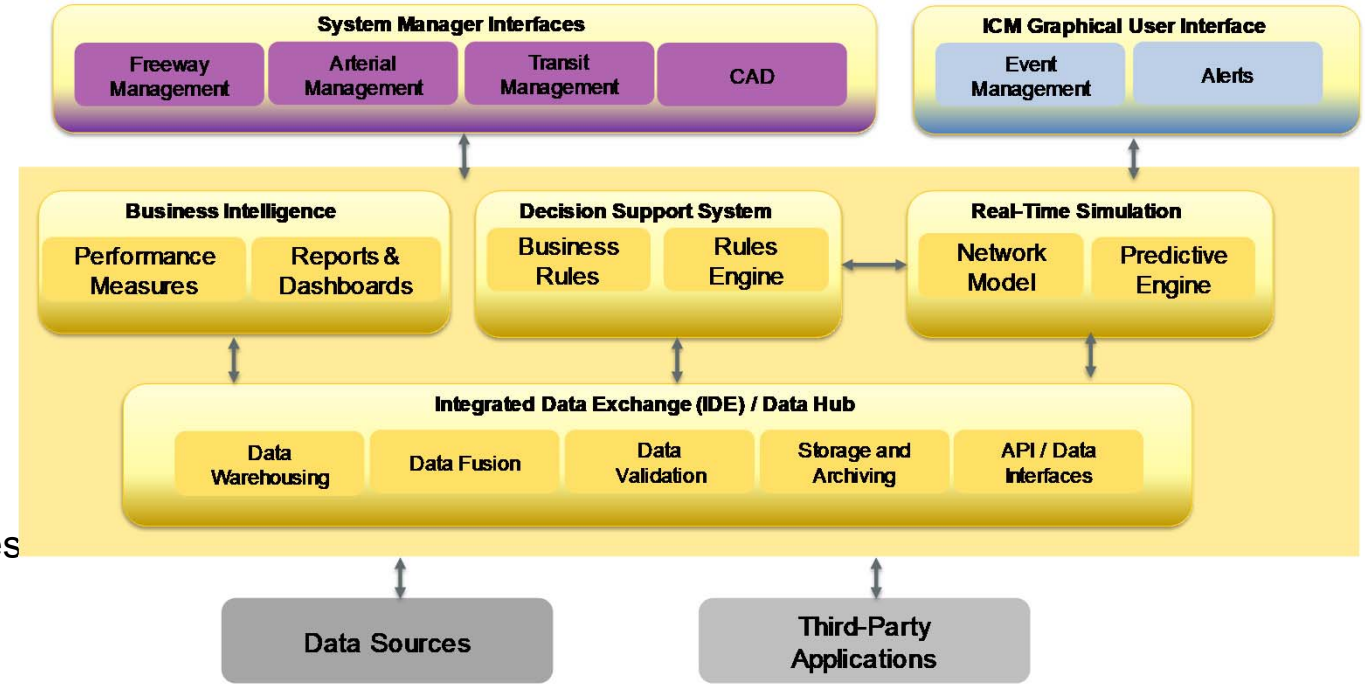
Lesson #3 – Performance Driven Approach

- Define Performance Measures that are easily calculated
- Provide Success thresholds
- Revisit Performance Measures as system evolves

Performance Measure	Performance Measure Success Threshold
Travel Time Index	Reduce Index by 2% per year
Corridor Throughput	Increase overall throughput – increase person/trips per hour by 2%
Clearance time for an Incident (based on Jurisdiction and Corridor)	Emergency Responder Training - 75% of agencies trained on Incident Management response.
Response time	Response to Incidents - target is consistent response between jurisdictions (within 5 minutes)
Parking Lot Volume at Transit locations	Parking Lot Capacity – 90% utilization
Ridership per vehicle (Transit)	Increase of ridership – 2% (year to year increase)
Provide ATIS information to public on incident	Information to Regional 511 System – 10 minutes of Incident entered into SmartNET
Public Perception	Public Perception – Awareness of ICM and perceived benefits (survey based)
ICM Response Plan deployment	ICM Response Plan activated - 95% of plans were deployed correctly

