



# Technology and Distracted Driving

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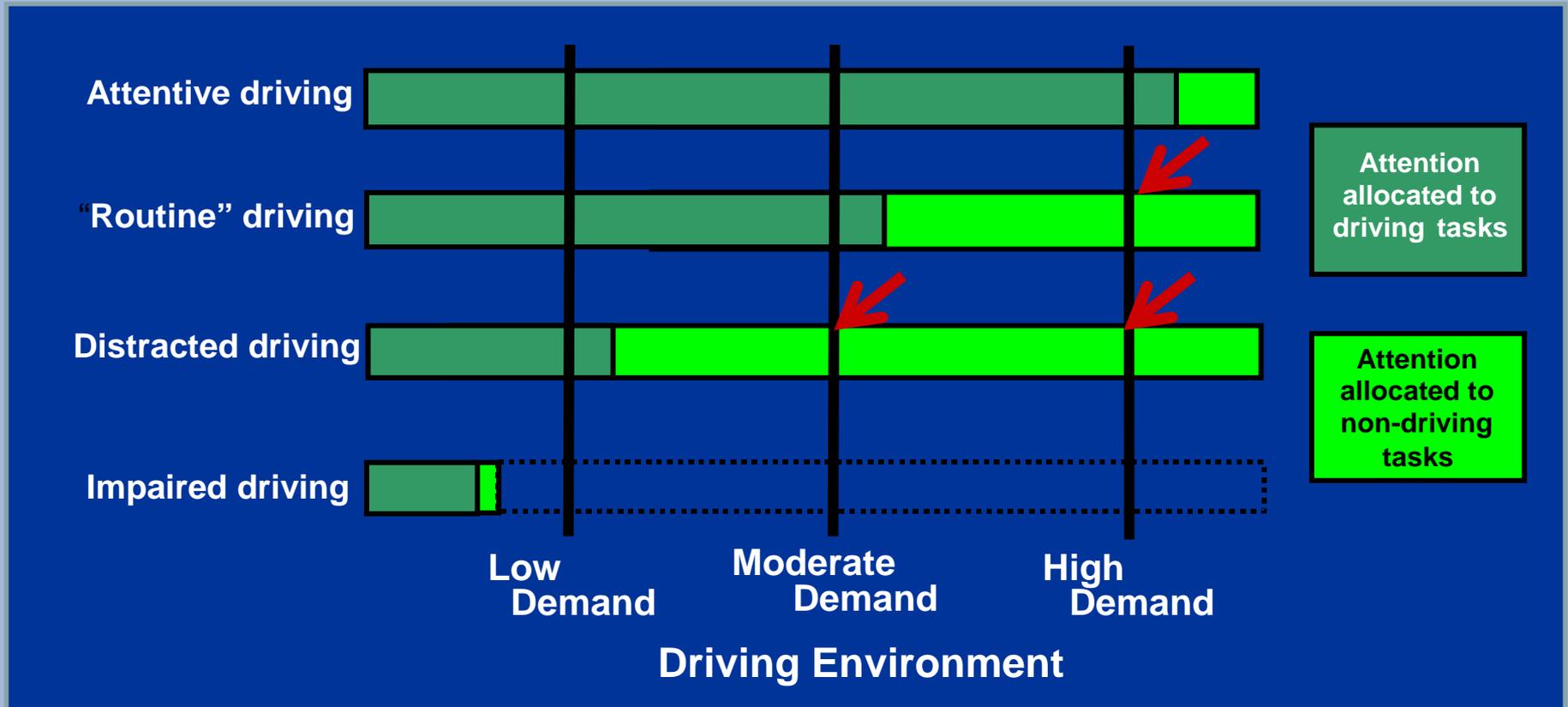
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# What is Distracted Driving?

- **The safe operation of a motor vehicle requires that a driver focus a portion of his or her attentional resources on driving-related tasks.**
- **A driver may also engage in non-driving activities (e.g., talking on a cell phone) that compete for attention.**

# What is Distracted Driving?



# Distraction Sources

- **Things outside of the vehicle:**

- Incidents
- Billboards
- Scenery



- **Things inside the vehicle:**

- Passengers
- Eating
- Personal grooming
- Pets
- Smoking
- Reading
- Objects moving in vehicle
- Using built-in technology
- Using nomadic technology



