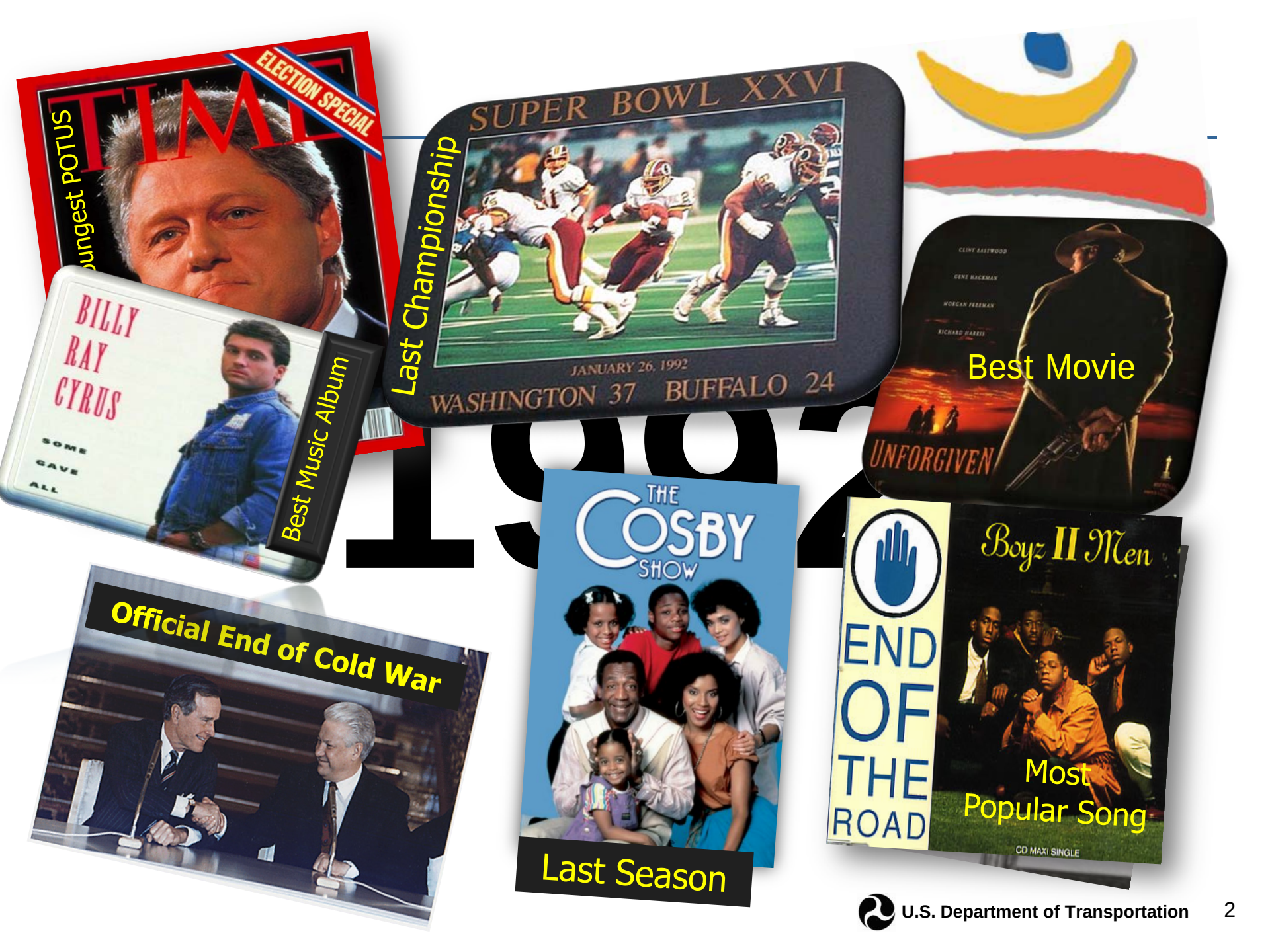
UNITED STATES
DEPARTMENT OF TRANSPORTATION

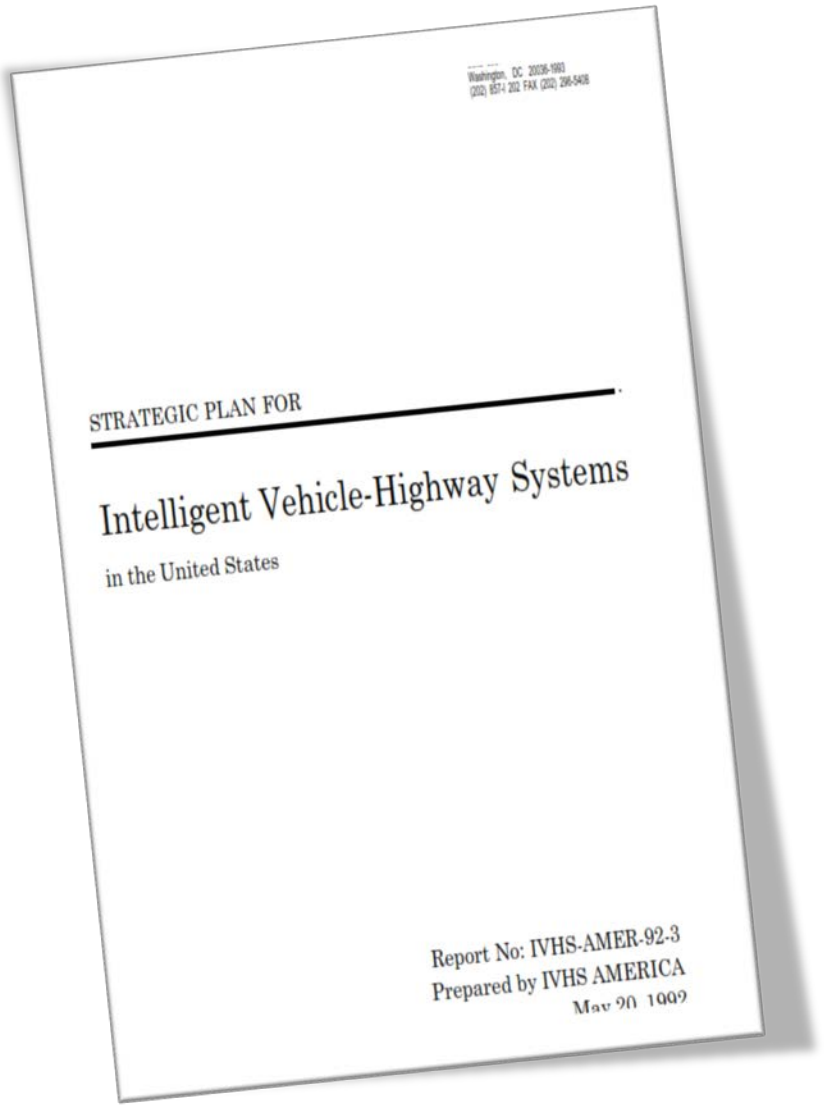
91st Transportation Research Board (TRB) Annual Meeting
January 23, 2012

The State of the Intelligent Transportation Systems Industry
Session # 316

Shelley Row
Director
Intelligent Transportation Systems Joint Program Office
Research and Innovative Technology Administration, USDOT


TIME
ELECTION SPECIAL
Youngest POTUS
SUPER BOWL XXVI
JANUARY 26, 1992
WASHINGTON 37 BUFFALO 24
Last Championship
BILLY RAY CYRUS
SOME GAVE ALL
Best Music Album
CLINT EASTWOOD
GENE HACKMAN
MORGAN FREEMAN
RICHARD HARRIS
UNFORGIVEN
Best Movie
1992
Official End of Cold War
THE COSBY SHOW
Last Season
END OF THE ROAD
Boyz II Men
Most Popular Song
CD MAXI SINGLE

