

*The National Workshop on
New Research Directions for High Confidence Transportation CPS
: Automotive, Aviation, and Rail
Vienna, Virginia*

*Advanced Research
for Integrated Active Transportation System
- In Revised Role, Vision, & Approach -*

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Advanced Research for IATS

- Overview -

- **Future Program with A Strategic Vision**
 - Transportation Problems, Means, and Performance
 - Revised Role and Vision

- **A New Transportation System Concept, IATS**
 - Fatality Causes (all safety modes) by Transportation Components
 - Approach to Transportation Components by Technologies
 - Real Time Response for A New Transportation System
 - Needed Technologies for Real Time Response: Advanced Research

- **A Strategic Action Plan: IATS Roadmap with ITS**
 - Four Phase Plan Development and Implementation

- **Expand the Concept to All Transportation Issues**
 - Safety, Mobility, Energy, Environment, and Productivity

A. Future Program with A Strategic Vision

- Strategic Approach -

Current Transportation Problems

- Safety
- Congestion
- Energy
- Environment
- Productivity

System Performance

The Washington Post
THURSDAY, DECEMBER 16, 1999

Bad Traffic Grows Worse, Study Says

By ALAN SEPERS
Washington Post Staff Writer

Severe congestion has spread to vast stretches of Washington area highway where only three years ago traffic moved freely, dead-end-by-end, commuters on roads such as I-66, I-270 and the Capital Beltway, according to a regional study released yesterday.

The analysis by the Metropolitan Washington Council of Governments, based on extensive aerial photography, represents the grim considerably worse. Since COG's last study in 1996, daily backups have developed on dozens more miles of highway, aggravating traffic that was already ranked the second-worst in the country behind the Los Angeles area.

The swelling congestion on the Beltway is perhaps the most dramatic illustration. Morning commuters had previously encountered severe backups on the Maryland portion of the outer loop between Interstate 49 and Georgia Avenue. But now that temperatures have gotten quite a bit warmer over quite a short period of time," said Ronald F. Kirby, COG's director of transportation planning. "It was bad only up there in Maryland. Now it's getting bad as Virginia."

The finding that the region's congestion is now spreading like an epidemic comes only weeks before the Virginia and Maryland legislatures are expected to tackle proposals for raising billions of dollars to expand roads and transit.

The COG analysis offers a lesson, because it shows

Morning Congestion has spread on the Capital Beltway:
Highway at capacity (green) Highway over capacity, with severe congestion (red)

1996 **1999**

Familiar sight: Traffic slows to a crawl during the morning rush hour on the Beltway's Inner Loop near Providence Road. A recent study says congestion on I-495 is worsening.

Slow going getting slower

Beltway: We're stuck on commuting by car. As a result, we're spending more time stuck in traffic on Interstate 495.

One in a series of occasional articles
By **LE ATWOOD**
new staff

Cautious congestion ahead. State officials are trying everything to ease traffic on the Baltimore Beltway.

tearing up a bridge to make way for another widening, pinpointing rush-hour snags by satellite and adding emergency vehicles to help at roadblock hotspots.

Despite those efforts and millions of dollars spent, traffic on the 50-mile loop is getting worse. "We can expect the congestion to grow over time," says Parker Williams, administrator of the State Highway Administration.

More than 500,000 vehicles a day join the roadway that was originally built to handle 80,000. A Baltimore-area resident spends an average of 47 hours a year stuck in traffic, much of it on Interstate 495, the heart of the area's transportation network. That's twice as much as 10 years ago, according to a study recently released by the Texas Transportation Institute.

Persuading drivers to use car pools and mass transit is critical to alleviating the congestion, Williams says. Mass transit is used for only 4 percent of the 14 million commuter trips made daily in Maryland.

For most, driving to work is a way of life.

"I just got into the habit of driving," says R.D. Randall, as he passes the Metro station on Old Court Road on the way from [See *Beltway*, Z4]

Source: ITS: Now and the Future

A. Future Program with A Strategic Vision

- Strategic Approach -

Future

Transportation Problems

- New Energy Sources for Vehicles
- New Technologies
- More Vehicles
- More Complicated Human Factors
- New Transportation Concept, etc.

