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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November 18, 2008

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

Morning Congestion has spread on the Capital Beltway:

Slow going getting slower

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** -

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

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

- **Emergency 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 -

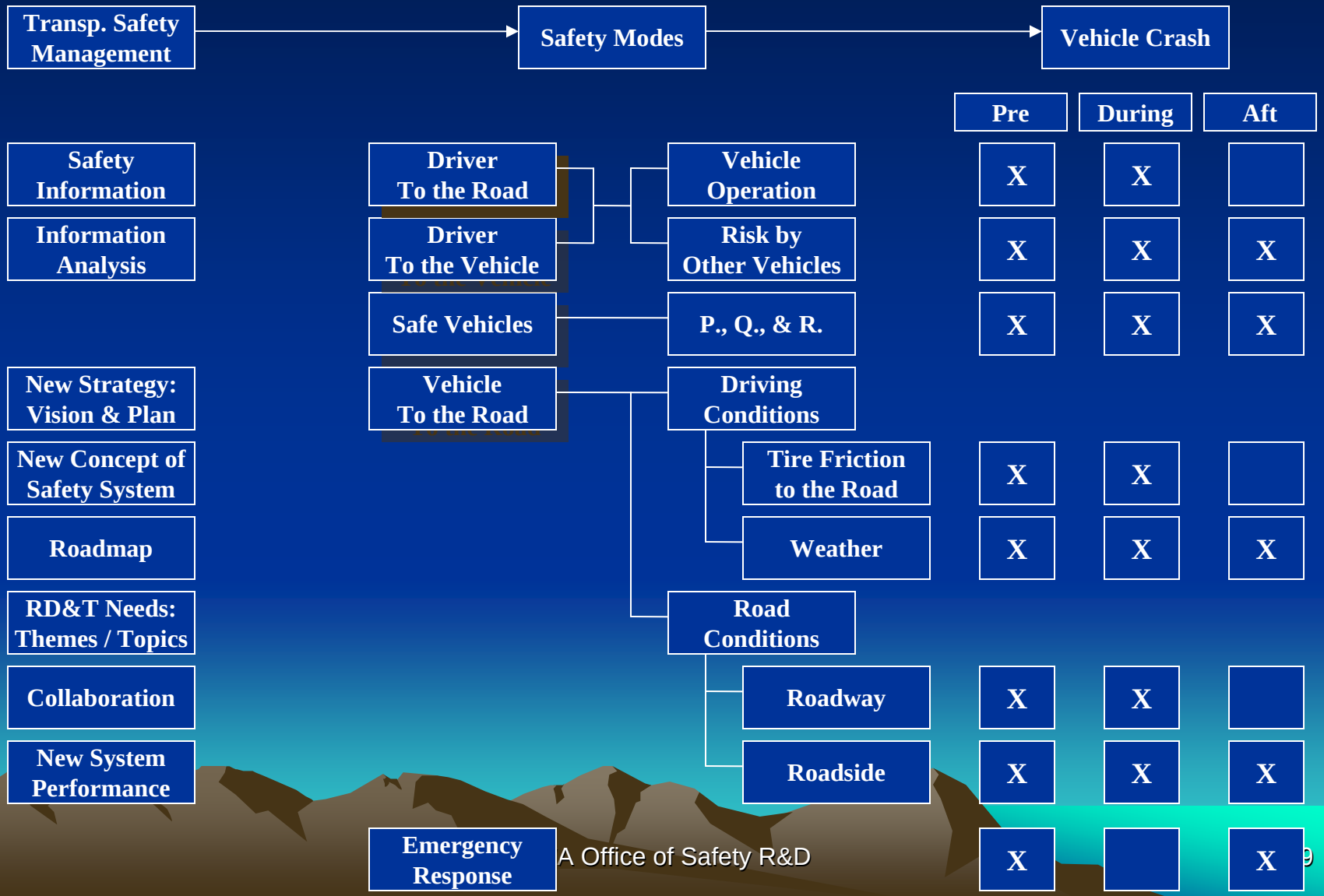
– **Connected vehicle**
  - Vehicle to vehicles within safety zones
  - Vehicle to infrastructure
  - Communicate appropriately with driver

