Introduction to ITS/CVO

presented to

Massachusetts Institute of Technology

presented by

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Transportation leadership you can trust.

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Discussion Topics

- **The Impetus for ITS/CVO Projects**

  - **Industry trends**

  - **State trends**

  - **Federal perspective**

- **Overview of ITS for CVO**

  - **User services**

  - **Enabling technologies**

- **CVISN Overview**

  - **What is CVISN?**

  - **Costs/benefits**

  - **Plans for "expanded" CVISN**

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Discussion Topics (continued)

- **CVISN Case Study – State of Connecticut**

  - Project components

  - Development process

  - Current status

  - System demonstration

- **Q & A session**

The Impetus for ITS/CVO Projects

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Motor Carrier Passenger Landscape

- **Motor Coach Industry**

    - $5 billion industry: Scheduled ($1.5b), Charter/Tour ($3.5b)

    - 3,700 bus companies/40,000 buses

    - 190,000 jobs provided

    - 775 million passengers annually

    - 90% are small operators (< 25 buses)

- **School Bus Industry**

    - Largest public fleet of vehicles in U.S.

    - 500,000 school buses transport 25 million students daily

    - Travel 4 billion miles annually

Source: Transportation Security Administration

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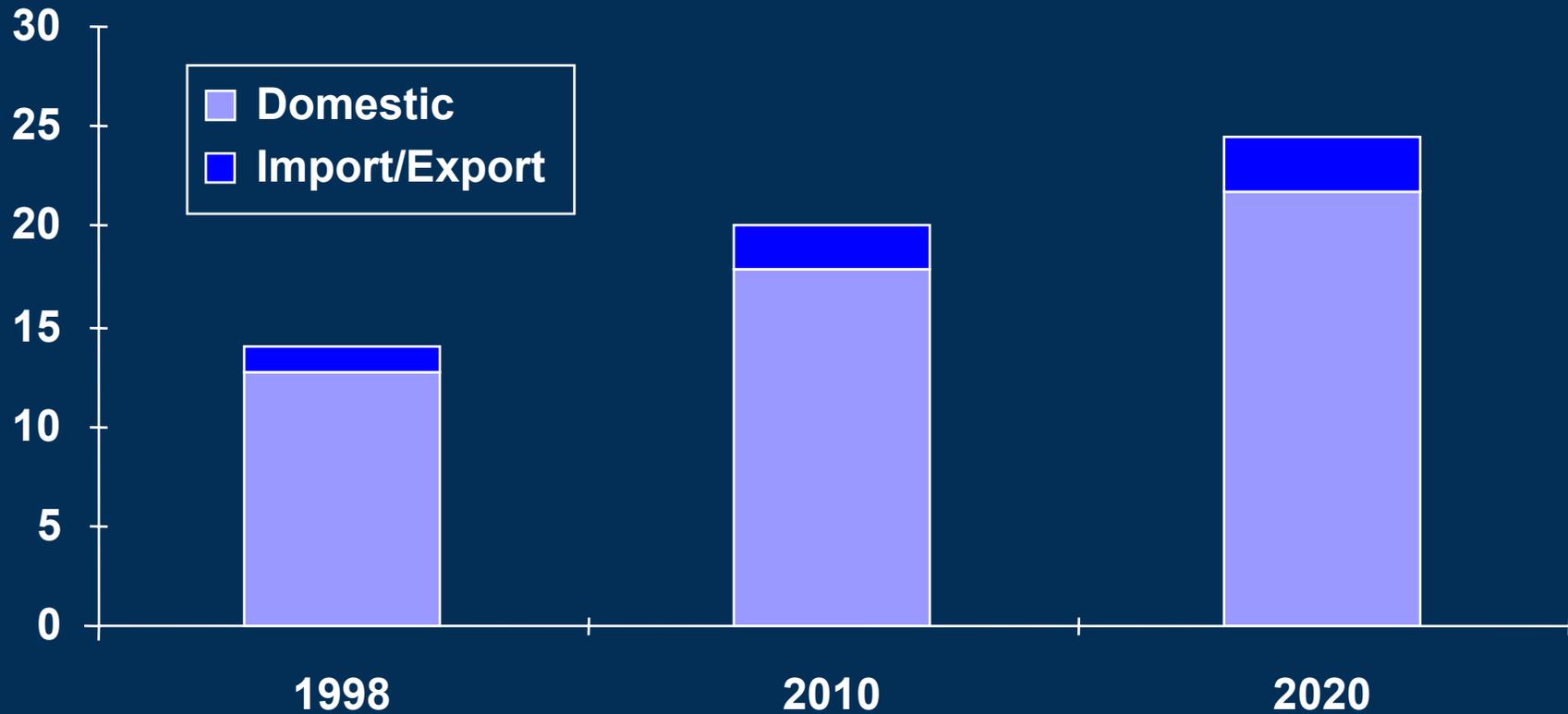
Motor Carrier Cargo Landscape

- 1.2 million motor carriers in the U.S.

- 9.7 million workers including 3.3 million drivers

- 15.5 million trucks that operate in the U.S.

- 40,000 new motor carriers annually

- 42,000 HAZMAT trucks

- 75% of U.S. communities depend solely on trucking for the movement of commodities

Source: Transportation Security Administration

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Next 10 Years Will Bring Much Change

| From…	To…
National markets	Global markets
Manufacturing economy	Service & information economy
Inventory management	Information management
Modal fragmentation	Cross-modal coordination
System construction	System optimization
Economic deregulation	Safety and security regulation
Low visibility of freight	Environmental accountability

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Anticipated Growth in Freight Traffic

Freight Tons (billions)