Future System Performance

A. Future Program with A Strategic Vision

- Implementing **The 4E's** -

- **E**ducation & **E**nforcement

- Non-users of safety belts
- Impaired / drunk drivers
- Teens and young adults
- Commercial vehicle / other trucks
- Non-users of motorcycle helmets



- **E**ngineering & **O**perations

- Run-Off-Road, Speed-Related, Intersection, and Pedestrian/Bike Crashes
- Design for special populations (Older Drivers, etc)



- **E**mergency Services

- “First Responders” to Crashes

A. Future Program with A Strategic Vision

- 2005 FARS DATA -

| Fatality Data | Nationally |
|--------------------------------------|-------------------|
| Fatalities | 43,443 |
| Fatal Rate (per 100M VMT) | 1.47 |
| Crash Costs | \$230.6 B |
| Cost/Population | \$819 |
| SVROR Fatal Crashes | 59% |
| Intersection Fatal Crashes | 21% |
| Speed Related Fatal Crashes | 30% |
| Alcohol Related Fatal Crashes | 39% |

A. Future Program with A Strategic Vision

- Revised Role and Vision -

- Means to reach the Vision of *all drivers, all vehicles, all roads, all times in real time*
- Longer Time Frame
- Greater Integration of **All Goal Areas**
- Greater Integration of **All System Components** (driver-vehicle-road-environment)
- Significant use of **new** (some to be invented) **sciences, technologies, and communications**

B. A New Concept of Transportation System, IATS

- All Safety Modes by Transportation Components -

– Connected vehicle

- Vehicle to vehicles within safety zones
- Vehicle to infrastructure
- Communicate appropriately with driver