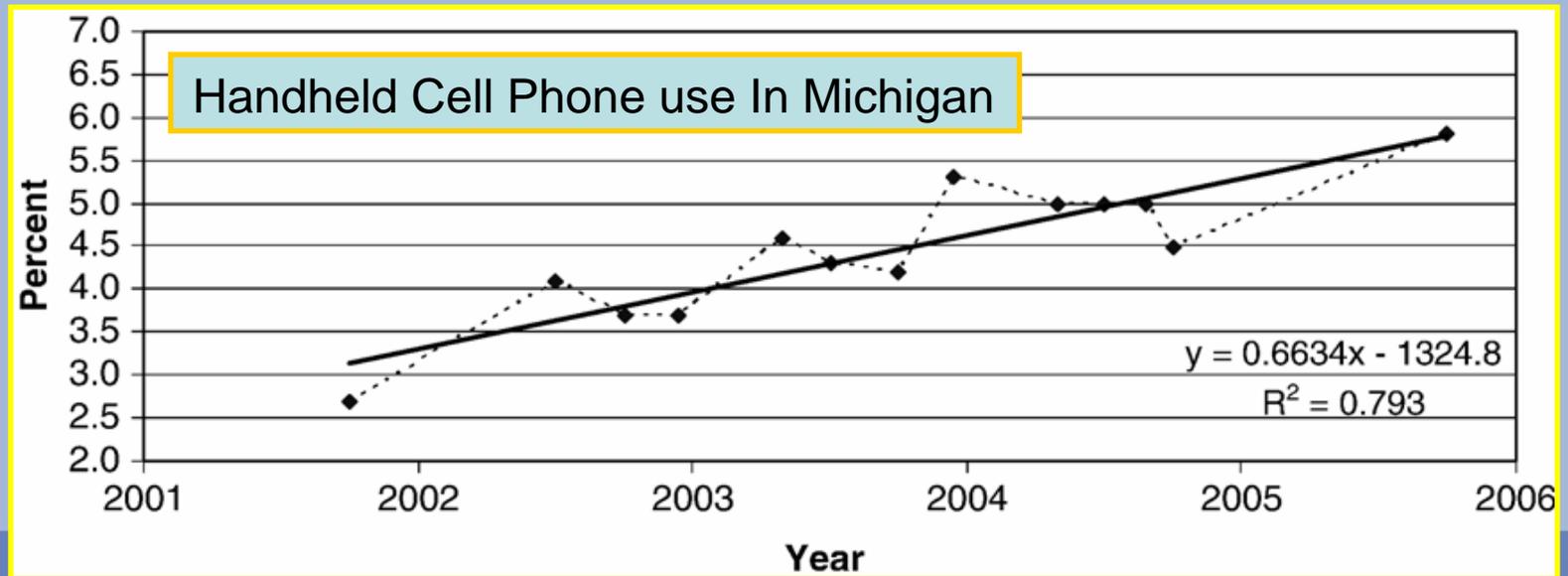
# Societal Factors

- Many new technologies in past decade:
  - MP3 players (iPod);
  - Smart phones;
  - Electronic book readers (Kindle);
  - Portable DVD players;
  - Personal digital assistants;
  - Tablet computers (iPad);
  - Texting.
- We can expect this development to continue.



# Societal Factors

- Technology use in vehicles is increasing:
  - GPS devices sold in US: increase from 20 million in 2008 to 28 million in the next 5 years.
  - NOPUS Survey shows more than a doubling of driver cell phone use between 2000 and 2005.
  - Michigan data:



# Societal Factors

- **Roadways are getting more congested:**
  - The number of licensed drivers in the US increased by 23 million between 1996 and 2006 and few new roadways are being built;
  - As the driving task demand increases, more attention needs to be devoted to driving and less attention can be allocated to secondary tasks.