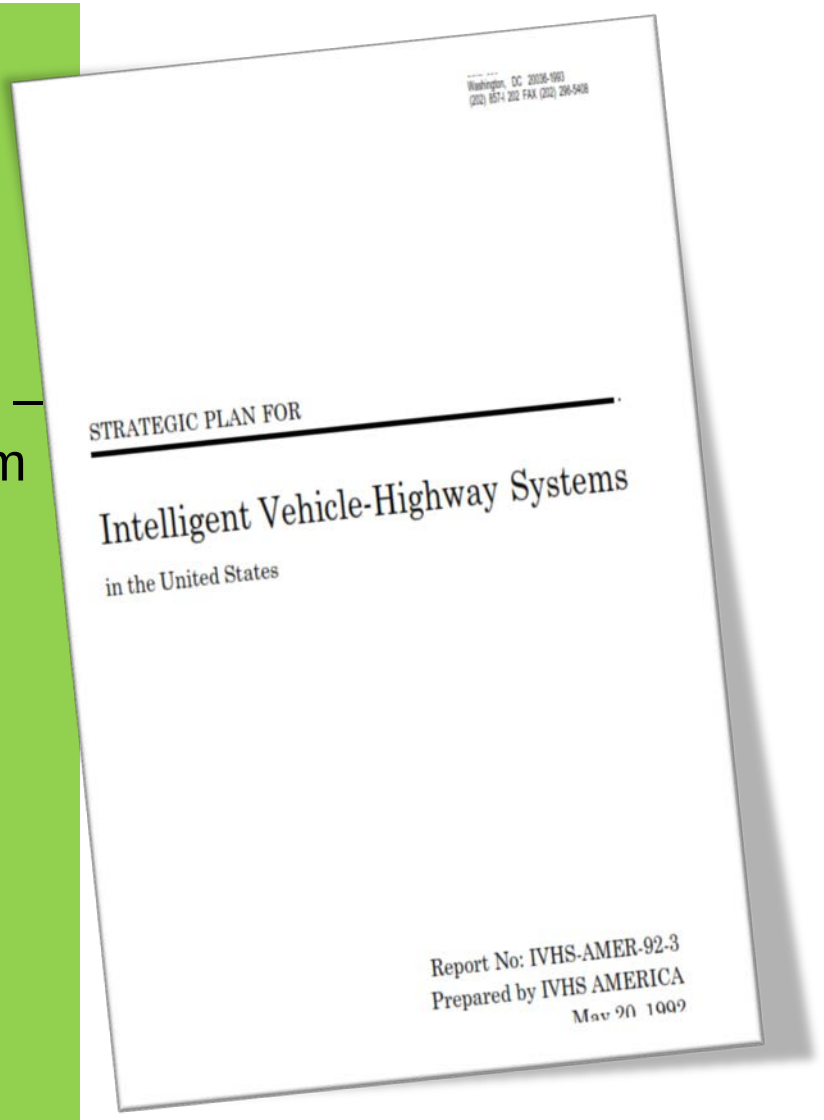
Strategic Plan for IVHS



20-Year Look Back

Top level view of the 20-year vision established by planners:

- Implementation of a national ITS Program
- Scope comparable to **Interstate Highway System**, but major difference – NOT exclusively a Government program
- **Public-private sector partnerships** – with major private sector involvement
- National system of travel support operating mode-to-mode and state-to-state to promote safe, expeditious, environmentally safe, and economic movement of people and goods
- A **vigorous US ITS industry**


STRATEGIC PLAN FOR

Intelligent Vehicle-Highway Systems

in the United States

Report No: IVHS-AMER-92-3

Prepared by IVHS AMERICA

May 20, 1992

INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT (ISTEA) – 1991

20-Year Look Back: ISTEA

Highlights

- New innovative technology research for transportation
- Organize & categorize functional areas – establish a common language
- Find out what works and what does not work – identify barriers to deployment

- **Operational Tests**
- **Deployment**

ISTEA was the era of:

- **Field Operational Tests** – deployment in an operational setting, bridge between R&D and Deployment – and evaluate deployment impacts
- **Priority Corridor Program**
- **Early Deployment Planning Studies** – planning for deployment at the local level
- **Architecture Development Initiated** (1994) – private sector firms partnering to develop
- **CVISN** Initiated
- **Metropolitan Model Deployment** Initiatives
- **Standards Program** starts up (1996) with a list of critical interfaces
- Sec. Peña **Operation Timesaver** (1996) – 75 metro areas (expanded to 78)
- **Deployment Tracking** – Definition of metrics for evaluation
- **AHS Demonstration** – Possibilities of vehicle-infrastructure cooperation

Transportation Equity Act for the 21st Century (TEA-21) 1998

20-Year Look Back: TEA-21

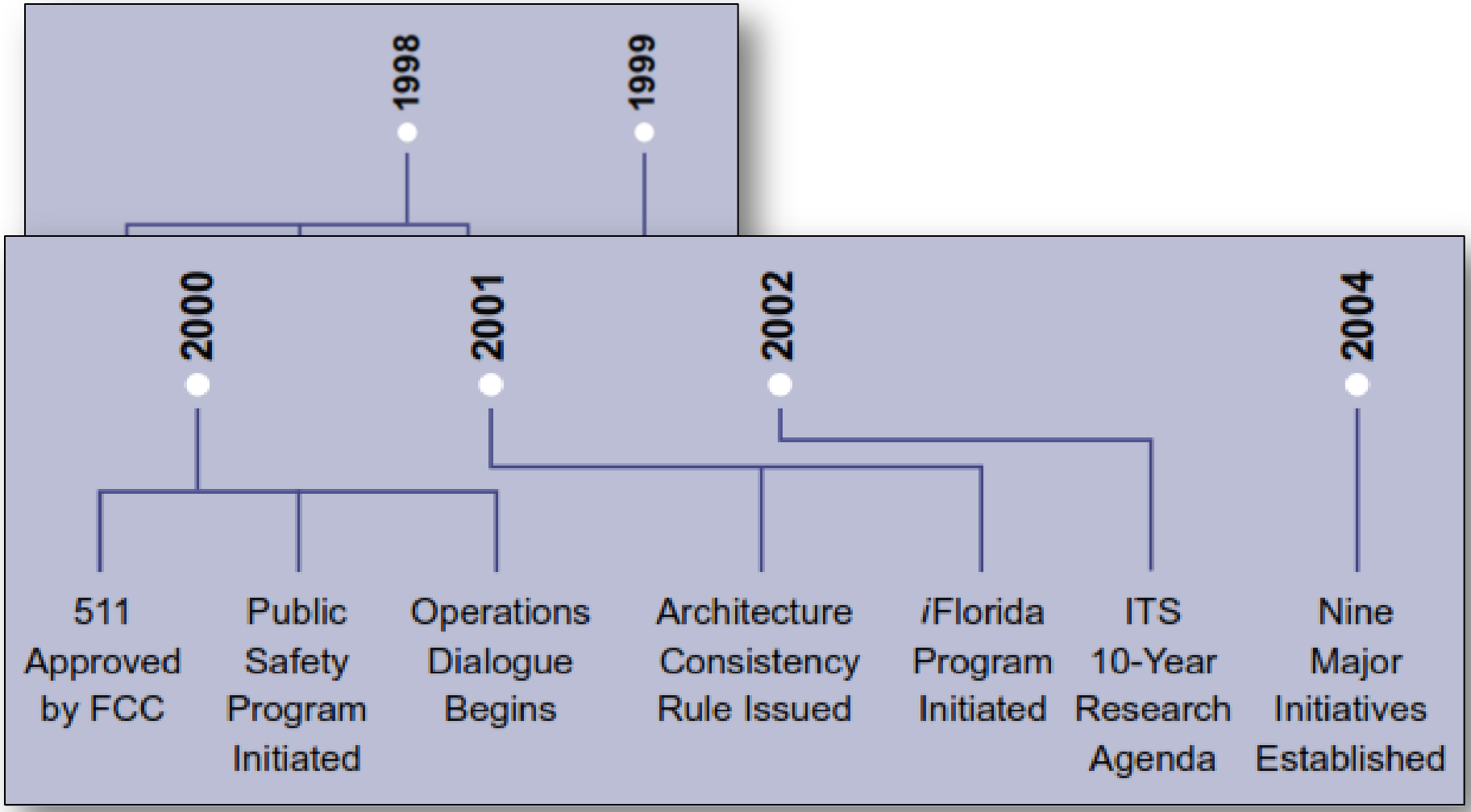
TEA-21 (July 1998 – September 2005) funded two separate activities:

- **ITS Research and Development Program**
  - Reaffirms Department's role in advancing research, development and integrated deployment of ITS
  - Creation and testing of vehicle infrastructure integration systems
  - Address policy and institutional issues uncovered during ISTEA
- **ITS Deployment Program**
  - ITS Integration Program
  - Commercial Vehicle ITS Infrastructure (CVISN) Deployment Program

- **Integrated Deployment**
- **Deployment Earmarks**

20-Year Look Back: TEA-21

- **Other TEA-21 milestones**



Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)
2005

20-Year Look Back: SAFETEA-LU

- Concept of deploying/integrating ITS is portrayed as in the ***mainstream of transportation***
- Congress enacts Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) – ITS Deployment Program **NOT** renewed
- JPO focuses on development of *fewer, high-impact, high-value* projects to showcase benefits of ITS. Connected vehicle emerges as the emphasis.
- ITS Research Program focuses on connected vehicles.
- Modal administrations lead in operations and deployment. ITS is growing part of "mainstream" programs.