– **Real time information**
  - All roads
  - All modes
  - All the time

Source: ITS: Now and the Future

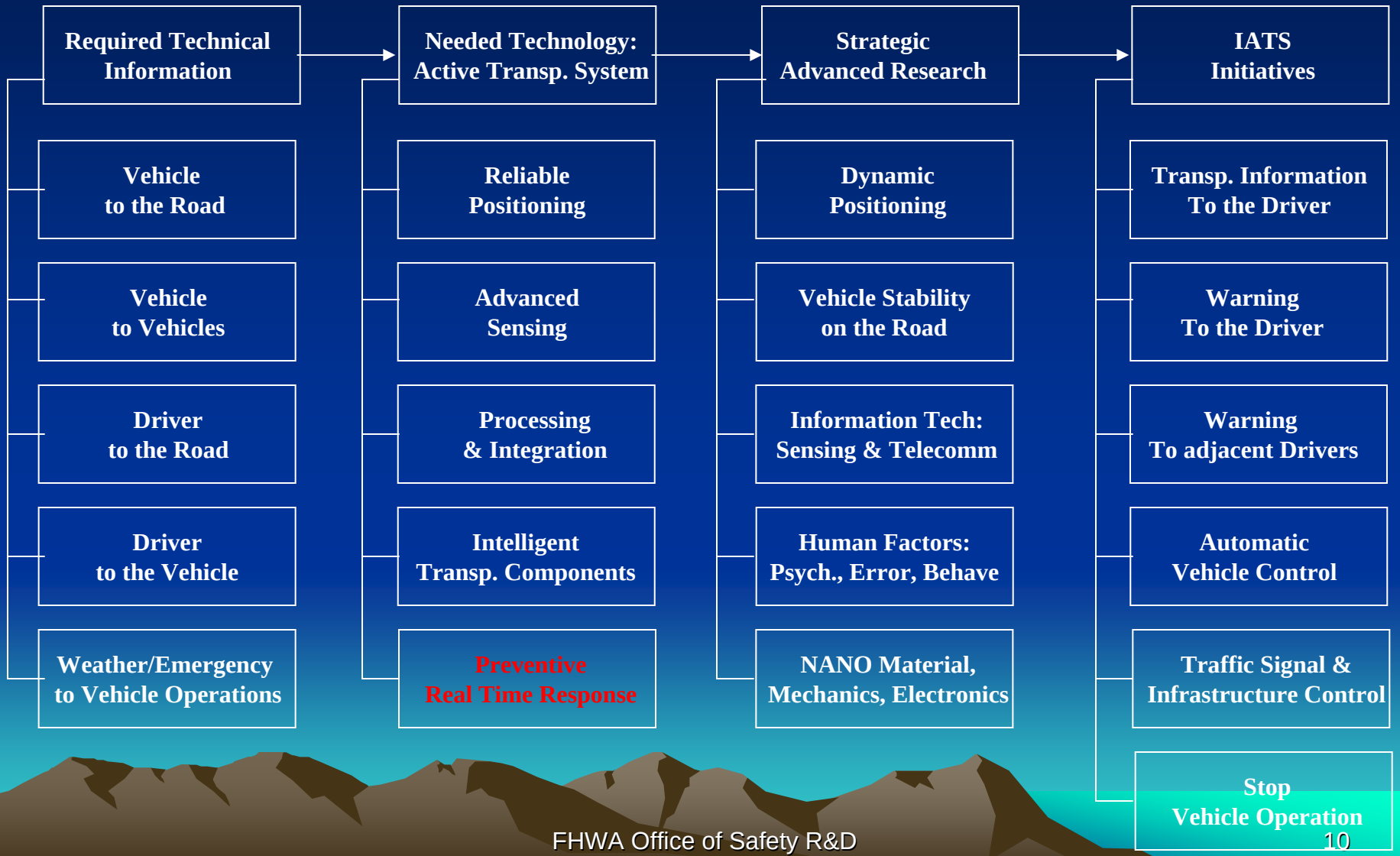
B. A New Concept of Transportation System, IATS