Legend:
- Domestic
- Import/Export

Y-axis: 0, 5, 10, 15, 20, 25, 30

X-axis: 1998, 2010, 2020

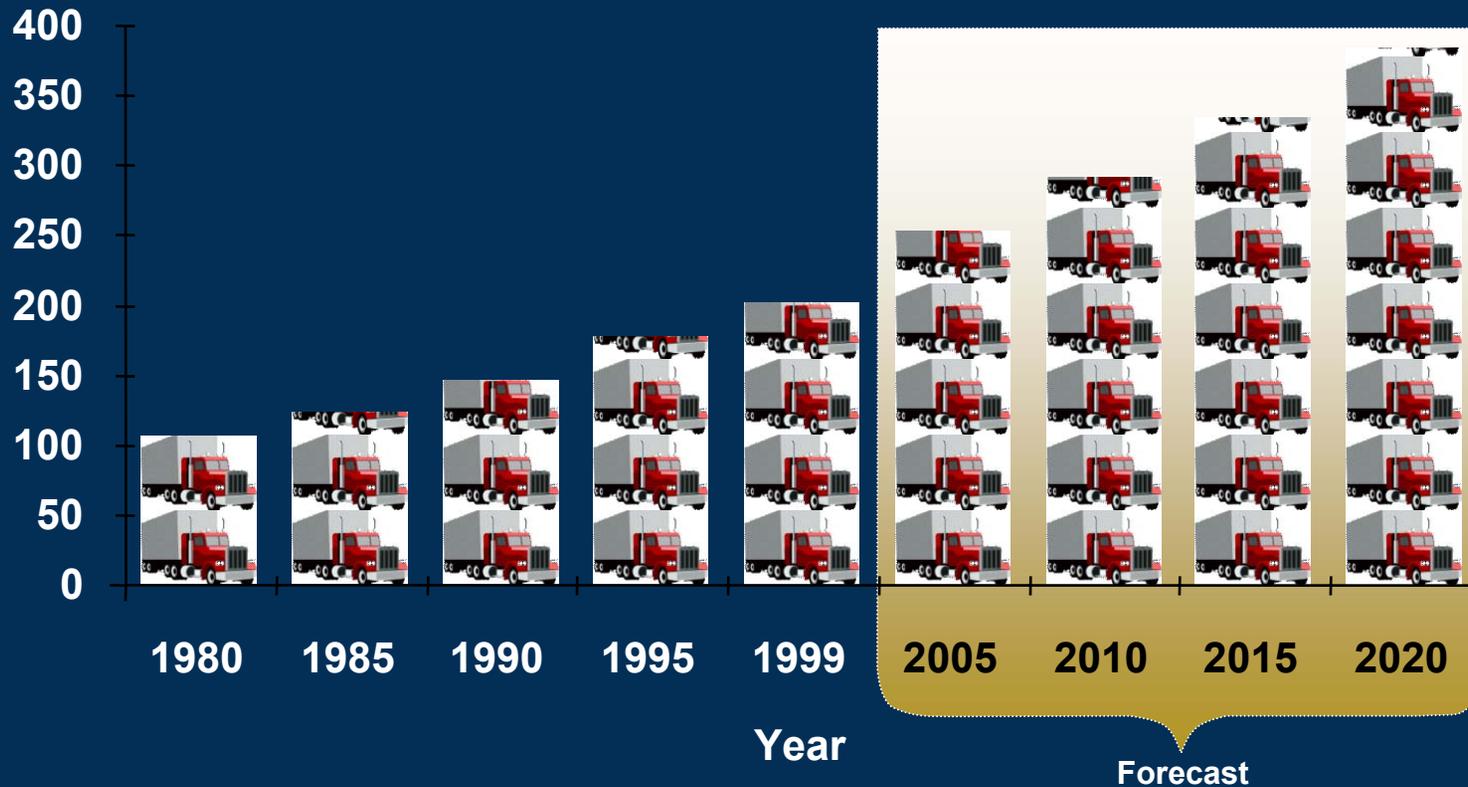*Source: Federal Highway Administration, Freight Analysis Framework, 2002 forecast*

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Freight Tonnage Forecasts by Mode
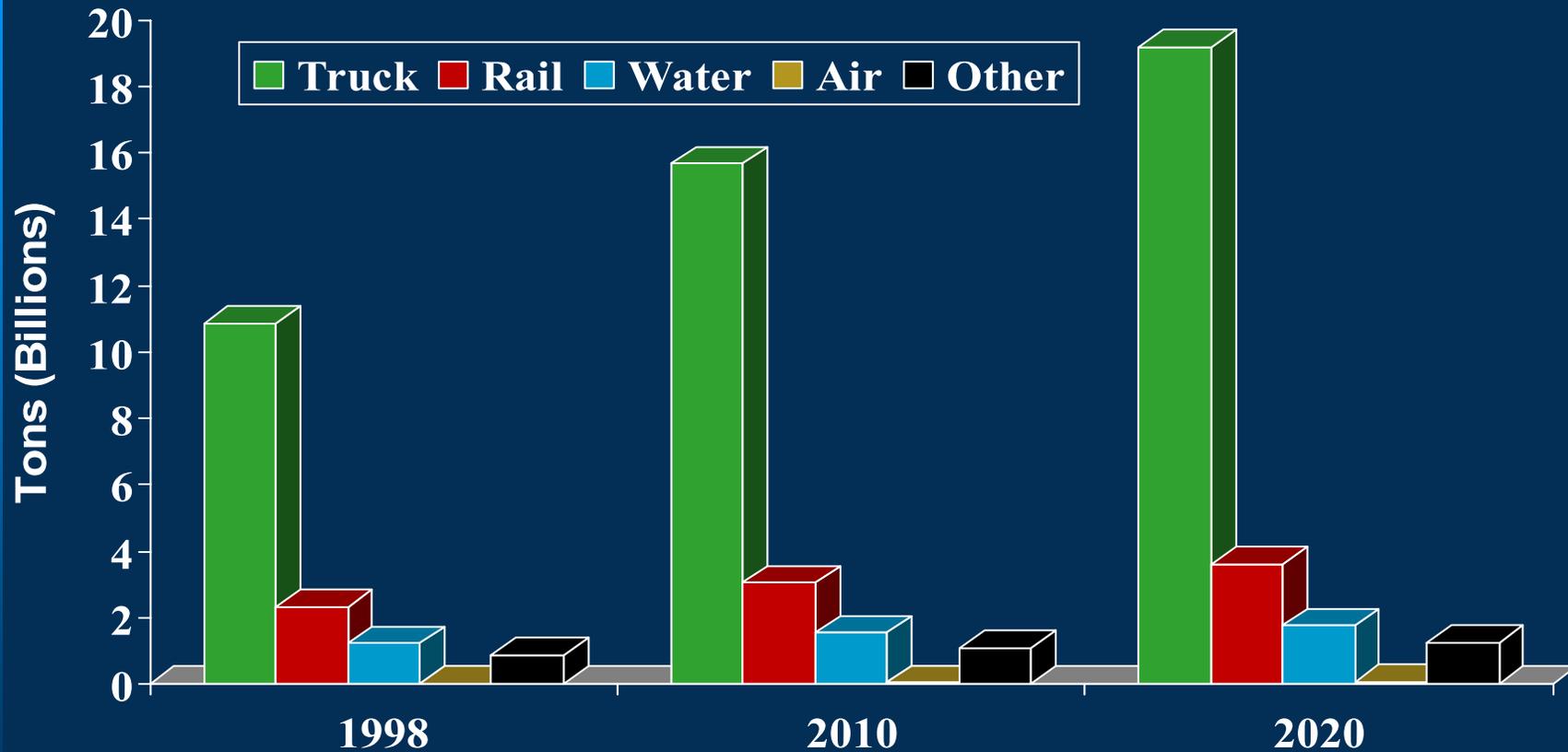
Source: Federal Highway Administration, Freight Analysis Framework, 2002 forecast