– Real time information

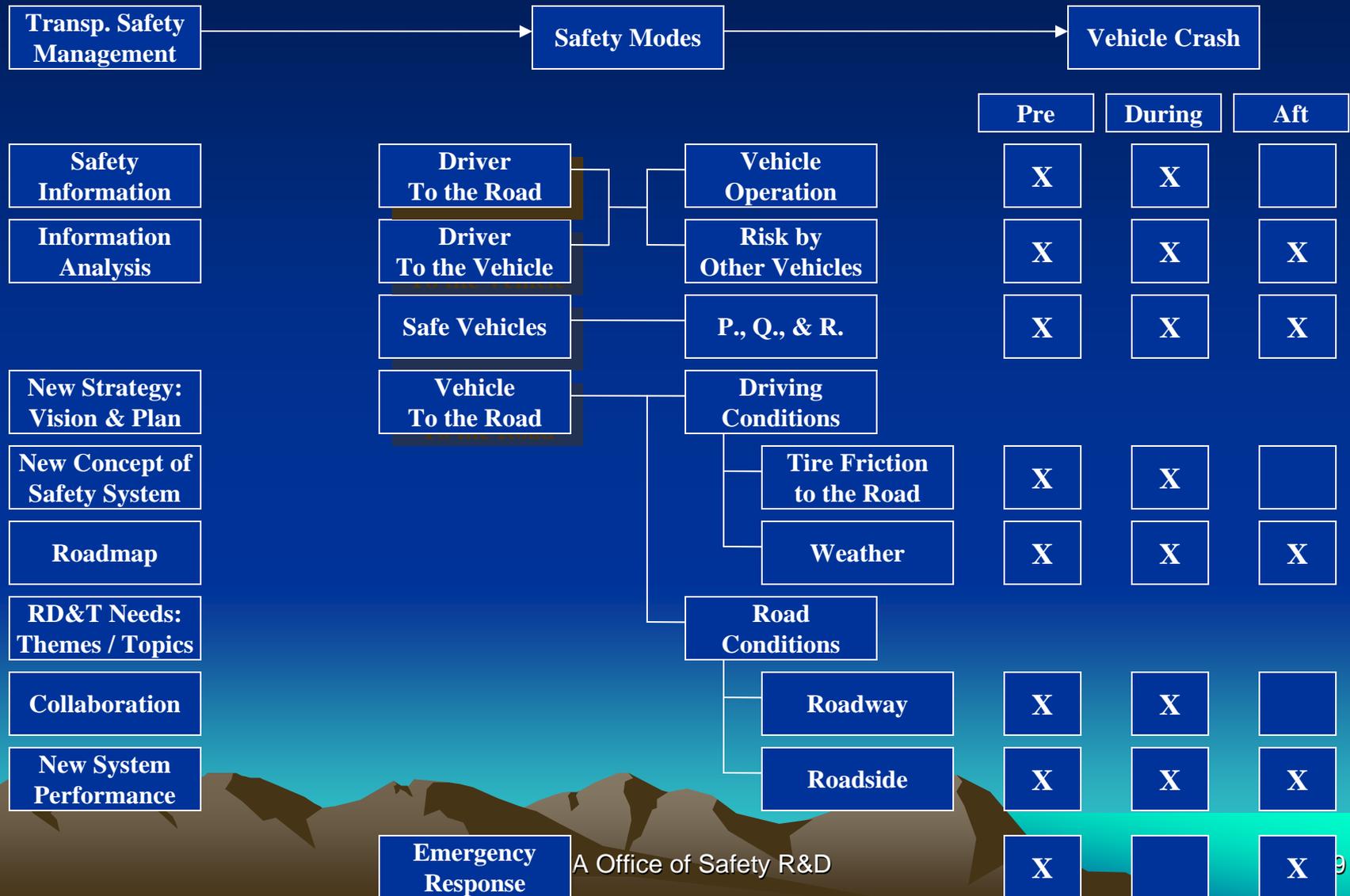
- All roads
- All modes
- All the time