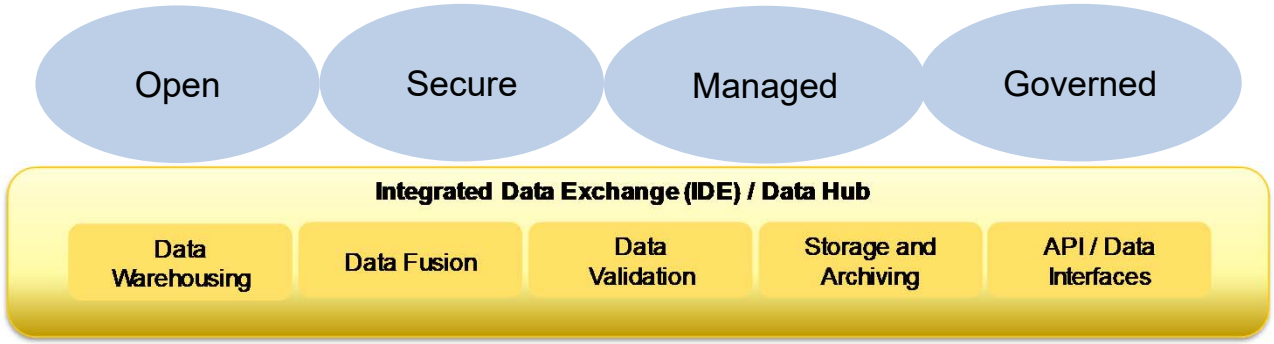
Lesson #4 – Open, Modular Architecture

- Basic Components of an ICM
  - Integrated Data Exchange
  - Decision Support System
  - Business Intelligence
  - Forecasting & Prediction (Simulation)
- Practical Considerations
  - Standards-based data interfaces
  - Open, modular architecture
  - Extensible platform



IDE Lessons Learned

- Design Considerations
  - Plan for large amounts of data
  - Data processing and fusion – standards-based (TMDD)
  - Support all types of data including video
  - Enable center-to-center data exchange as well as open data portal for external users
  - Conduct an inventory of existing data sources and identify
- Best Practices
  - Data governance
  - Cloud-based so it is easily accessible by all stakeholders
  - Requirements-driven – know what you need before gathering data
  - Scalable to expand capacity over time