- **Connected Vehicle Research**
- **Performance Management**

2012

How have we done with ITS deployment?

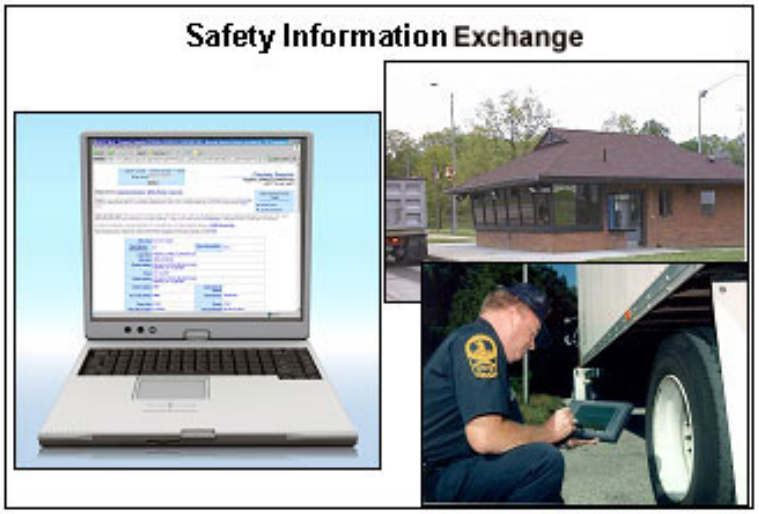
ITS Deployment Then and Now: *Transit Management, Electronic Fare Collection, Commercial Vehicles*

Near-Term (1992-1996)	Mid-Term (1997-2001)	Long-Term (2002-2011)
Productivity Enhancements		
• Productivity management systems for commercial and transit fleets • Electronic toll collection • Electronic transit fee collection • Electronic credential checking	• Electronic record-keeping for vehicle fleet operations • Integrated electronic transit fare, parking, and toll collection • Automated HOV lane use verification	• Transparent borders for commercial vehicles • Fully integrated transportation user-fee collection systems

- **77% of 117 fixed bus route agencies have AVL & real-time arrival data in fleets**
- 16,000+ fixed route buses equipped with smart card readers
- 451 heavy/rapid rail station equipped with smart cards
- **Electronic Toll Collection:**
  - **99% of Toll plazas**
  - **94% Toll lanes**

ITS Deployment Then and Now: *Transit Management, Electronic Fare Collection, Commercial Vehicles*

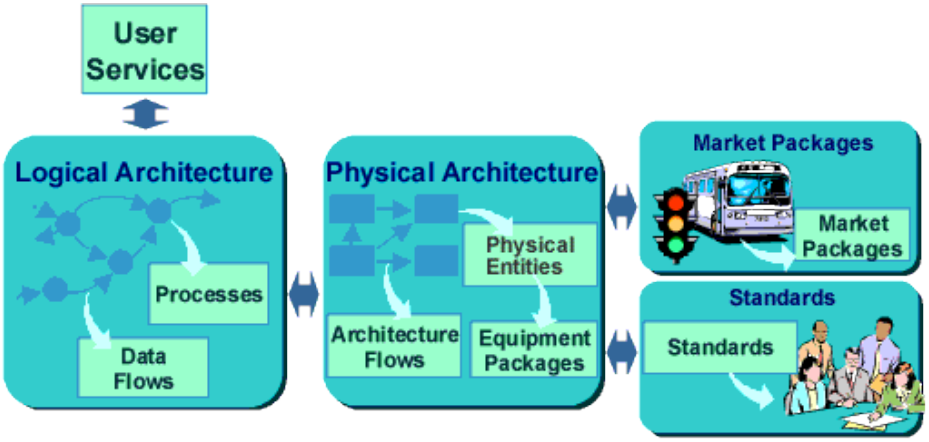
- 50 states & District of Columbia deployed:
  - Safety information exchange
  - Electronic credentialing & screening
- 33 states - Exchanging credential data via CVIEW/SAFER
- 28 States - Core CVISN Deployed
- **40 states have electronic screening systems at over 360 weigh stations with 70,000 participating trucking companies and about 500,000 transponder-equipped trucks**



ITS Deployment Then and Now: *Deployment Support*

- Training – Professional Capacity Building (PCB) will reach **50,000 total participants** this year
  - National architecture
  - Systems Engineering
  - ITS Procurement
  - ITS Standards

- ITS JPO participated in the development of **106 published standards** (since 1995)



ITS Deployment Then and Now: *Freeway and Arterial Management*

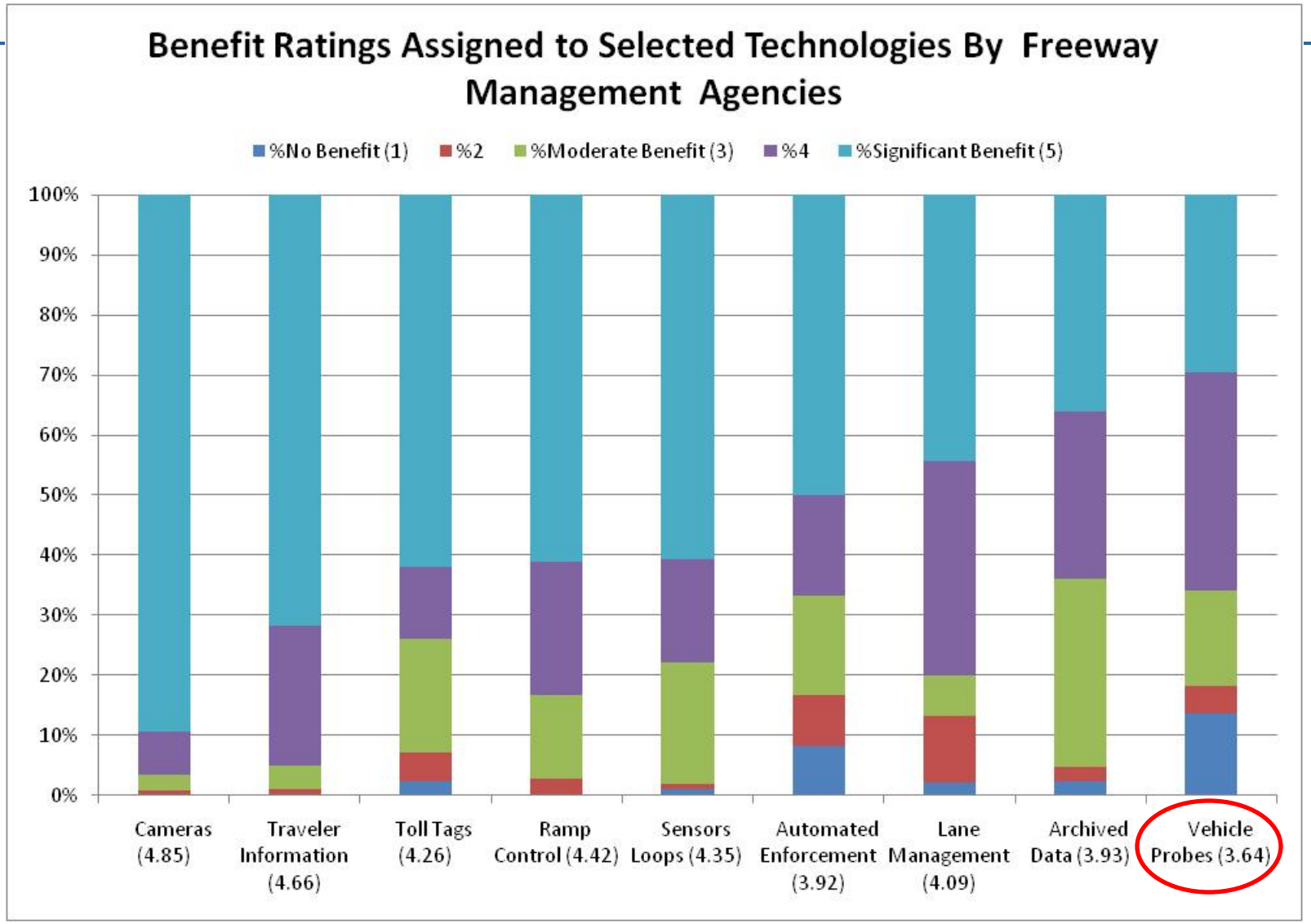
Near-Term (1992-1996)	Mid-Term (1997-2001)	Long-Term (2002-2011)
Transportation Management		
Local area traffic monitoring and control for 15 metro area corridors	Area-wide, real-time, adaptive traffic and transit fleet control for corridors in 50 metro areas and 25 inter-city corridors	Area-wide, full-featured systems to manage intermodal surface transportation nationwide in large urban areas and major rural corridors