- 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

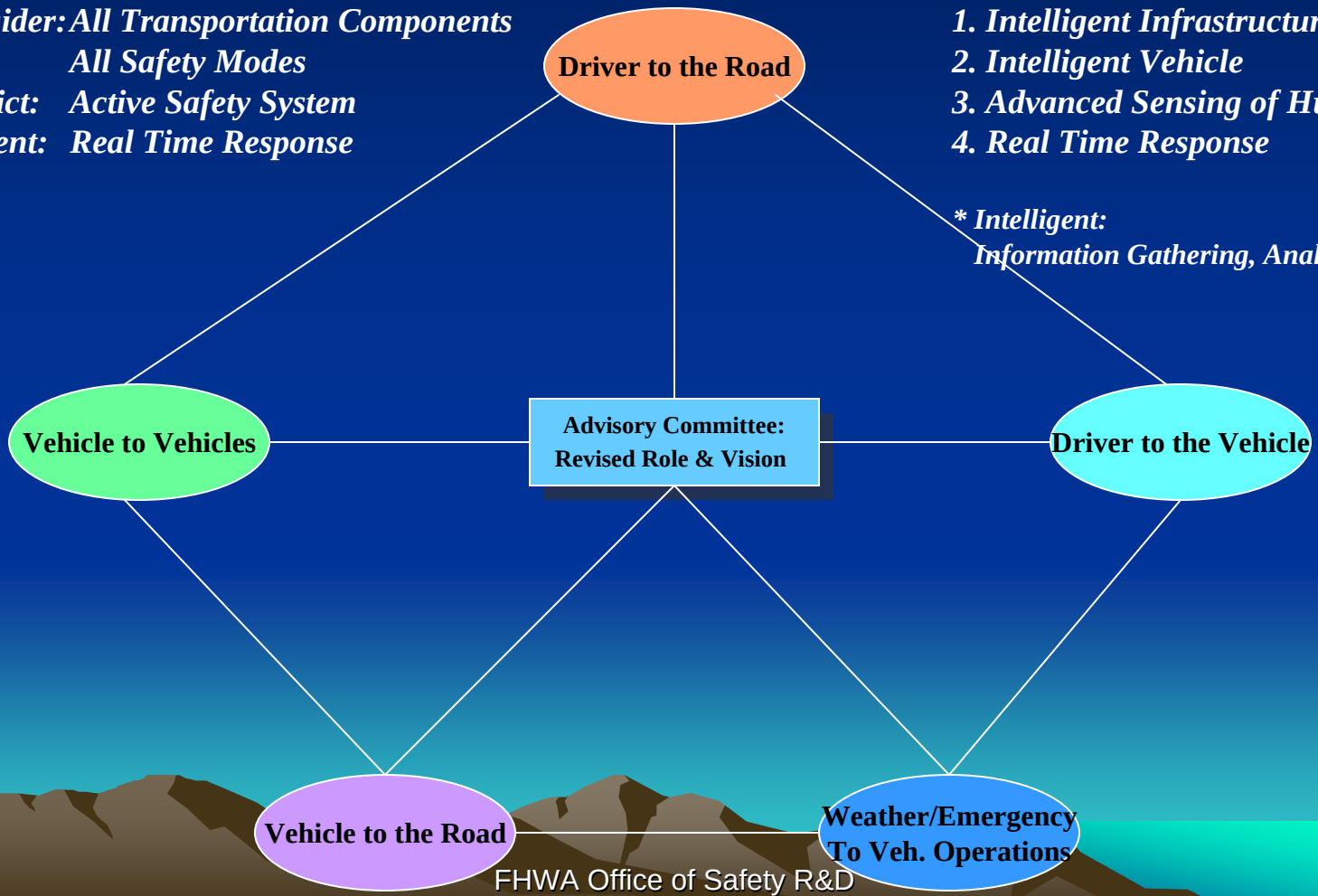
- Real Time Response by A New Transportation System -