Policy Issues

- **Safety**

- **Security**

- **Productivity and efficiency**

- **Environmental accountability**

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FMCSA's Safety Goal

**Reduce The Large-Truck Fatality Rate
From 2.8 Per 100 Million Miles
Of Truck Travel In 1996 To 1.65 In 2008**

Legend:
- Fatalities
- Projected Fatalities

5,142 fatalities
2.8 fatality rate

5,082 fatalities
2.4 fatality rate

4,330 fatalities
1.65 fatality rate

X-axis: '88 '90 '92 '94 '96 '98 '00 '01 '02 '04 '06 '08

Y-axis: 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000
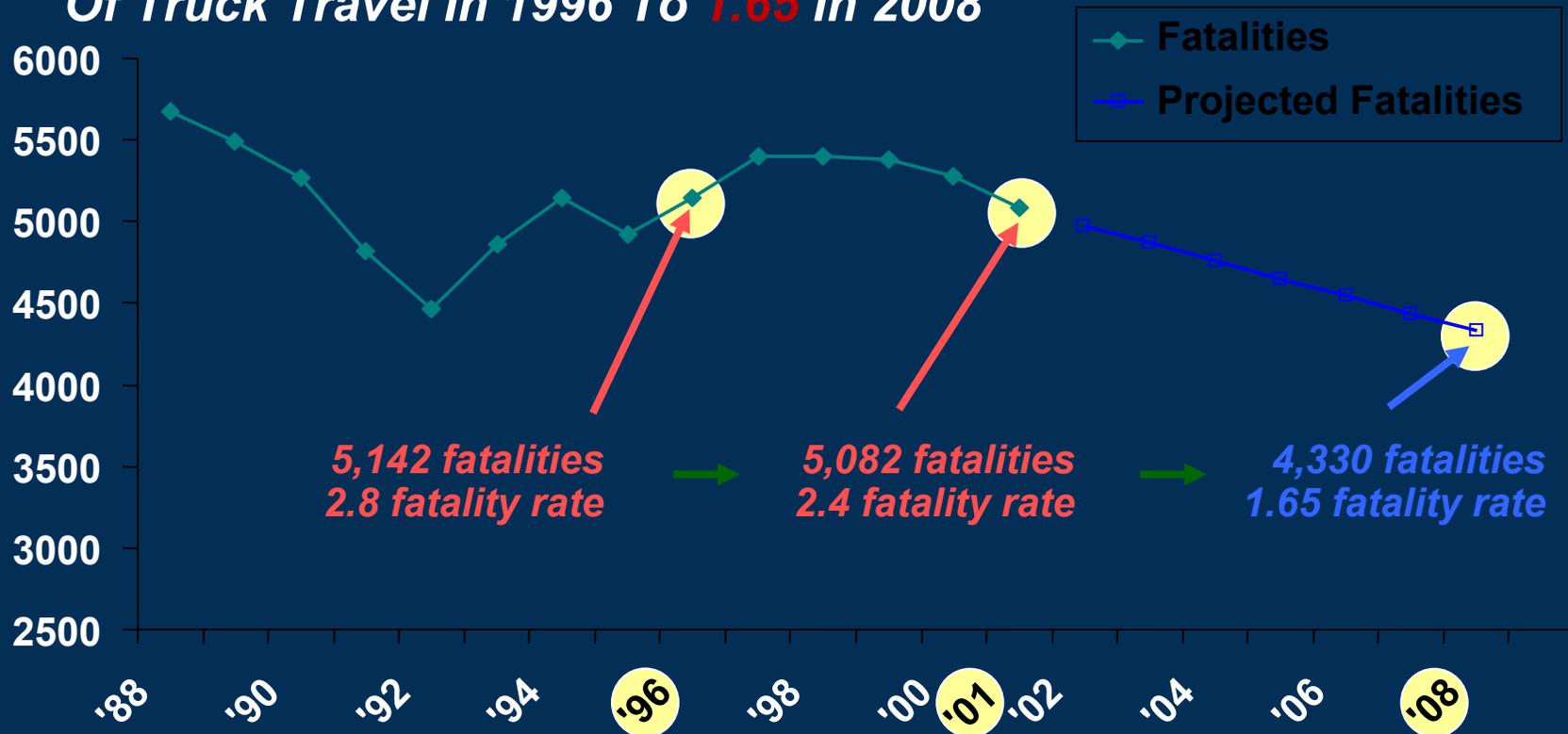
*FMCSA's safety goal is consistent with DOT's goal of 1.0 fatalities
per 100 million vehicle miles traveled in all crashes by 2008*
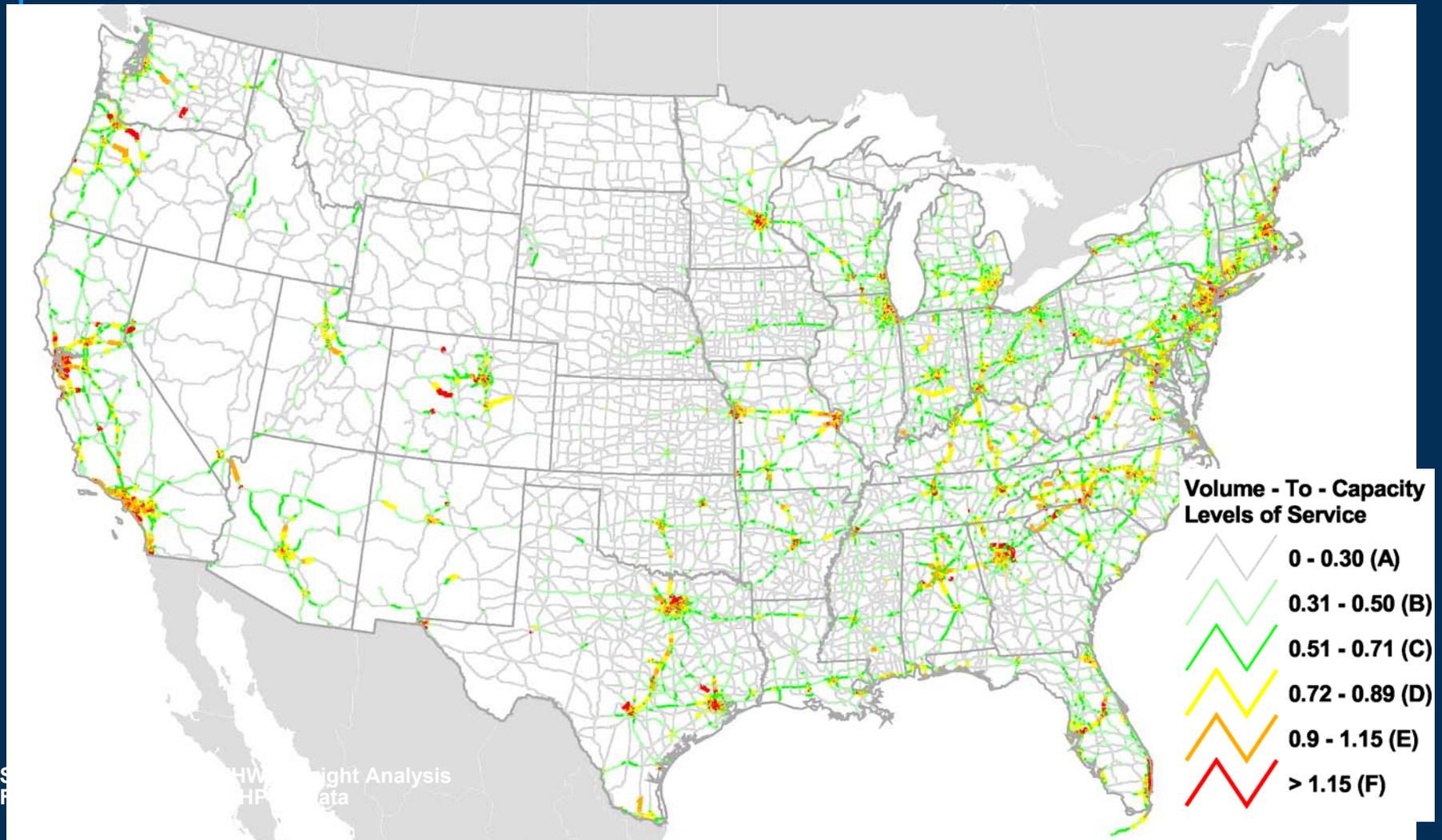
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Security