- **266 Operational Traffic Management Centers (TMCs)**
- For collection of travel times:
  - 7700 freeway miles under surveillance from roadside infrastructure
  - 4500 miles under surveillance from vehicle probes
  - 54% of all freeways in 75 metro areas are under surveillance

ITS Deployment Then and Now: *Freeway and Arterial Management*

Near-Term (1992-1996)	Mid-Term (1997-2001)	Long-Term (2002-2011)
Transportation Management		
Local area traffic monitoring and control for 15 metro area corridors	Area-wide, real-time, adaptive traffic and transit fleet control for corridors in 50 metro areas and 25 inter-city corridors	Area-wide, full-featured systems to manage intermodal surface transportation nationwide in large urban areas and major rural corridors

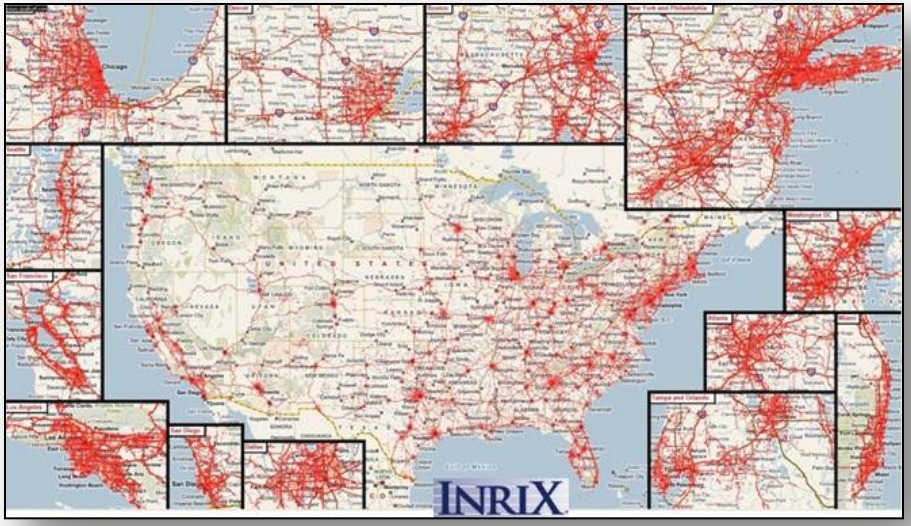
- For collection of travel times:
  - 2464 arterial miles under surveillance from roadside infrastructure
  - 1730 miles under surveillance from vehicle probes
  - 50% of intersections in 75 metro are under electronic surveillance