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

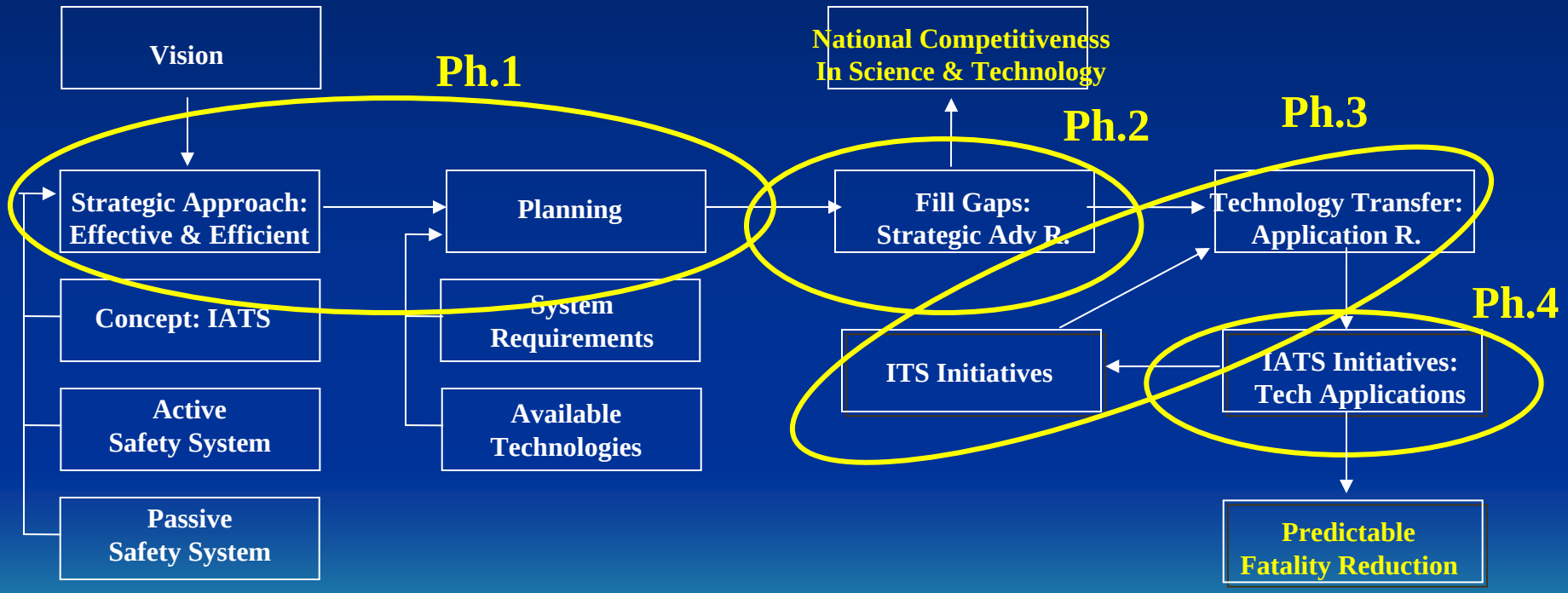
1. ITS Initiatives deploy Technologies, while IATS Initiatives create Technologies.

