Preventing Crashes by Reducing

Driver Distractions

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Common Distractions

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The Safety Problem of Electronic Distractors

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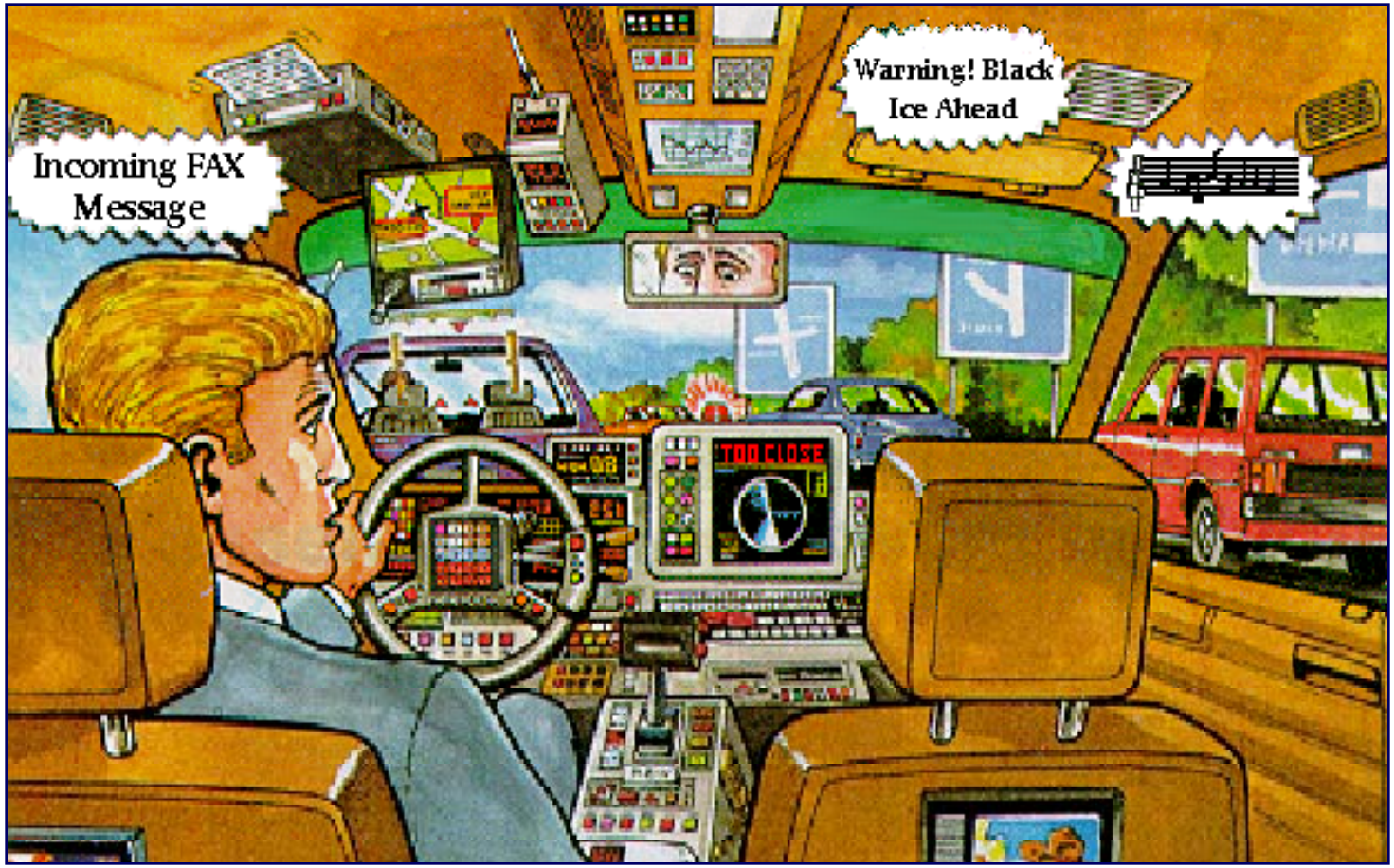
- **Crash Data not complete regarding *existing* sources of distraction**
  - Driver dishonesty; driver/witness misperceptions, low police investigation priority
- **Data clear that *existing* "electronic distractors" (primarily cell phones and radios) contribute to crashes, but extent of problem is unknown**
- **Problems from *new* "electronic distractors" may not show up in crash data for years**
- **But Telematics applications increasing**

How can we manage and minimize the distraction problem to avoid this?