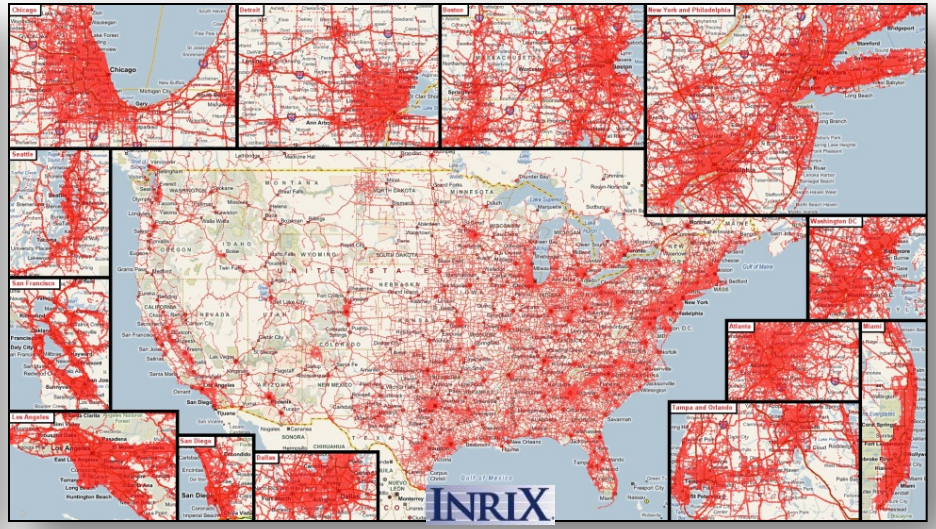
Vehicle Probes

Growth in Vehicle Probe Data

April 2009



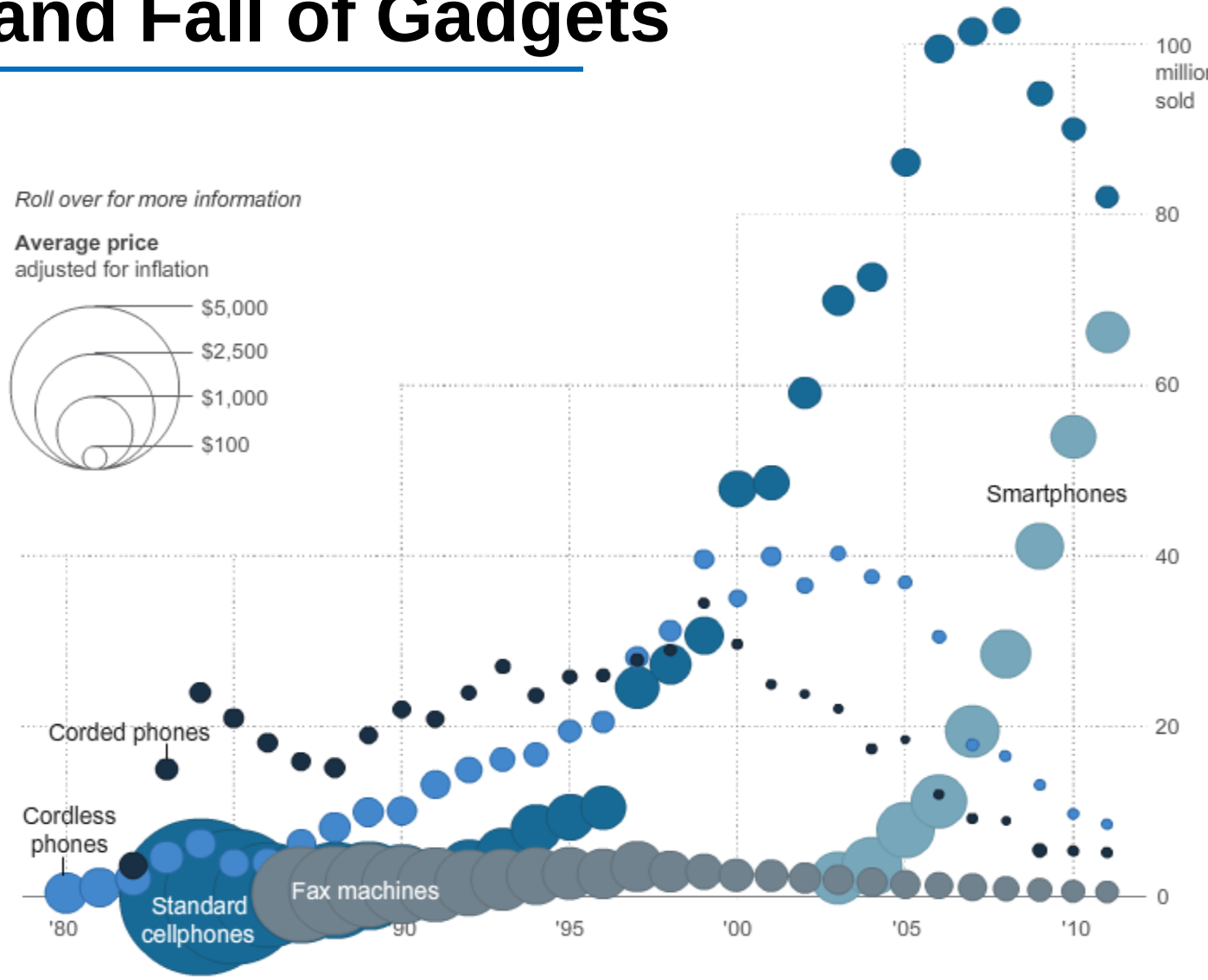
January 2012



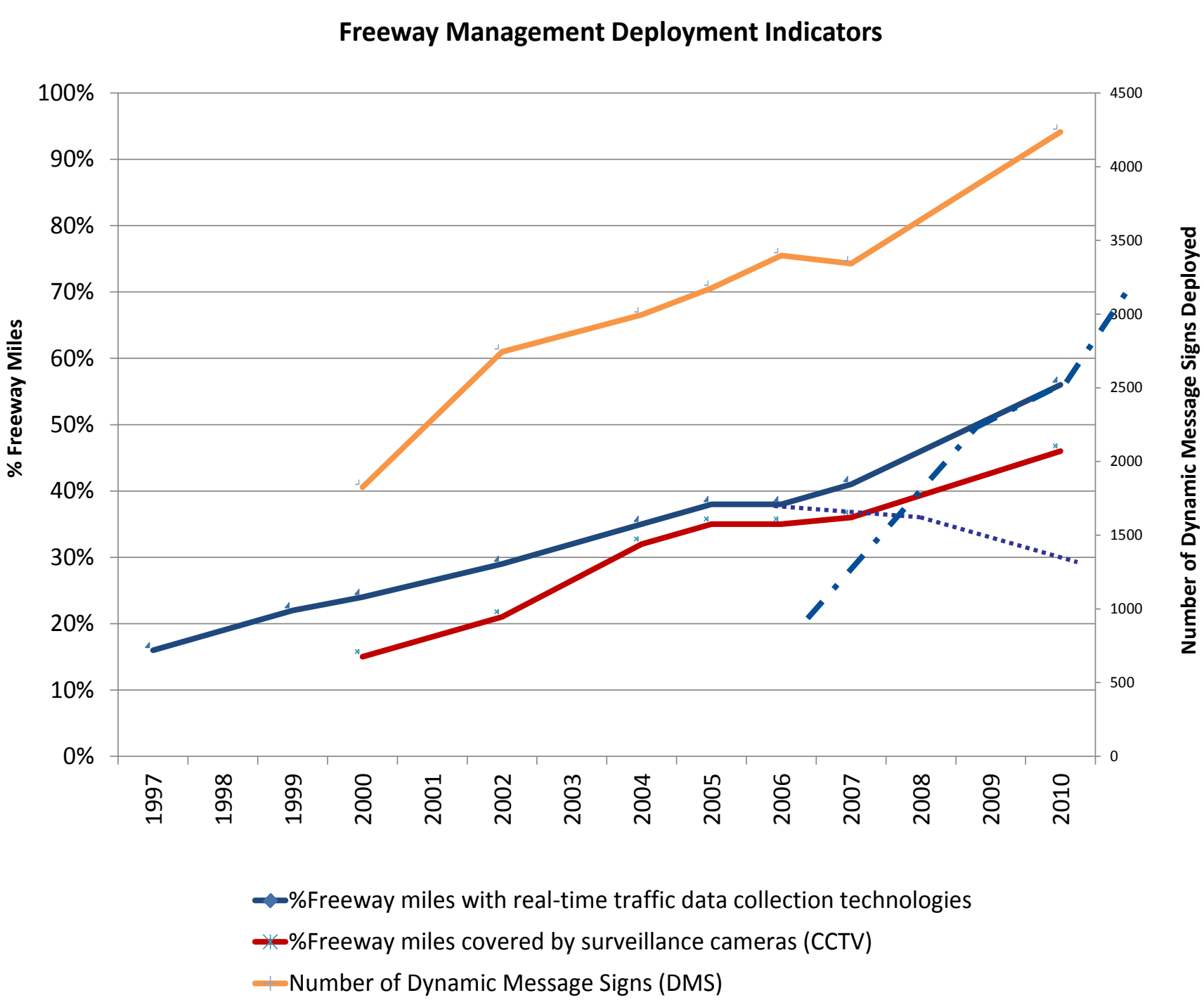
- **15 minute snapshot of incoming GPS data (fleets, cars, phones, apps, etc.) – Source INRIX®**

Courtesy: INRIX

Rise and Fall of Gadgets



NOTE: 2010 data are estimates and 2011 data are projections. GRAPHIC: Alicia Parlapiano / The Washington Post - January 10, 2011