- **What are the threats?**

  - Drivers – 2.6 million CDL holders

  - Trucks – More than 7 million privately owned or farm trucks

  - Motor coaches – 4,000 carriers with 44,000 buses

  - Containers – 62 million twenty-foot equivalent units (TEU) today, growing 8 percent per year

  - Hazmat – 800,000 shipments daily, 94 percent moving over the highway system

  - Infrastructure – Highways, bridges, ports, terminals, …

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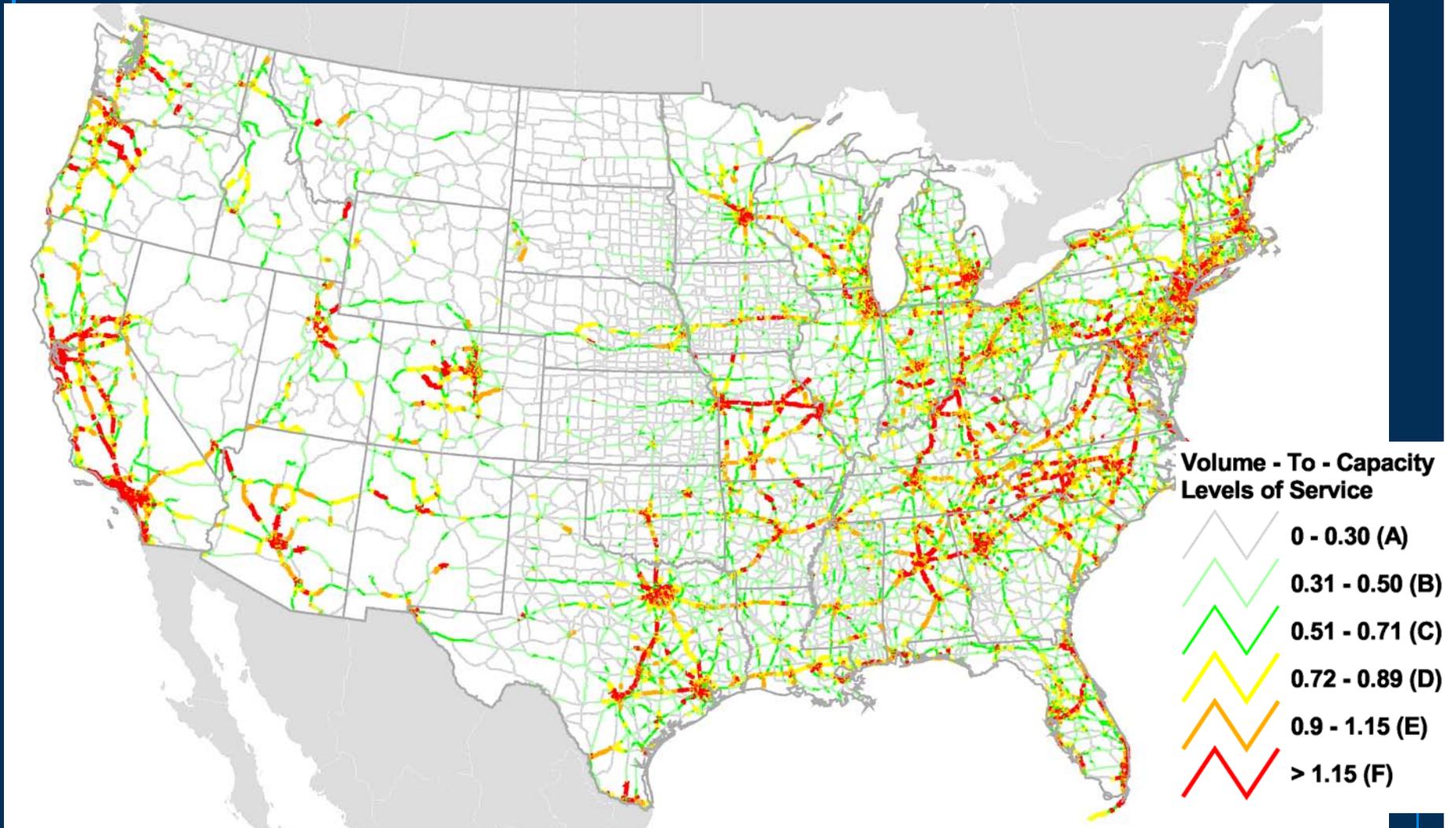# Productivity and Efficiency