Source: ITS: Now and the Future

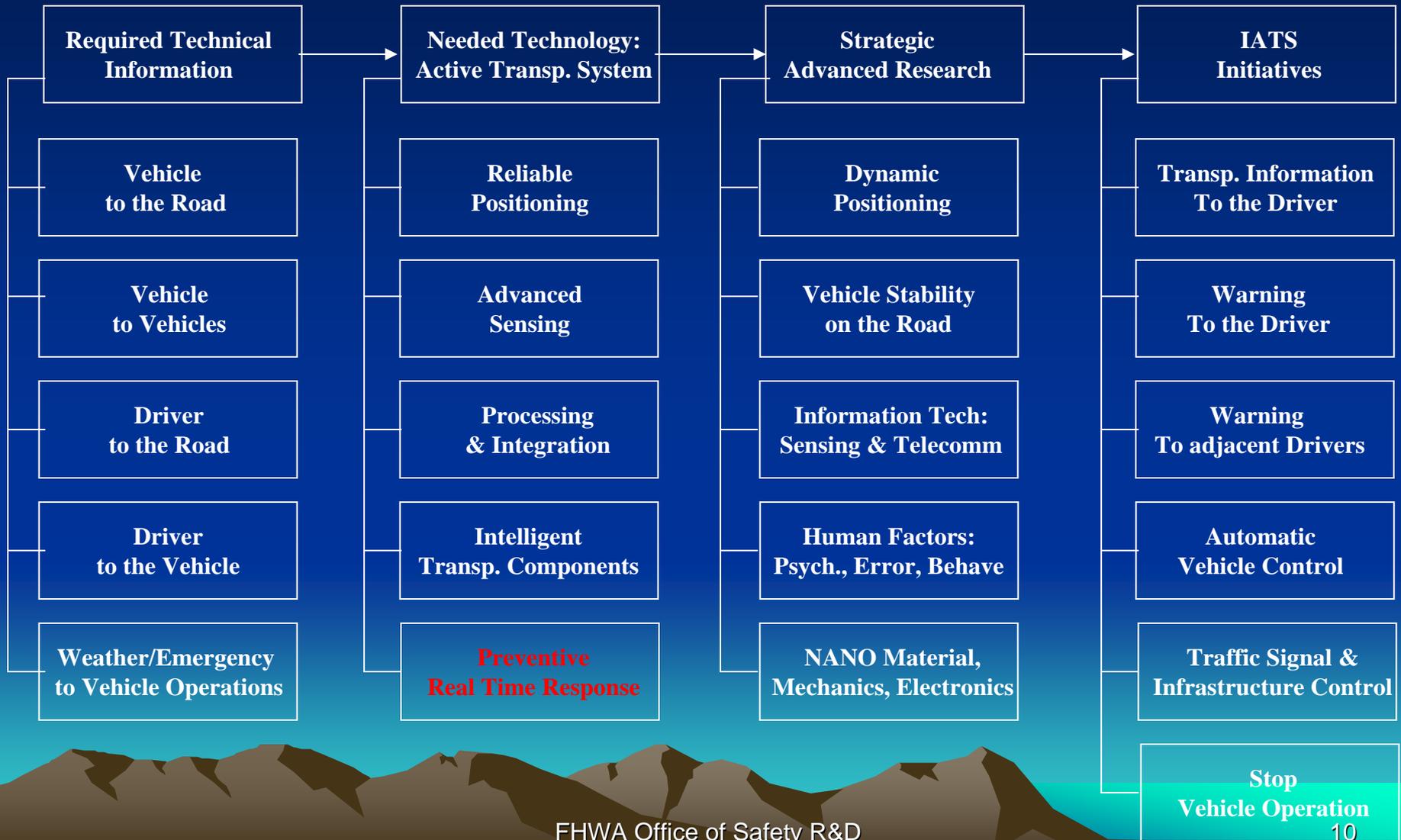
B. A New Concept of Transportation System, IATS