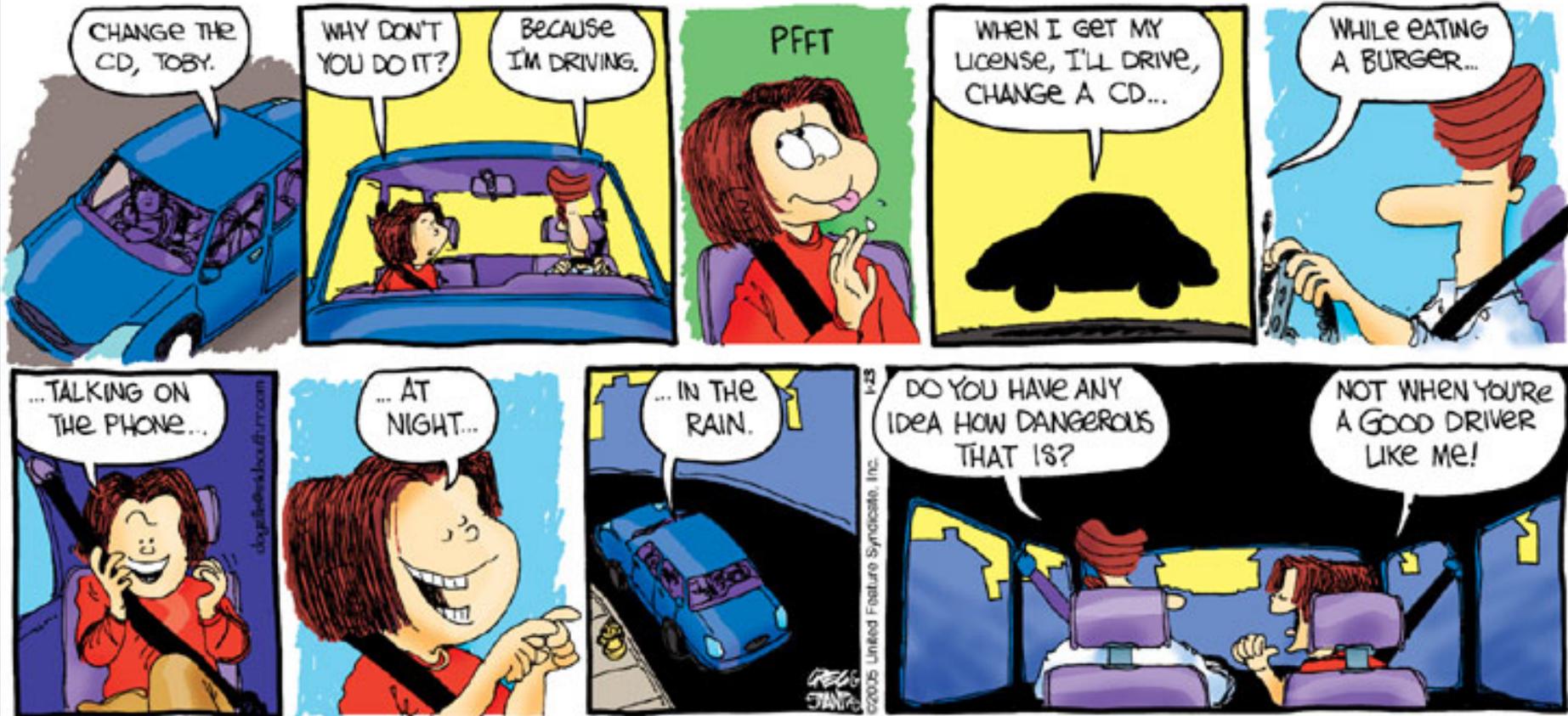


# Societal Factors

- **Our population is aging.**
  - By 2030, Michigan older adults will represent about 20% of the driving population.
- **Young drivers are the most frequent users of nomadic technology.**
  - Young drivers have the highest crash rates of any age group.
  - Study: 20% of young survey respondents reported selecting songs on their portable music player while driving.
  - NOPUS: teen drivers use cellular phones while driving more than any other age group.

# THE BUCKETS

BY SCOTT STANTIS & GREG CRAVENS



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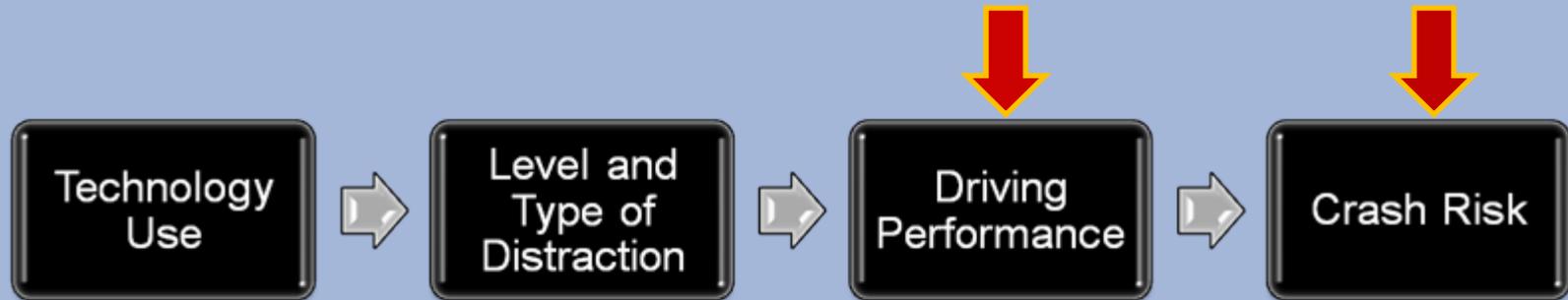


# Technology and Driver Distraction

- Any technology that engages a driver's attention can be distracting.
- Multiple factors can influence the level of distraction and crash risk.
- Little research on distracting effects of technology except for cell phones and, much less so, navigation devices.



# Driver Distraction Research



- Two most important safety outcome measures:

- Driver performance (e.g., lane keeping);
- Effects on crash risk.

# Distraction Research Methods

## ■ Simulator

### ■ Advantages:

- Risky situations can be investigated;
- Objective measures of performance;
- Excellent control over variables.

### ■ Disadvantage:

- Not real driving.