- **Issues**

  - **Congestion**

  - **Travel time reliability**

  - **Time required for inspections, security checks**

  - **Cost-effective use of public resources**

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Highway Congestion, 2000

Volume - To - Capacity
Levels of Service

- 0 - 0.30 (A)
- 0.31 - 0.50 (B)
- 0.51 - 0.71 (C)
- 0.72 - 0.89 (D)
- 0.9 - 1.15 (E)
- > 1.15 (F)

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Highway Congestion, 2020

Volume - To - Capacity Levels of Service

- 0 - 0.30 (A)
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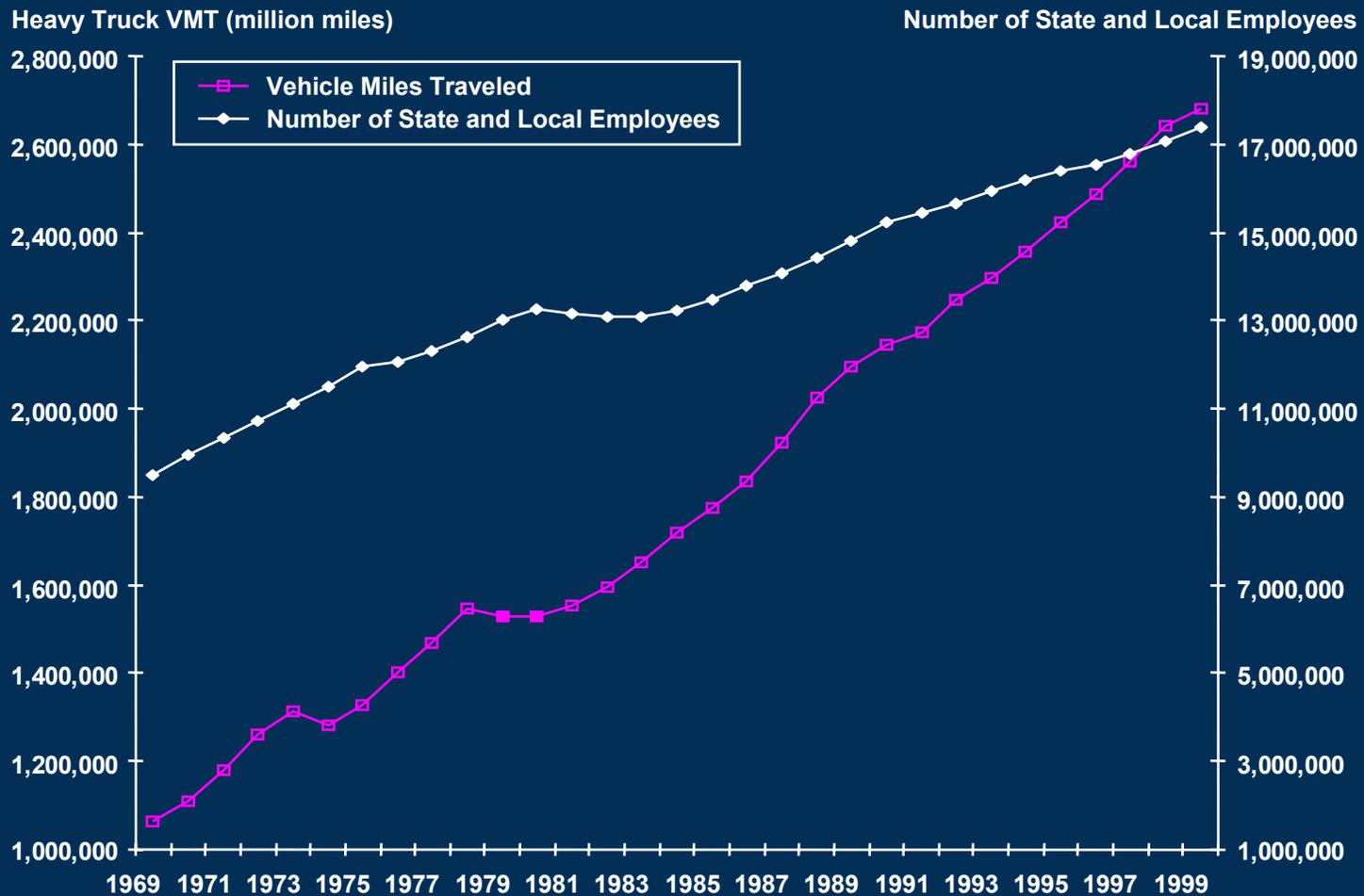
Logistics Cost Improvements Have Stalled
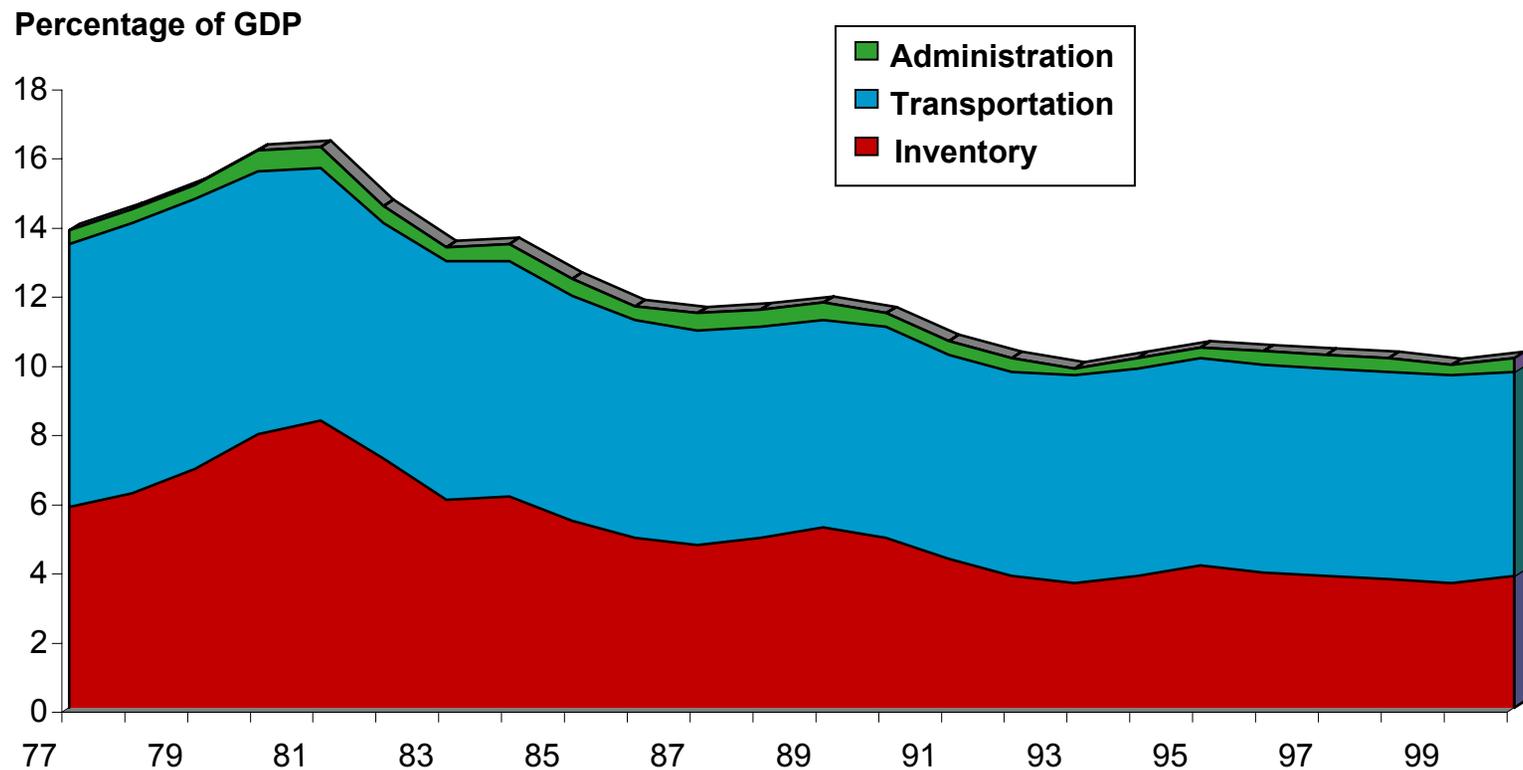
Source: Cass/ProLogis 12th Annual State of Logistics Report, 2000