- All Safety Modes by Transportation Components -



B. A New Concept of Transportation System, IATS

- Approach to Transportation Components by Technologies -



B. A New Concept of Transportation System, IATS

- Real Time Response by A New Transportation System -

Over 360 Fatality Causes will be reduced systematically through Four Strategic Safety Research Themes with considerations of three major safety components, Driver, Vehicle, and Infrastructure

The IATS Concept

1. Consider: All Transportation Components

All Safety Modes

2. Predict: Active Safety System

3. Prevent: Real Time Response

Advanced Research & Tech

1. Intelligent Infrastructure

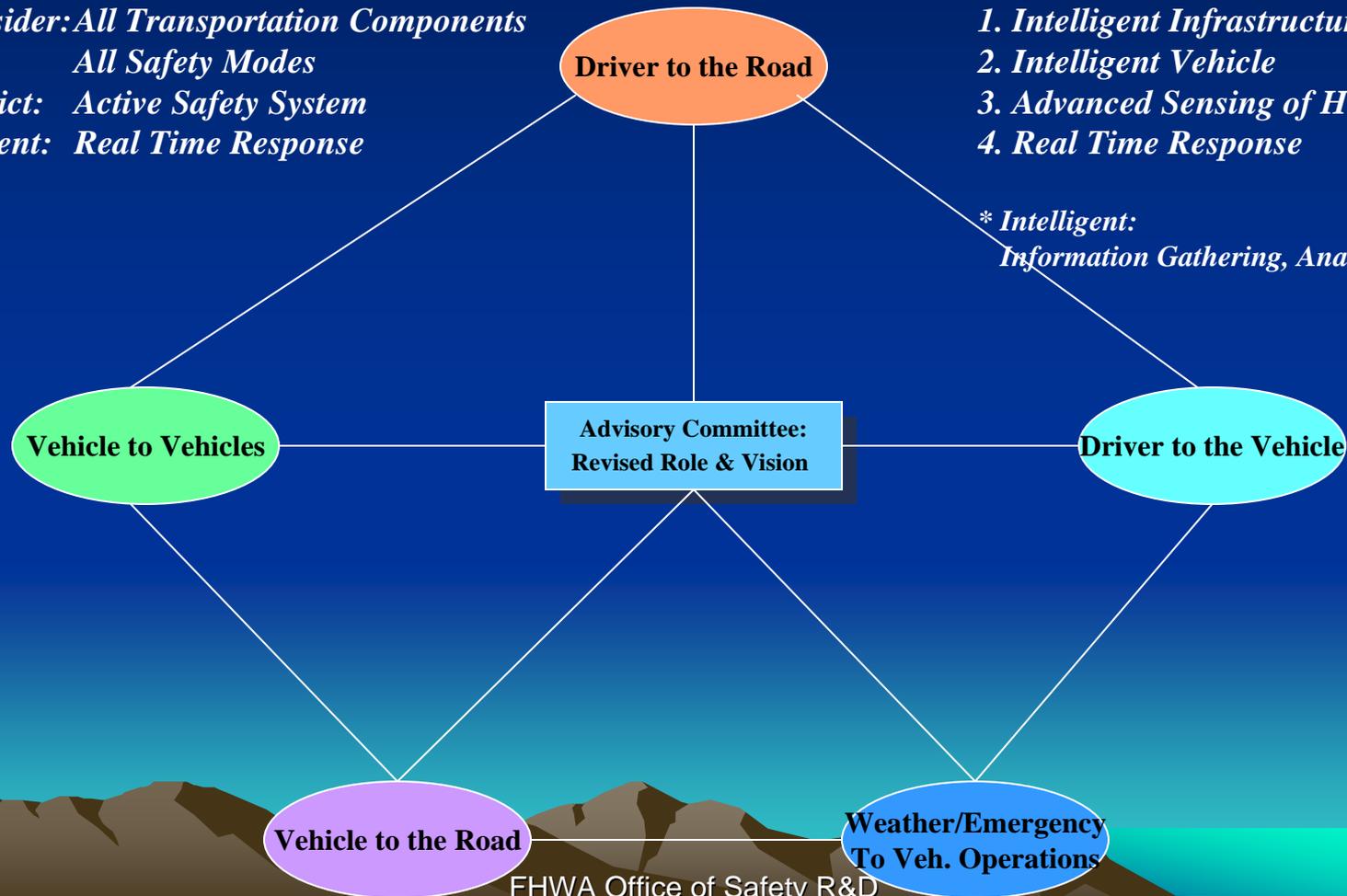
2. Intelligent Vehicle

3. Advanced Sensing of Human Factors

4. Real Time Response

** Intelligent:*

Information Gathering, Analysis, Decision



B. A New Concept of Transportation System, IATS

- Needed Technologies for Real Time Response -

- **Strategic Advanced Research**
 - Positioning accuracy and reliability
 - Five types of Sensing and advanced Processing
 - Information Integration of all system components
 - Information Management
 - Artificial Intelligence for real time response
- **Future Research**
 - NANO concept development along with sciences
 - Wireless Telecommunication System
- **Basic Science Research**
 - Scientific base for Physical and or Chemical Phenomena