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

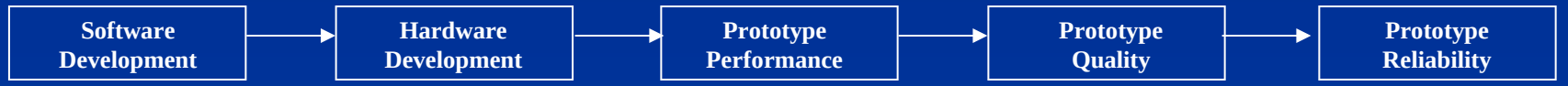
- Four Phase Plan Implementation -

Ph.1. Strategy and Planning: 2009-2012

Adv Research S&C
UTC Workshop

Ph. 2. Advanced Research: 2009 - 2019

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



Ph.4. Technology Deployment: 2019 - 2024

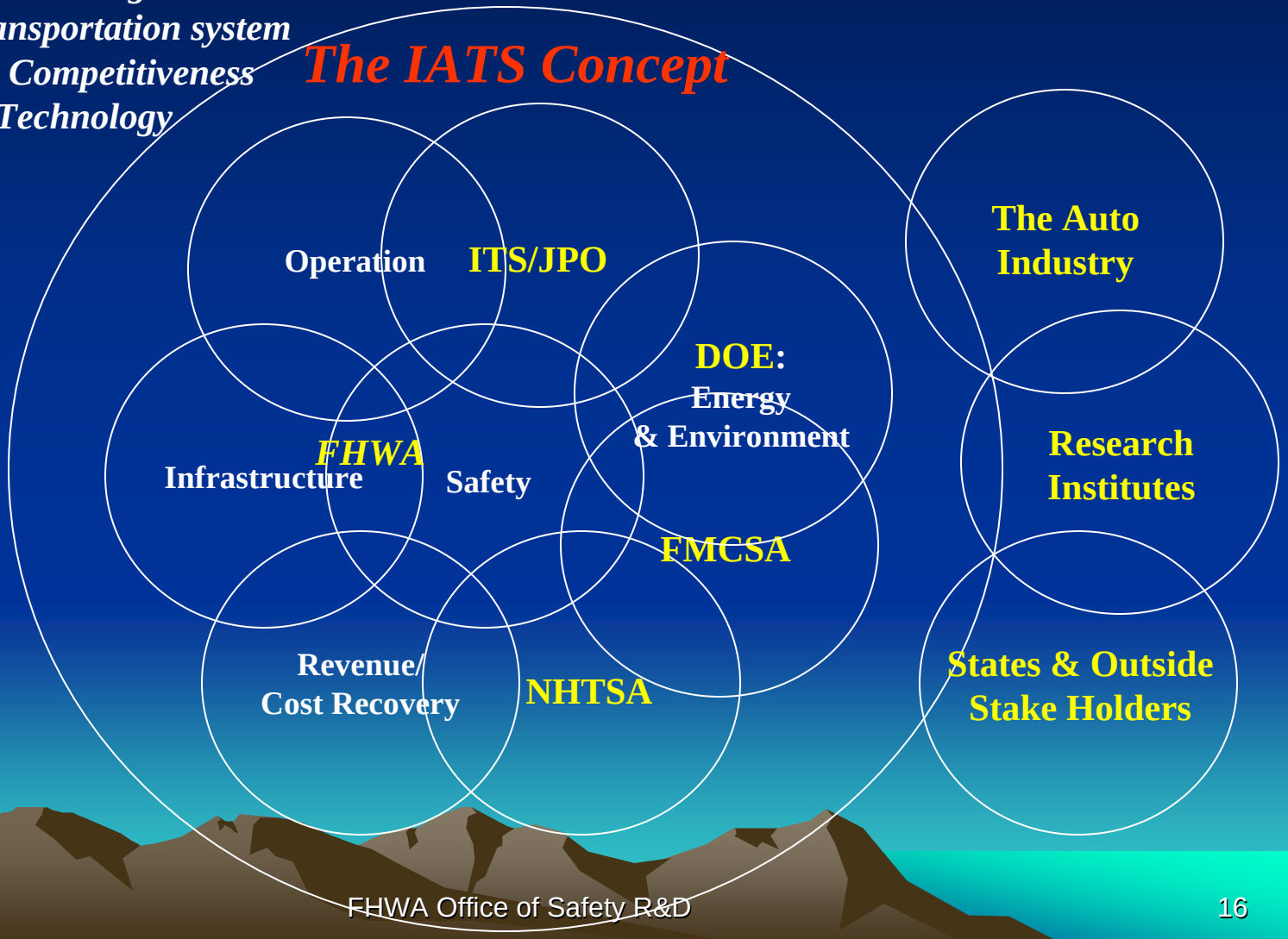
Revise dates as

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



Meeting The Challenge, Together!