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State Agencies Must Do More with Less

Heavy Truck VMT (million miles) vs. Number of State and Local Employees, 1969–1999

- Vehicle Miles Traveled
- Number of State and Local Employees

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Environmental Accountability

- **Issues**
  - Emissions
  - Fuel consumption and alternative fuels
  - Noise, vibrations
  - Environmental justice

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Overview of ITS for CVO

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CVO Defined

- CVO include all the operations associated with moving goods and passengers via commercial vehicles over the North American highway system and the activities necessary to regulate the operations.

- These operations involve dozens of areas of interaction between the public sector and motor carriers including:

  - Commercial vehicle credentials administration

  - Roadside safety enforcement

  - Size and weight enforcement

  - Vehicle safety inspections and maintenance

  - Fleet routing and dispatching operations

  - Cargo handling and tracking

Source: John's Hopkins University/Applied Physics Laboratory

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Key Challenges

- **Safety --** Despite reductions in the accident rate, the number of commercial vehicle crashes has not declined due to growth in travel

  - **Challenge: How to focus limited resources on high-risk carriers, vehicles, drivers**

- **Economic Competitiveness --** Motor carriers lose about $1 for every minute a large truck is caught in congestion or waiting in lines at an inspection site

  - **Challenge: How to reduce costs and unnecessary delays for motor carriers**

- **Efficiency --** State agencies and motor carriers spend millions of dollars on regulatory activities

  - **Challenge: How to handle growing volume of transactions with constrained funding and fixed or declining staff levels**

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Federal ITS/CVO Goals

- **Improve highway safety**

- **Simplify operations**

- **Save lives, time and money**

Source: John's Hopkins University/Applied Physics Laboratory

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ITS/CVO "User Services"

Program Areas

Safety Assurance	Credentials Administration	Electronic Screening	Carrier Operations
• Access to driver, vehicle, and carrier information on inspections and accidents • Automated inspections and reviews • Onboard safety monitoring	• Electronic credentialing • Clearinghouses • Interagency data exchange • Interstate data exchange	• Automated weight and credentials screening • International electronic border clearance	• Fleet and vehicle management • Traveler information systems • Hazardous Materials incident response

CVISN Architecture (Technical Infrastructure)

Mainstreaming and Deployment Planning (Organizational Infrastructure)

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ITS/CVO Program Areas (User Services)

- **Safety Assurance**

  - Programs and services designed to assure the safety of drivers, vehicles and cargo
    - Access to driver, vehicle and carrier information on inspections and accidents
    - Automated inspections and reviews
    - On-board safety monitoring

- **Enabling technology**

  - Centralized safety and credential database(s)

  - Systems to collect and upload inspection data

  - Automated brake testing, onboard computers

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ITS/CVO Program Areas (continued)

- **Credentials Administration**

    - Programs and services designed to improve the deskside procedures and systems for managing motor carrier regulation

        - Electronic application, purchasing, and issuance of credentials

        - Automated tax reporting and filing

        - Interagency data exchange

        - Interstate data exchange

- **Enabling Technology**

    - Software that automates the submittal, review and issuance of credentials

    - Interstate clearinghouses

    - E-payment technology

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ITS/CVO Program Areas (continued)

- **Electronic Screening**

  - Programs and services designed to facilitate the verification of size, weight and credential information
    - Automated screening and clearance of commercial vehicles
    - International electronic border clearance

- **Enabling Technology**

  - Transponders & roadside interrogators (AVI)

  - Weigh-in-motion systems

  - Automatic vehicle classification systems

  - Automated safety screening algorithms

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ITS/CVO Program Areas (continued)

- **Carrier Operations**

  - Programs and services designed to help manage the flow of commercial vehicles
    - Travel information services
    - Hazardous material incident response services
    - Routing and dispatching operations
    - Fleet maintenance

- **Enabling Technology**

  - Global positioning systems/on-board computers

  - Computer-aided dispatch

  - Engine diagnostic systems

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Introduction to CVISN

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What Is CVISN?