C. A Strategic Action Plan

- IATS Roadmap with ITS -

1. The Concept of Integrated Active Transportation System

Entire Safety Components

Preventive Safety Actions

Real Time Response

2. Current ITS Applications extended to IATS

Vision, Concept, Strategy, Objectives,

Adv Research, Technology, Process, and Deployment

3. IATS Roadmap with considerations of ITS Applications

IATS vs. ITS

1. ITS Initiatives deploy Technologies, while IATS Initiatives create Technologies.

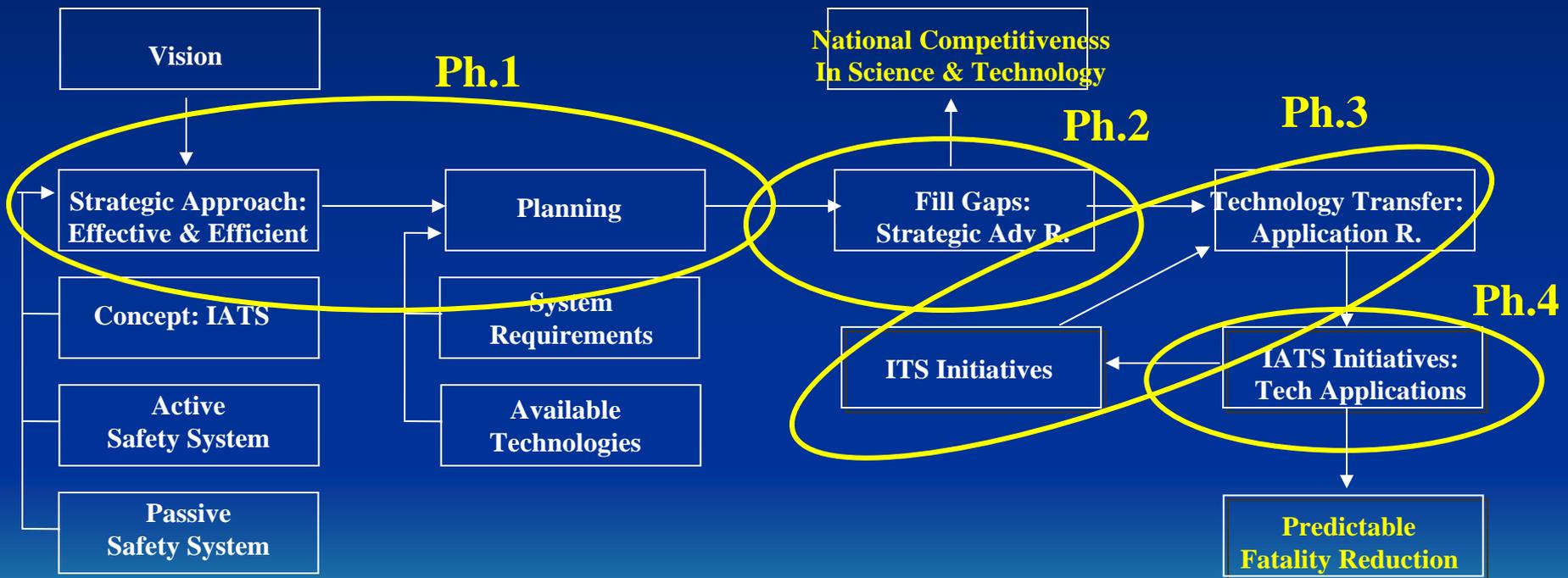
2. Scope of IATS initiatives requires full buy-in and processes for the program:

Vision, Strategy, Information, Technologies, Objectives, R&D, and Deployment

C. A Strategic Action Plan

- Four Phase Development for Vision and Objectives -

1. *Predictable* Fatality Reductions
2. By-Product of National Competitiveness in Science & Technology



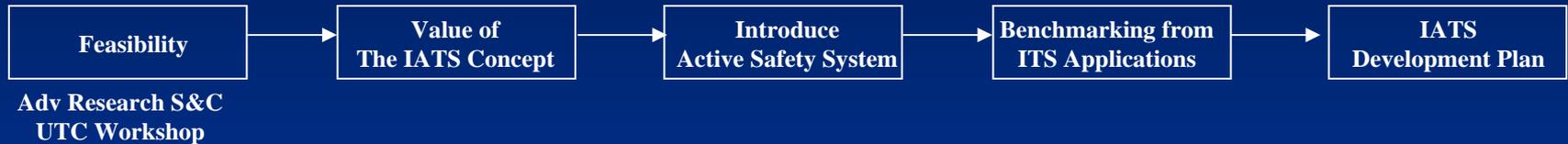
Other Mobility, Environment, Energy & Revenue Goals