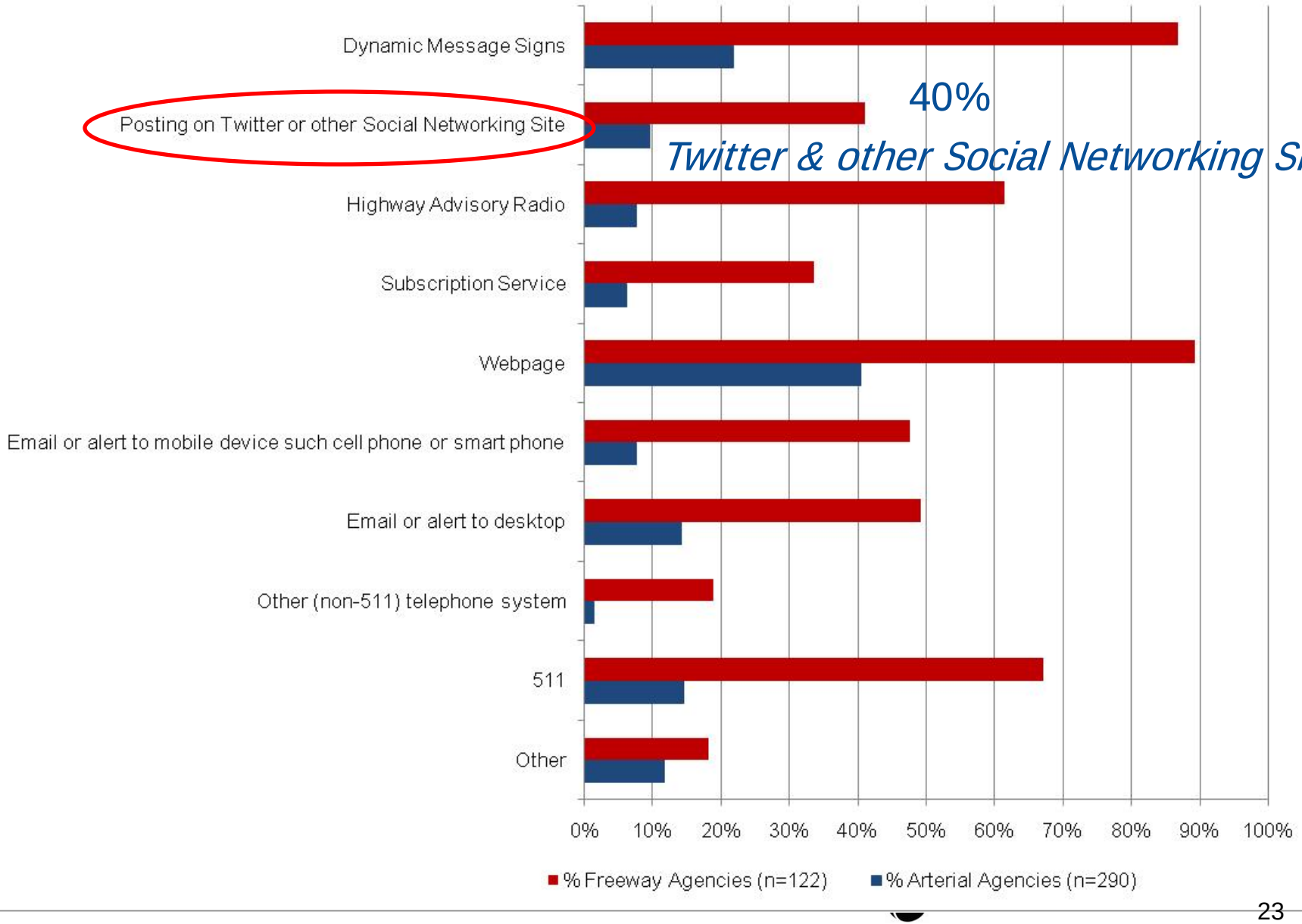

Freeway Management Deployment Indicators
% Freeway Miles
Number of Dynamic Message Signs Deployed
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
%Freeway miles with real-time traffic data collection technologies
%Freeway miles covered by surveillance cameras (CCTV)
Number of Dynamic Message Signs (DMS)

ITS Deployment Then and Now: *Traveler Information*

Near-Term (1992-1996)	Mid-Term (1997-2001)	Long-Term (2002-2011)
Traveler Information Systems		
• Transportation data available at home, work, public kiosks, stations, and through hand-held devices • Static route guidance with business/tourist data in new vehicles and as after-market product	• Real-time transportation system condition information for regional and rural travel and multiple modes of transportation • Route guidance reflecting dynamic traffic conditions • In-vehicle display of road signs	• Multi-modal demand-responsive information systems • Area-wide transportation control integrated with optimal routing

- 511 coverage for all or parts of 38 states covering 70% of US population
- 36 of 40 metro areas and 58 locations use travel time on DMS
- 109 freeway management agencies report posting traveler information on DMS

Methods Used to Distribute Traveler Information By Freeway Management and Arterial Management Agencies



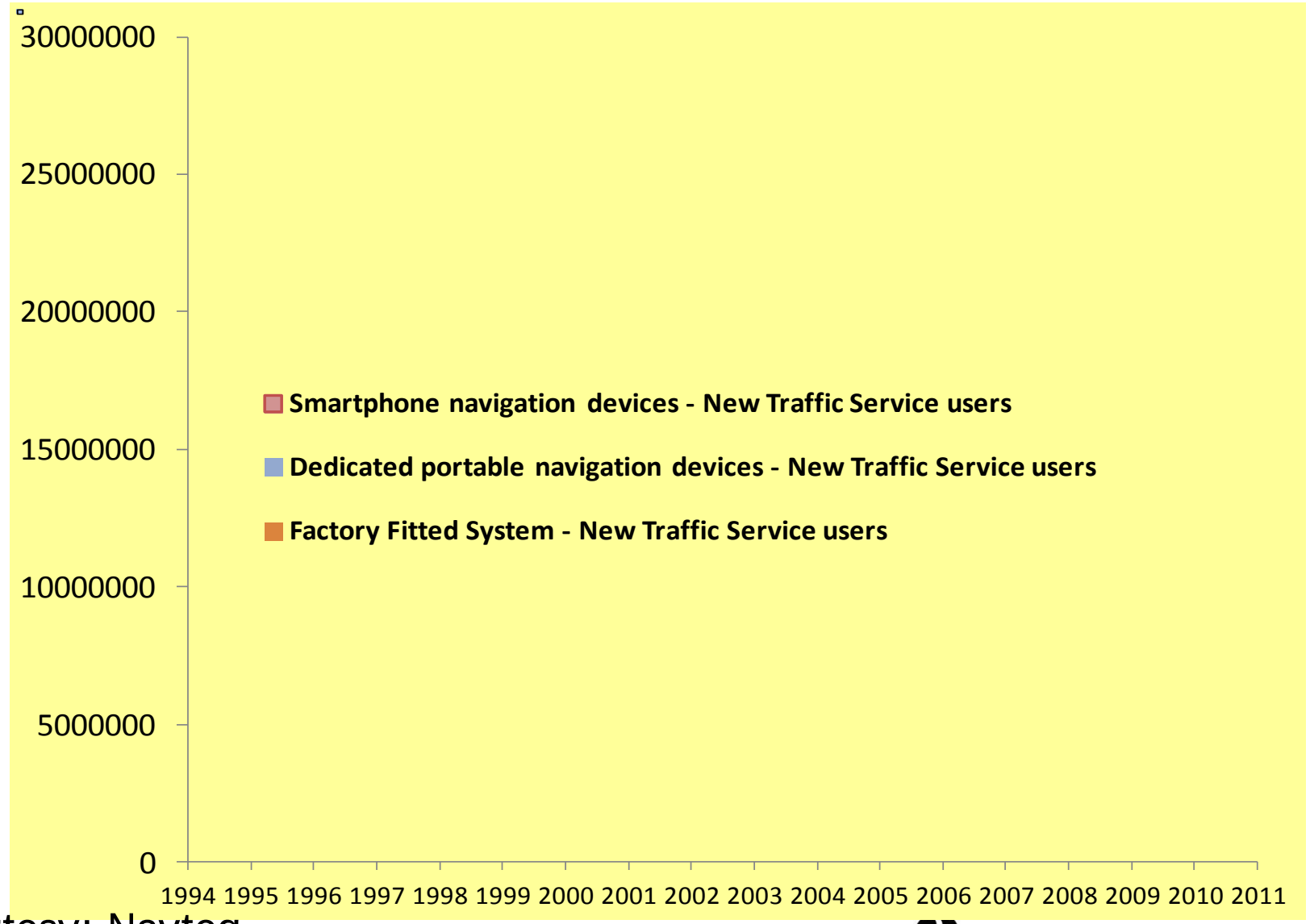
40%

Twitter & other Social Networking Site

ITS Deployment Then and Now: *Traveler Information*

- Sample of companies providing traveler information:
  - INRIX
  - TrafficLand
  - Speed Info
  - Navteq