- ➢ **An interagency deployment program with Federal, State, and industry partners**

- ➢ **Integrates National, State, and carrier information systems**

- ➢ **Improves safety, simplifies processes, and provides savings**

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CVISN Integrates Safety Data Systems

CVISN

Roadside Operations
- Inspections
- Accidents
- Citations
- Traffic data
- Weather

State Agencies
- Safety records
- Driver licensing
- Registration
- Insurance
- Permitting
- Tax

Federal Agencies

Other States

Carriers
- Vehicle maintenance
- Driver records
- Dispatching
- Hazmat

Third Parties
- Shippers
- Insurance Carriers
- Banks

Examples of CVISN Capabilities

- **ASPEN inspection software**

- **Inspection Selection System (ISS) algorithm**

- **SAFER data warehouse (safety records of interstate motor carriers)**

- **Weigh in motion (WIM) scales**

- **Dedicated short-range communications (DSRC) transponders for electronic screening, toll collection**

- **Electronic application, issuance, and payment of motor carrier credentials via EDI or the Internet**
  - **International Registration Plan (IRP)**
  - **International Fuel Tax Agreement (IFTA)**
  - **Oversize/overweight permitting**

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CVISN Is a Partnership

- State Agencies

- Carriers

- Service Providers & Manufacturers

- Professional & Trade Associations

- Federal Motor Carrier Safety Administration (FMCSA)

- Federal Highway Administration (FHWA)

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CVISN Level 1 Deployment

TEA-21 goal to complete CVISN deployment in a majority of States by FY 2003.

- ➢ **Safety Information Exchange**

- ➢ **Interstate (IRP / IFTA) Credentials Administration**

- ➢ **Roadside Electronic Screening**

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Definition of CVISN Level 1 Deployment

An organizational framework for cooperative system development has been established among state agencies and motor carriers.

A State CVISN System Design has been established that conforms to the CVISN Architecture & can evolve to include new technology & capabilities.

All the following elements of 3 capability areas have been implemented using applicable architectural guidelines, operational concepts, & standards:

- Safety Information Exchange
  - **ASPEN (or equivalent) at all major inspection sites**
  - **Connection to SAFER**
  - **CVIEW (or equivalent) for snapshot exchange within state and to other states**
- Credentials Administration
  - **Automated processing (i.e., carrier application, state application processing, credential issuance) of at least IRP & IFTA credentials; ready to extend to other credentials (intrastate, titling, OS/OW, carrier registration, HAZMAT).** *Note: Processing does not include e-payment.*
  - **Connection to IRP & IFTA Clearinghouses**
  - **At least 10% of the transaction volume handled electronically; ready to bring on more carriers as carriers sign up; ready to extend to branch offices where applicable**
- Electronic Screening
  - **Implemented at a minimum of one fixed or mobile inspection site**
  - **Ready to replicate at other sites**

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Federal CVISN Rollout Strategy

Plan

Prototype

Pilot (infrastructure and a few states)

Deployment (all interested states)

Operations and Maintenance (all deployment states)

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CVISN Benefits

- **State**

  - Improved customer service

  - Improved safety

  - Coordinated investment and more efficient use of existing state resources

  - Enables state to keep pace with increased transaction volumes and commercial motor vehicle traffic

- **Motor Carriers**

  - Reduced compliance costs

  - Improved turnaround time and accuracy

  - Performance based enforcement -- levels playing field for safe carriers

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Benefits of CVISN
Results from Previous Studies

- **Safety Information Exchange**

    - **Participation**

        - **84% of states utilize ASPEN software for recording and processing of inspection data and viewing historical data**

        - **More than half of states are connected to the SAFER system**

    - **Benefits**

        - **Electronic screening, automated safety inspections, onboard safety systems could reduce fatalities by 14 to 32% (USDOT)**

        - **Extensive implementation of on-board monitoring systems could reduce truck-related crashes by 17% annually (USDOT)**

        - **In a study of 40,000 CV inspections, safety inspectors removed an additional 4,000 unsafe drivers and vehicles from the road using advanced safety systems than in a similar test using traditional methods (USDOT)**

Benefits of CVISN
Results from Previous Studies

- **Interstate Credentials Administration**

  - **Participation**

    - 3 states have successfully demonstrated end-to-end processing of IRP, IFTA; numerous states have partially deployed these systems

  - **Benefits**

    - Reduces up to 75% of the current costs for credentials administration for both states and motor carriers; potential cost savings of $20 per processed credential (preliminary estimates from systems deployed in Kentucky)

    - Electronic credentialing can reduce motor carrier labor costs, showing a benefit cost ratio of 4.2:1 to 19.8:1, depending on carrier size (ATA)

    - Budget analysis of costs and benefits conclude electronic credentialing can be financially self-supporting (NGA)

Benefits of CVISN
Results from Previous Studies

- **Roadside Electronic Screening**

  - **Participation**

    - 25 states in the United States and nearly 7,000 motor carrier fleets participate in electronic screening programs

    - Truck enrollment has grown by 100% in the past few years

  - **Benefits**

    - Provides savings of 1.5 to 4.5 minutes per bypass for participating motor carriers (USDOT)

    - Carriers who pay their drivers by the hour are expected to see savings ratios associated with electronic screening from 3.3:1 to 7.4:1, depending on carrier size (ATA)

    - State agencies can automate existing fixed facilities to process more vehicles through per hour, rather than physically expanding an existing facility. Retrofit costs could range from $1.5 to 3 million, vs. $4 to $8 million for physical expansion (Kentucky)
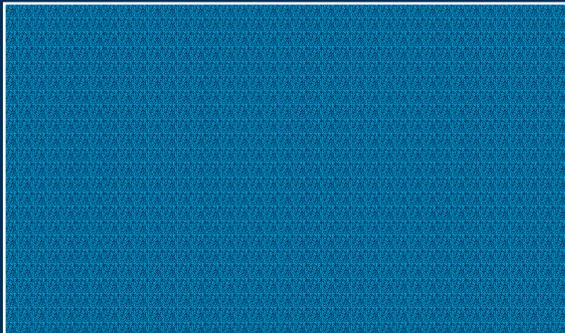
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Potential Future CVISN Program Areas
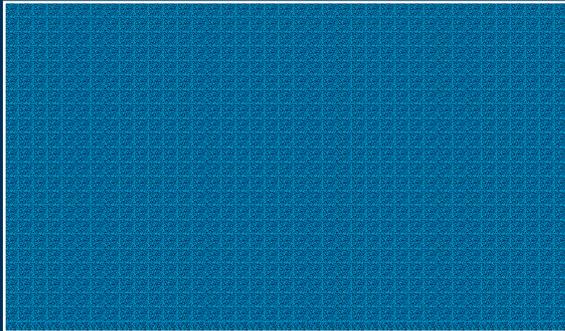
## *Data Integration and Exchange*

The electronic collection, integration and exchange of safety, security, and credentials information among States, Federal agencies, motor carriers, and other stakeholders