C. A Strategic Action Plan

- Four Phase Plan Implementation -

Ph.1. Strategy and Planning: 2009-2012



Ph. 2. Advanced Research: 2009 - 2019



Ph. 3. Technology Transfer (Application Research): 2016 - 2021



Ph.4. Technology Deployment: 2019 - 2024



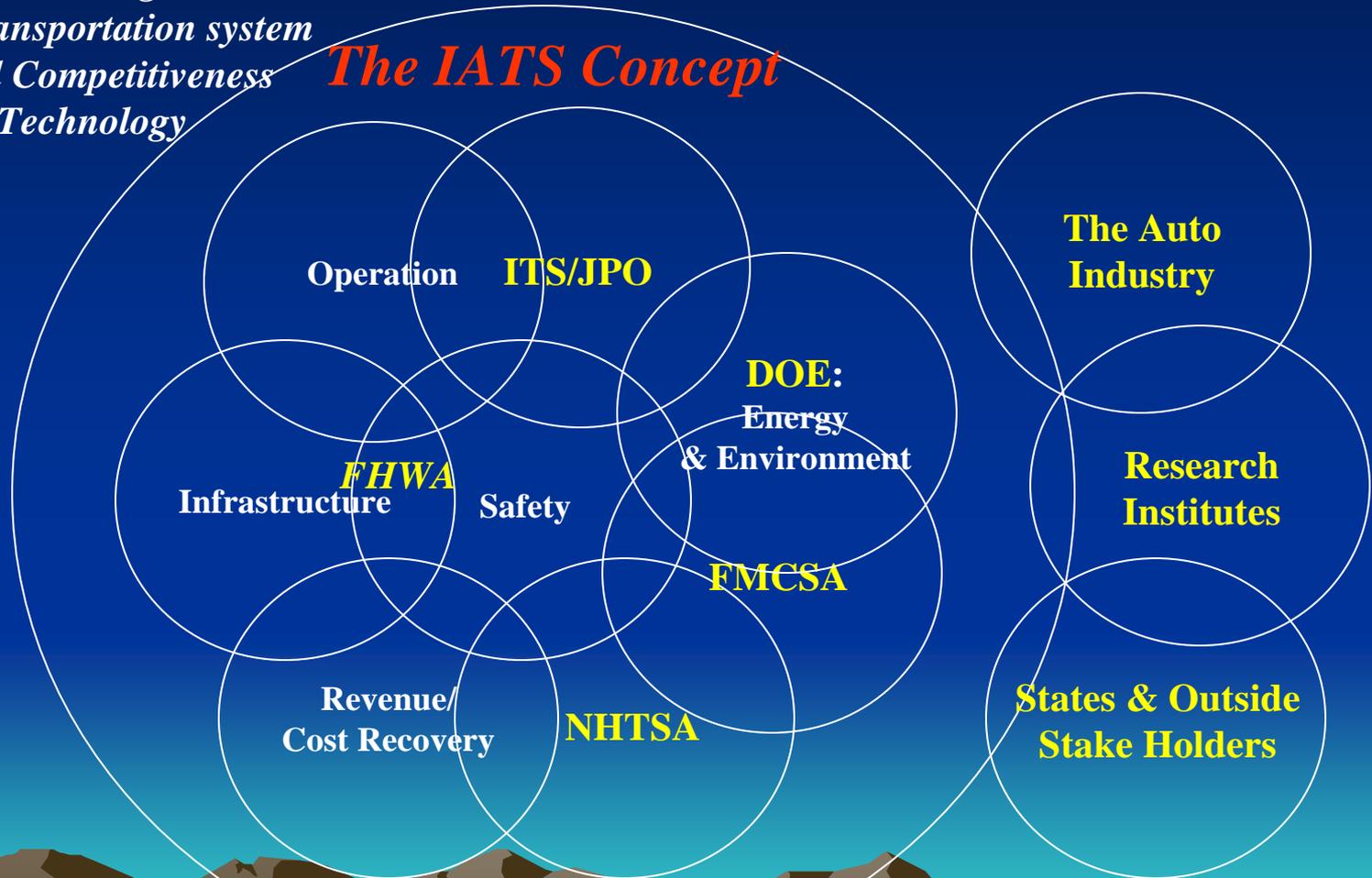
Revise dates as
Discussed in Nov.

D. Expand the Concept to All Transportation Issues

- Safety, Mobility, Energy, Environment, and Productivity -

1. *By means of technologies*
2. *For a new transportation system*
3. *For National Competitiveness in Science & Technology*

The IATS Concept



Meeting The Challenge, Together!