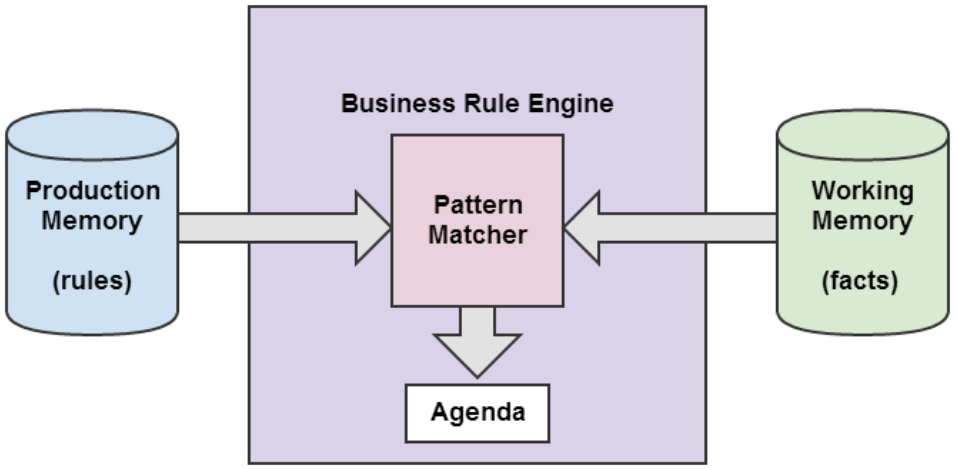


Decision Support System

Provide a consistent and repeatable response to events

Considerations

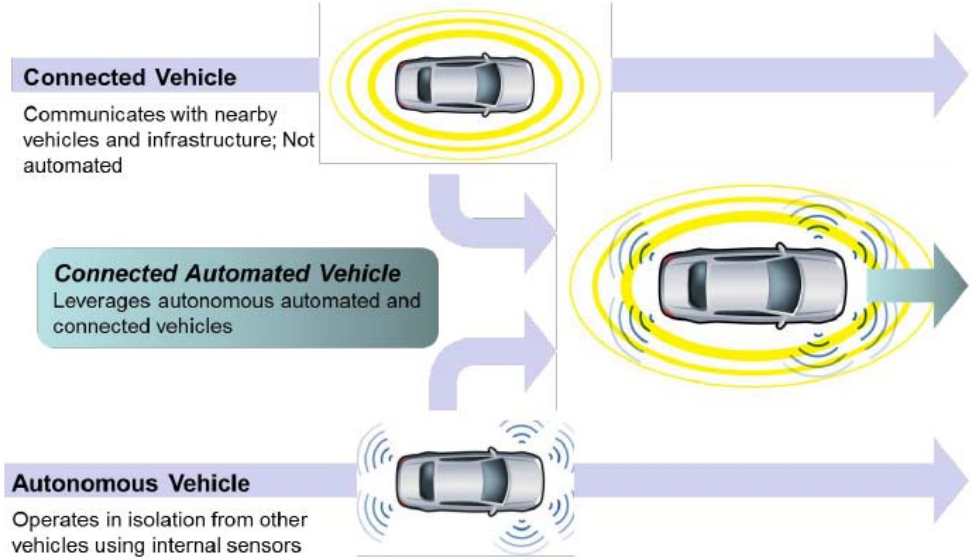
- Account for expected conditions
- Consider multimodal impacts
- Include enough time and budget for validation
- Plan for long-term calibration
- Incorporate feedback to assess response success

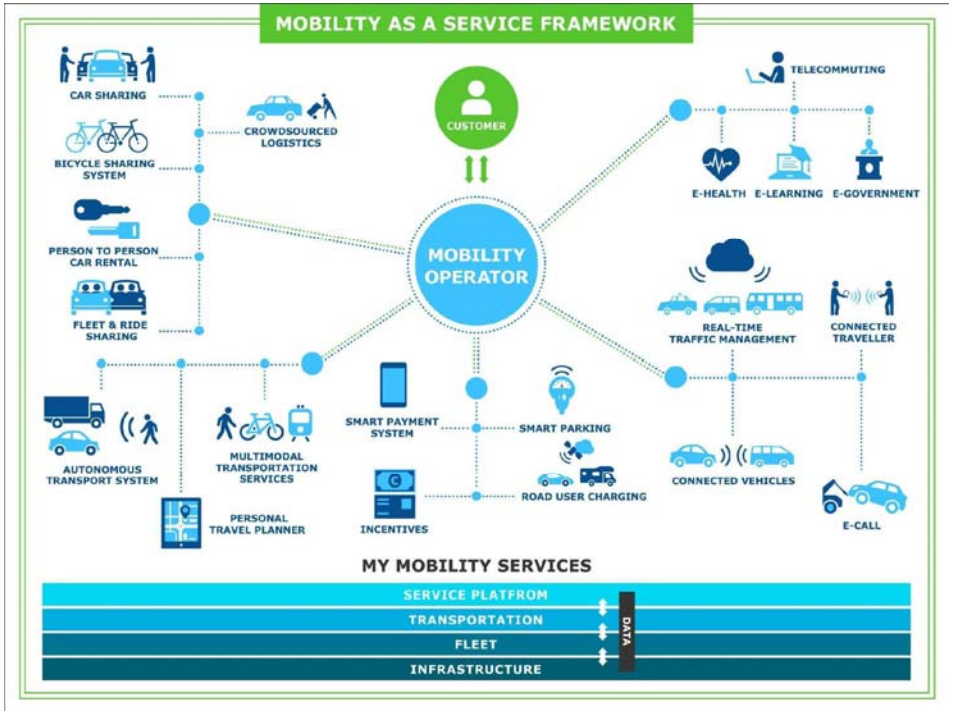


Lesson #5 - The Work Does not End at Deployment

- Assess and evaluate ICM against performance measures
- Continually seek to refine and expand the ICM
  - Geographic
  - Systems
  - Agencies
  - Applications
- Secure funding to support O&M
  - Adding new stakeholders
  - Incorporating new data
  - Calibrating the simulation and decision support system
  - Data mining and analytics

Lesson #6 - Be Adaptable





Summary

- ICM is a tool to facilitate cooperative, holistic traffic management
- Prioritize needs and implement incrementally
- Be driven by performance measures
- Obtain full commitment of regional partners and stakeholders.
- Design ICM outside of standard operational systems – it is a shared system
- Follow system engineering best practices
- Adhere to standards and best practices for open architecture
- Secure funding for Design/Build and O&M

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