Roadside Operations

Use of technology on highways and key nodes to manage commercial vehicle traffic, help prevent and respond to incidents, focus enforcement resources on high-risks, and reduce unnecessary delays
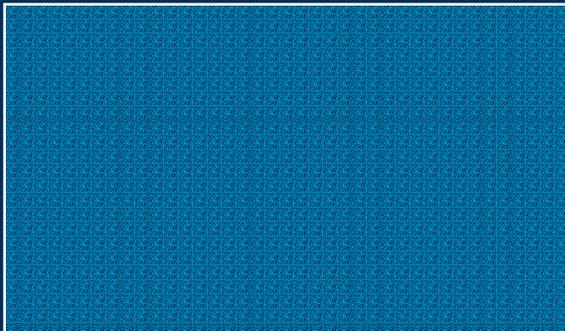
E-business/E-government

Provision of better government or business services to customers through use of technology

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Connecticut CVISN Case Study

Core Elements of Connecticut's CVISN/PRISM Project

- **Electronic Credentials**

  - Enable carriers to apply for, pay user fees and receive credentials (IRP, IFTA, OS/OW, SSRS, etc.) electronically

  - Implement a centralized system to manage these business transactions (one point of access for industry)

  - Provide links from this centralized system to existing or emerging "back-end" systems

- **Electronic Screening and Clearance**

  - Provide data to the state's roadside electronic screening program (mobile and fixed enforcement)

  - Provide a single point for commercial motor carriers to register transponders

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Core Elements of Connecticut's CVISN/PRISM Project (contd.)

- **Centralized Data Management**

  - Provide a central repository for managing motor carrier safety and credential data

  - Provide access to this data for authorized users

- **System Integration and Linkages to National Information Systems**

  - Link core CVISN systems with state legacy systems

  - Provide links to national systems such as the Safety And Fitness Electronic Records (SAFER) and the IFTA Regional Processing Center to facilitate the exchange of interstate motor carrier credential and safety data
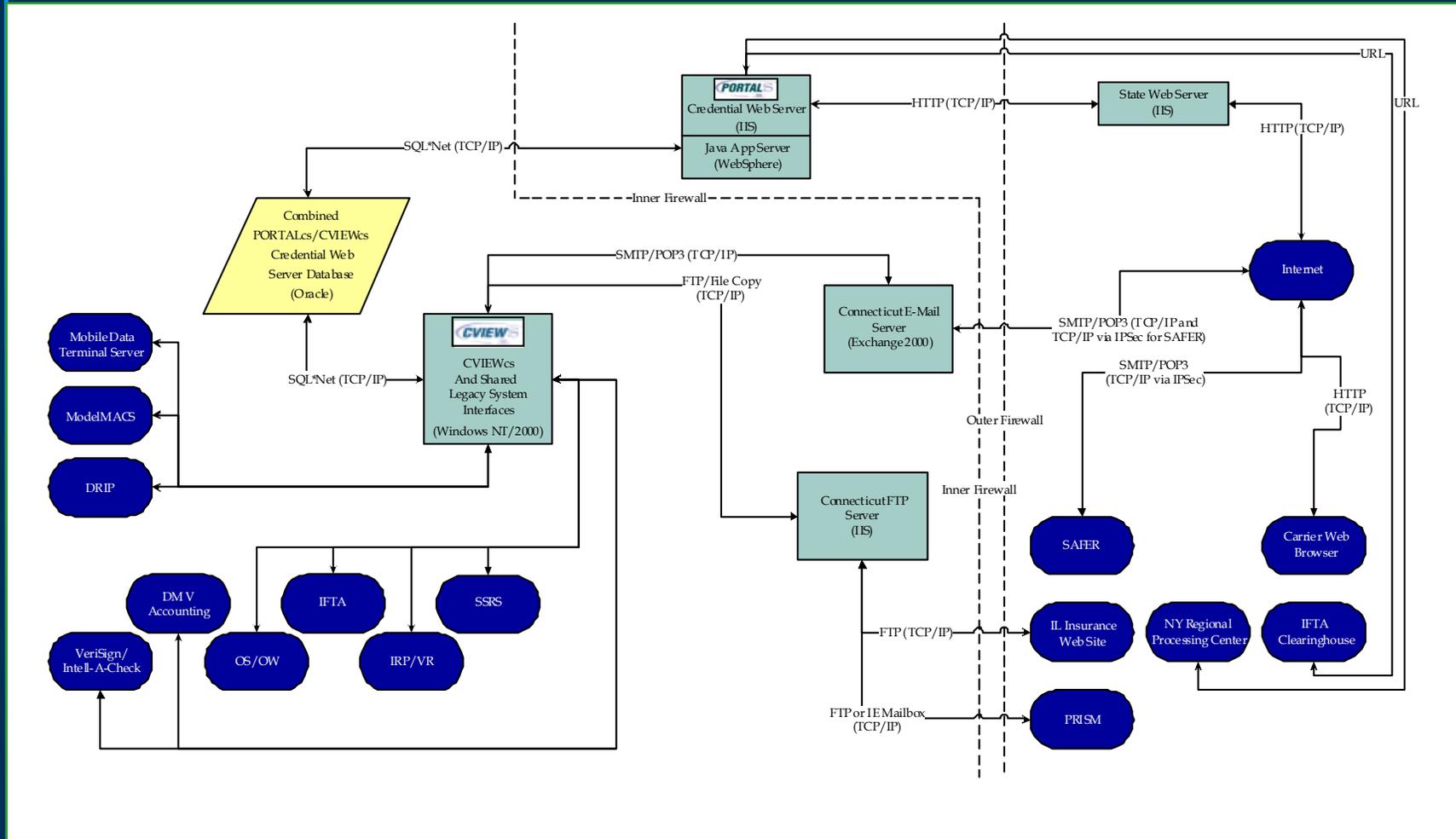
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Core Elements of Connecticut's CVISN/PRISM Project (contd.)

- **Project Management**

  - **Coordination with other State vendors**

  - **Issues resolution**

  - **Quality assurance**

- **Marketing and outreach**

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CVISN Implementation Approach

- **Our approach recognizes that every client has unique business and technical requirements**

- **Our implementation process leads to the development of a customized system that builds off of our base products**
  - **Design**
    - **Requirements analysis reveals the unique needs of the State**
    - **Use case design specifies how these needs will be met by the system and what functions the system will support**
  - **Development**
    - **Customization activities**
    - **New functionality development**
    - **Testing and quality assurance**
  - **Training and deployment**
  - **Ongoing support and maintenance**

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Connecticut CVISN/PRISM Architecture

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Connecticut CVISN PORTAL