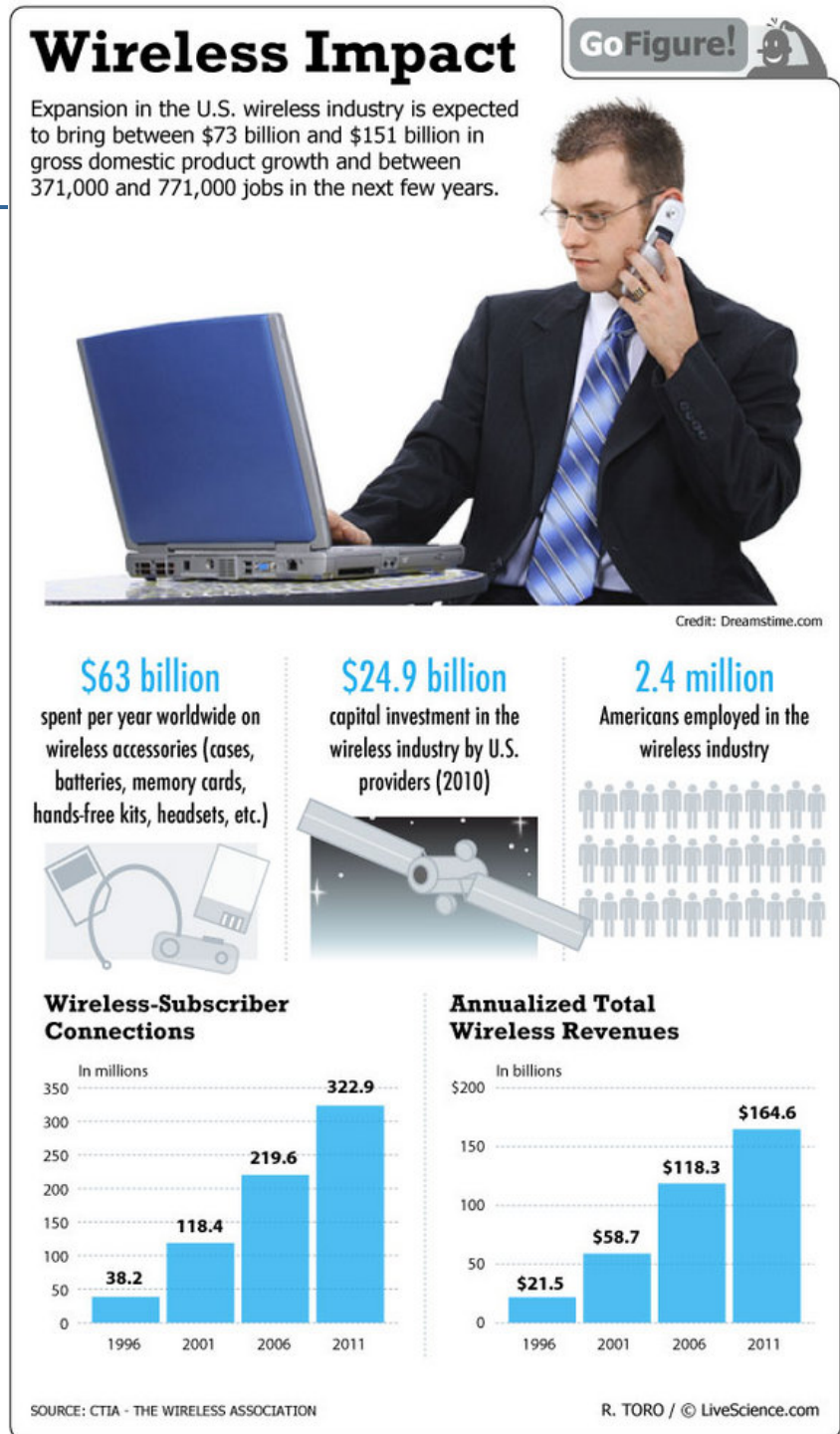
US New Traffic Subscribers 1996 to 2011



Courtesy: Navteq

2012:
In fact, the connected car ” **is the third-fastest growing technological device, following smartphones and tablets**,” said Intel in a statement Wednesday.

– CEO Outlook

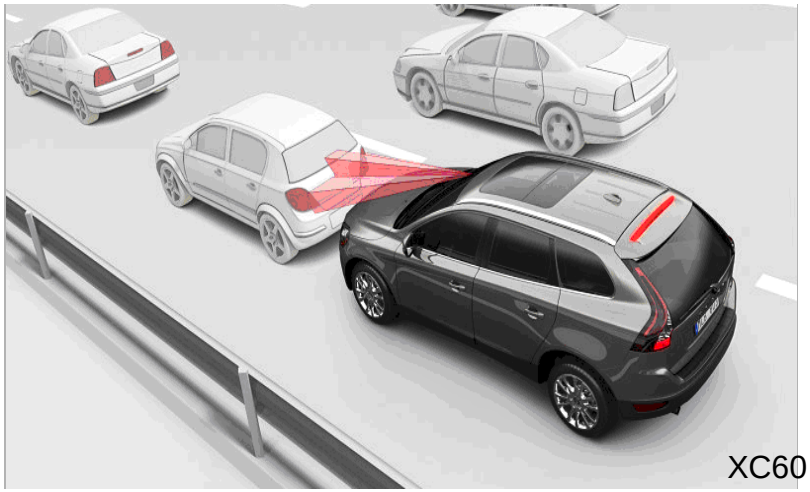


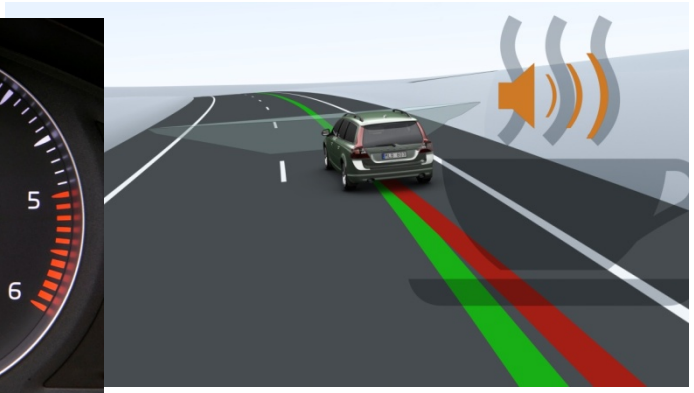
ITS Deployment Then and Now: *Vehicle Safety Systems*

Near-Term (1992-1996)	Mid-Term (1997-2001)	Long-Term (2002-2011)
Safety and Driver Assistance		
• Roadway and environment safety systems • Near-obstacle warning • Simple vehicle performance monitoring • Adaptive cruise control	• Automated highway demonstration • Semi-automated Mayday capability • Passenger security systems • Vehicle monitoring systems • Collision warning • Automated collision avoidance	• Automated vehicle operation on specially equipped roadways • Fully automated Mayday systems with coordinated dispatching • Intersection hazard warnings

Crashes Avoidance Has Arrived

- Functions
  - Electronic Stability Control
  - Adaptive Cruise Control
  - Forward collision warning/avoidance
  - Lane departure warning / avoidance
  - Blind spot warning / avoidance
  - Pedestrian warning / avoidance
  - Driver Alert (fatigue)
  - Night Vision
  - Speed Sign Recognition





Courtesy: Bishop Consulting

Today's Intelligent Vehicles - What's Available in a $20,000 Car?

- Adaptive cruise control
- Forward Collision Mitigation
- Blind spot information system
- Traffic sign recognition
- Lane keeping aid
- Driver alert

2012 Ford Focus

Courtesy: Bishop Consulting

Connected Vehicle Program

NHTSA Agency Decision - 2013

- Evaluation includes several factors:
  - **Technical functionality**
    - Vehicle-based technology
    - Security network and back end functions
  - **Effectiveness of applications –** Safety Pilot
  - **Cost Effective**
  - **Supportable operationally**
    - Well managed
    - Sustainable financially

Safety Pilot Sites

- **Driver clinics**
  - Assess user acceptance

Six Driver Clinic Sites

- **Large-scale model deployment**
  - Obtain empirical safety data for estimating safety benefits