Adapted from T. Ross and G. Burnett,"The Right Road to Take", ITS International, June, 1996, prepared under Project V1037 STAMMI

- **New devices will provide drivers with an array of functions including access to the Internet, e-mail, and route navigation.**
- **The complexity of these devices and the demands they can place on drivers' visual, manual, and cognitive resources, is the reason for NHTSA's research interest.**

New Technologies Increase Complexity of Driving Task

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- **May engage attention longer and more frequently**
- **May place more cognitive and manual demands on drivers**
- **May interrupt drivers at unsafe times**

Options to Minimize Distraction Problem

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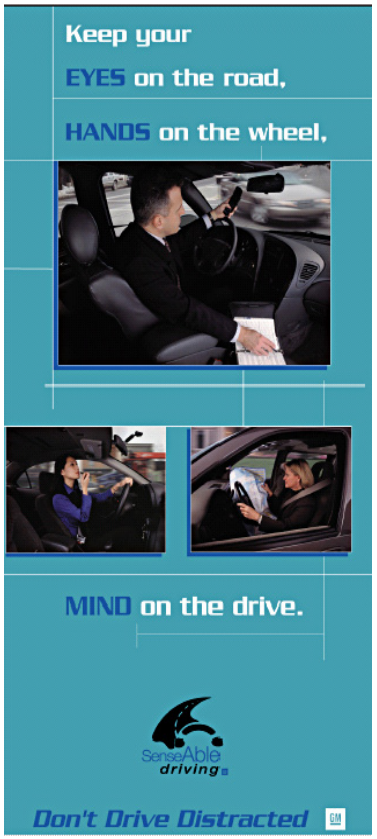
- **Change Driver Behavior**
  - Laws to prohibit unsafe use
  - Educate drivers regarding dangers of driving while distracted
- **Change Device Designs**
  - Human engineer equipment design to minimize demands on drivers
  - Lockout operation while in motion
  - Monitor driver task demands in real time to limit distractions or provide warnings

Behavior Change Challenges



- **Laws are unpopular and difficult to enforce, especially for cognitive distractions**
- **Effectiveness of education programs not demonstrated**
- **Still need more information about distraction related behaviors and what drivers know and don't know**

Device Design Challenges

- **Electronic Distractors integrated in vehicle by OEMs may require different approach than portable devices brought in by drivers**
- **Performance Standards vs Design Standards**
  - PS based on driver performance are difficult to implement objectively (e.g., glance times less than 2 seconds)
  - DS are too restrictive and limit innovations
  - Hard to apply to multiple devices with additive demands on driver

NHTSA Driver Distraction Research Areas

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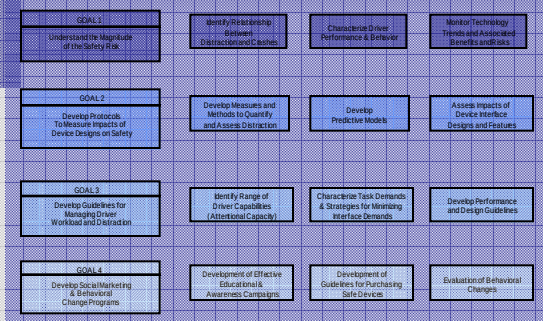
GOAL 1 Understand the Magnitude of the Safety Risk	Identify Relationship Between Distraction and Crashes	Characterize Driver Performance & Behavior	Monitor Technology Trends and Associated Benefits and Risks
GOAL 2 Develop Protocols To Measure Impacts of Device Designs on Safety	Develop Measures and Methods to Quantify and Assess Distraction	Develop Predictive Models	Assess Impacts of Device Interface Designs and Features
GOAL 3 Develop Guidelines for Managing Driver Workload and Distraction	Identify Range of Driver Capabilities (Attentional Capacity)	Characterize Task Demands & Strategies for Minimizing Interface Demands	Develop Performance and Design Guidelines
GOAL 4 Develop Social Marketing & Behavioral Change Programs	Development of Effective Educational & Awareness Campaigns	Development of Guidelines for Purchasing Safe Devices	Evaluation of Behavioral Changes

GOAL 1

Understand the Magnitude of the Safety Risk



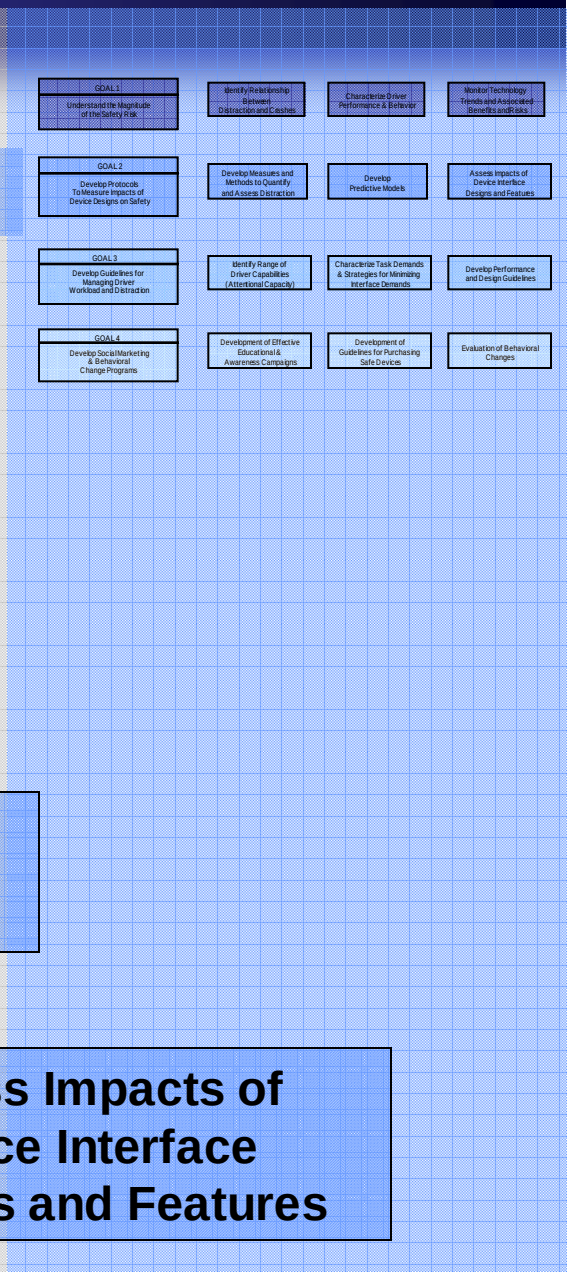
Identify Relationship Between Distraction and Crashes

Characterize Driver Performance & Behavior

Monitor Technology Trends and Associated Benefits and Risks

GOAL 2

Develop Protocols To Measure Impacts of Device Designs on Safety



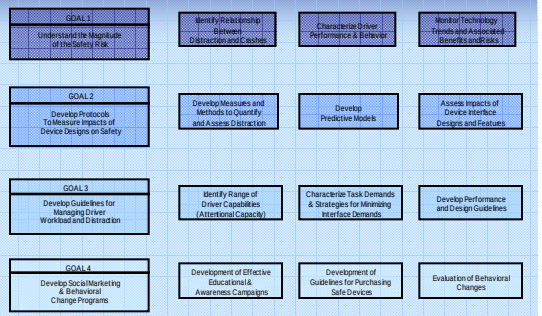
Develop Measures and Methods to Quantify and Assess Distraction