One Model Deployment Site

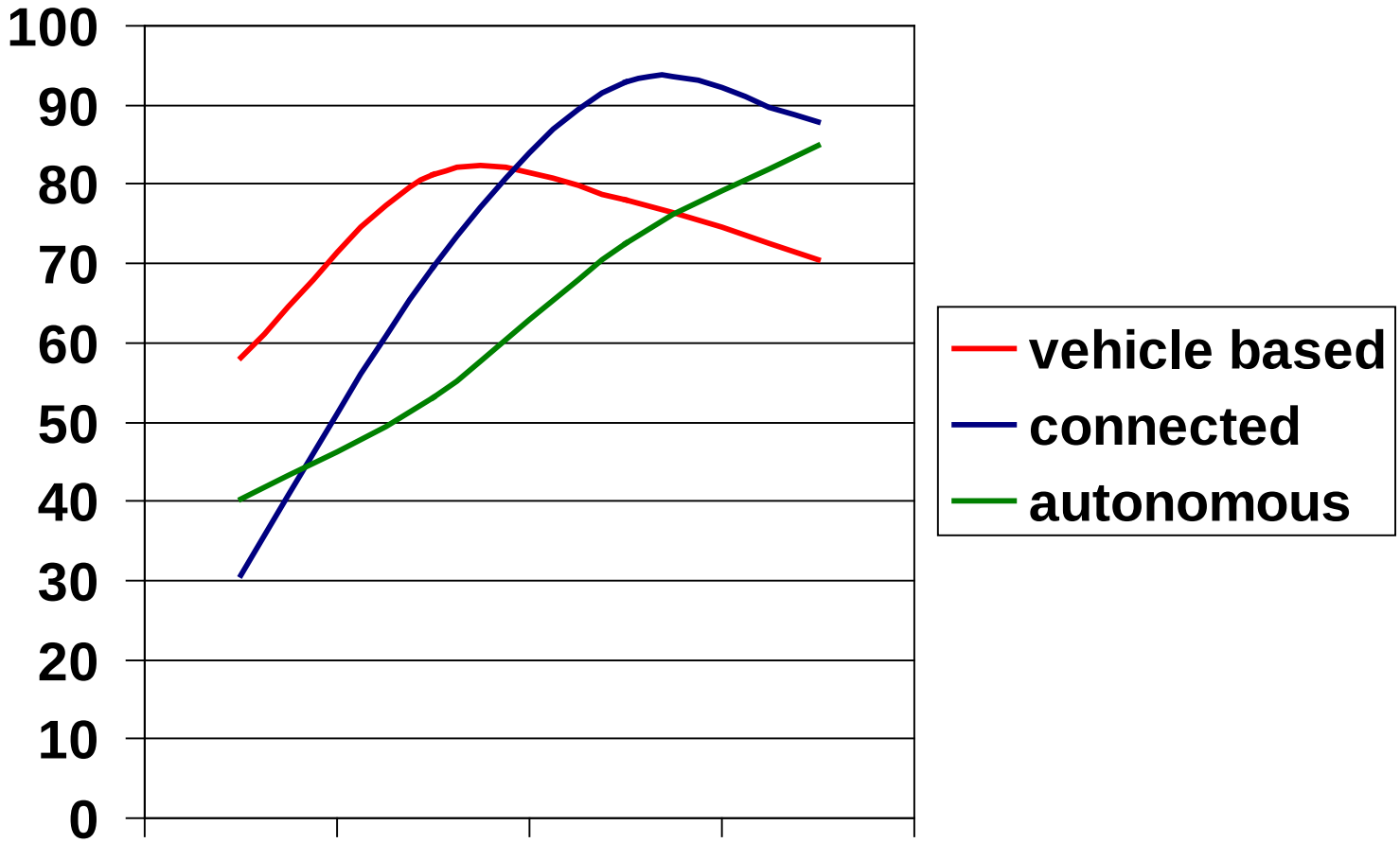
Critical Questions

- **Which communications media can support the needs for distributing security certificates? Choices include:**
  - Existing Cellular Networks
  - Dedicated Short Range Communications (DSRC)
  - WiFi
  - No infrastructure option
- **All security network options require financing for operational support**
  - **All public –** politically feasible?
  - **Public/private partnership –** what type of framework?
  - **All private –** where's the value?

Autonomous Vehicle Activities

- DARPA – Grand Challenge & Urban Challenge
- Google – 160,000 miles of autonomous operation
- SARTRE: Safe Road Trains for the Environment
  - European project
  - Autonomous driving, platooning
  - Lead vehicle in platoon human-driven
- Temporary Auto-Pilot
  - Volkswagen driving semi-automatically at 130 kmph
  - Within European HAVE-IT project
- VisLab Intercontinental Autonomous Challenge
- Truck Automation

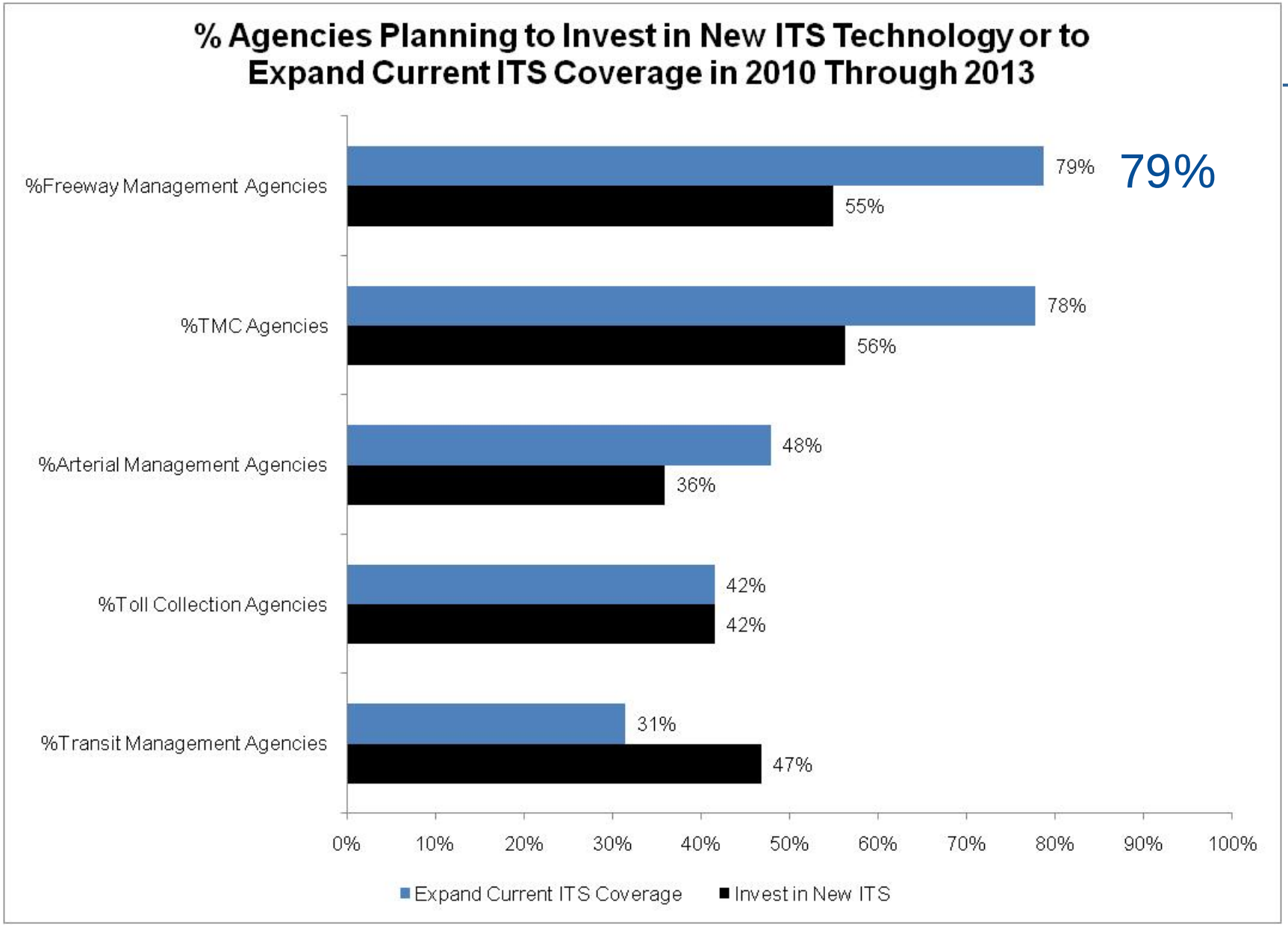
Future Technology Evolution



20-Year Self-Assessment

What happened in 20 years?

- **Steady progress in advancing ITS technologies:**
  - **$18 billion in ITS deployment by top 75 metro areas**
  - $3 billion in federal ITS funds
  - Deployment happened where local and regional governments had priorities
  - Investment happened where cost and perceived value made a case for deployment
  - Fostering a partnership with private sector
  - **$48 billion U.S. ITS end-use products and services market** – *ITS America*


% Agencies Planning to Invest in New ITS Technology or to Expand Current ITS Coverage in 2010 Through 2013
%Freeway Management Agencies
79%
55%
%TMC Agencies
78%
56%
%Arterial Management Agencies
48%
36%
%Toll Collection Agencies
42%
42%
%Transit Management Agencies
31%
47%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Expand Current ITS Coverage
Invest in New ITS

79%

38

20-Year Self-Assessment

What happened in 20 years?

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  - Investment happened where cost and perceived value made a case for deployment
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20-Year Look Back: Closing Thoughts

- ITS is not the Interstate System model
- ITS is model of state and local government choice
- ITS is a public and private sector success story

The ITS deployment glass is more than half full