Develop Predictive Models

Assess Impacts of Device Interface Designs and Features

GOAL 3

Develop Guidelines for Managing Driver Workload and Distraction



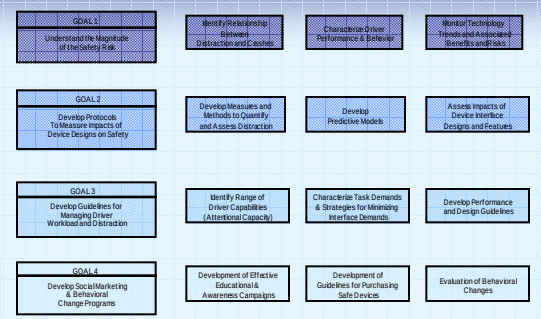
Identify Range of Driver Capabilities (Attentional Capacity)

Characterize Task Demands & Strategies for Minimizing Interface Demands

Develop Performance and Design Guidelines

GOAL 4

Develop Social Marketing & Behavioral Change Programs



Development of Effective Educational & Awareness Campaigns

Development of Guidelines for Purchasing Safe Devices

Evaluation of Behavioral Changes

Promising Research Initiatives

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Driver Workload Metrics Project

Cooperative Research with Collision Avoidance Metric Partnership (Ford, GM, Toyota, Nissan)—completion 2004

- **To develop driver distraction metrics and tests that are Practical, Meaningful, and Repeatable for use in product development process and human factors guidelines.**
- **Exploring a range of on-road performance measures and lab-based surrogate measures**

Test Methods

- **On-Road**
  - Car following with object & event detection way finding
- **Test Track**
  - Car following with object & event detection highly demanding tasks
- **Lab-Based Surrogate Testing**
  - Analytic measures
  - Visual occlusion
  - Part-task simulation
  - Peripheral detection task

Promising Initiatives

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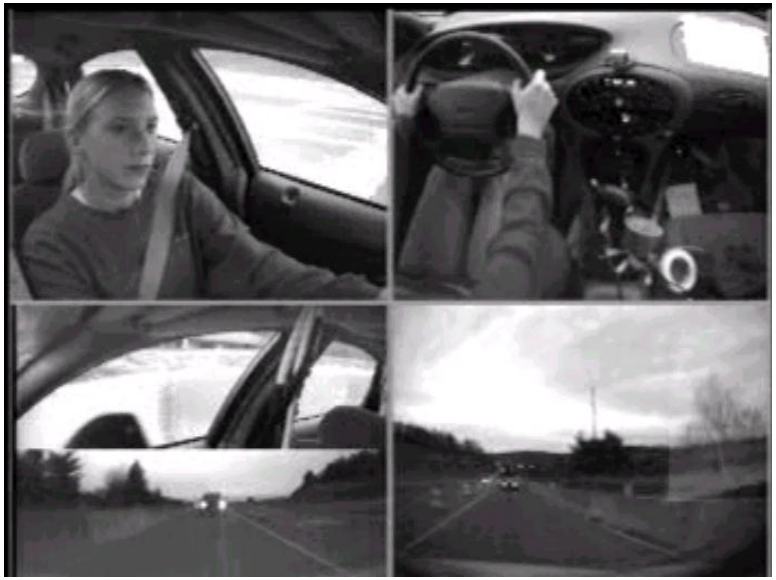
- **Collecting naturalistic driving data to derive relationship between task completion time, eyes-off-road time and critical incident likelihood—(completion 2004)**
  - Provides baseline relating performance to safety-related risk



Promising Initiatives

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- **Partnering with industry to develop human factors basis for real time monitoring and management of workload from multiple systems— (completion 2005)**
  - Provides warnings when driver is being distracted
  - Automatically limits availability of information

Safety Vehicle Using Adaptive Interface Technology (SAVE-IT)

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Key Challenge: *How to minimize distraction from Voice Interfaces*

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