## ■ Instrumented vehicles

### ■ Advantages:

- Real driving;
- Objective measures of performance.

### ■ Disadvantages:

- Little control over variables.



# Distraction Research Methods

- **Epidemiological (Case-Crossover Design)**
  - Phone use records are compared to crash records.
  - **Advantages:**
    - Actual crashes are addressed;
    - Exposure can be managed and crash risk estimated;
    - Each case is its own control.
  - **Disadvantages:**
    - Don't know exactly what the person is doing at time of crash;
    - Not all technology use can be studied.

# Technology and Driver Distraction

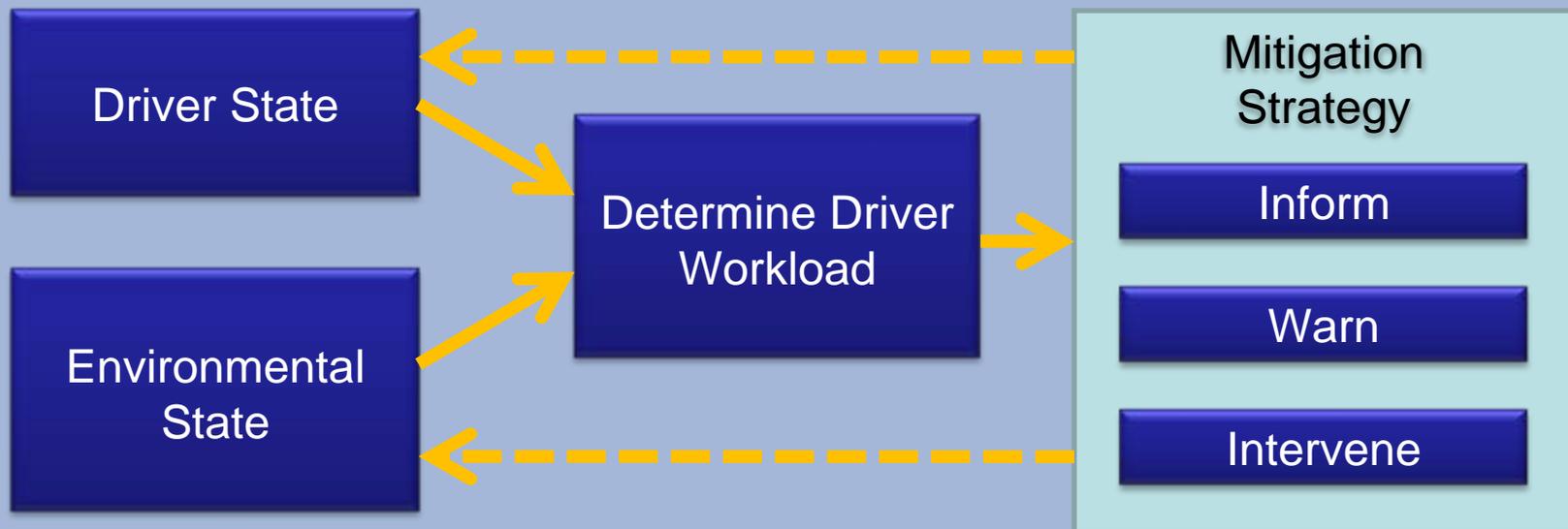
Technology	Driving Performance Affected?	Crash Risk
MP3/iPod	Yes, for song selection and video watching	Increased crash risk in simulator
DVD Player Watching/listening	Yes, in most studies. Greater for watching	Unknown
Radio/CD Manipulating/listening	Minimally. Greater for manipulating.	Slight increase in crash risk in simulator
Navigation System Destination entry	Yes, but depends on system. Manual entry is worse.	Likely increased , if not locked out
Navigation System Destination following	Yes, but depend on system. Verbal Instructions are best. Most better than maps	Unknown

# Cellular Phones

<b>Technology</b>	<b>Driving Performance Affected?</b>	<b>Crashes/Near Crashes</b>
<b>Handheld Dialing/answering</b>	<b>Yes, operational skills</b>	<b>Higher risk than when conversing</b>
<b>Handheld Conversing</b>	<b>Yes, tactical skills (situation awareness)</b>	<b>Increased</b>
<b>Handsfree Dialing/answering</b>	<b>Moderate, but less so than with manual dialing</b>	<b>Likely increased</b>
<b>Handsfree Conversing</b>	<b>Yes, tactical skills (situation awareness)</b>	<b>Increased, generally less than for handsfree</b>
<b>Integrated</b>	<b>Moderate, but less so than nonintegrated handsfree cell</b>	<b>Unknown</b>
<b>Cell Phone Overall</b>	<b>Yes, operational and tactical</b>	<b>4-9 fold increase in crash risk</b>
<b>Texting</b>	<b>Yes, for both novice and experienced drivers</b>	<b>Unknown</b>

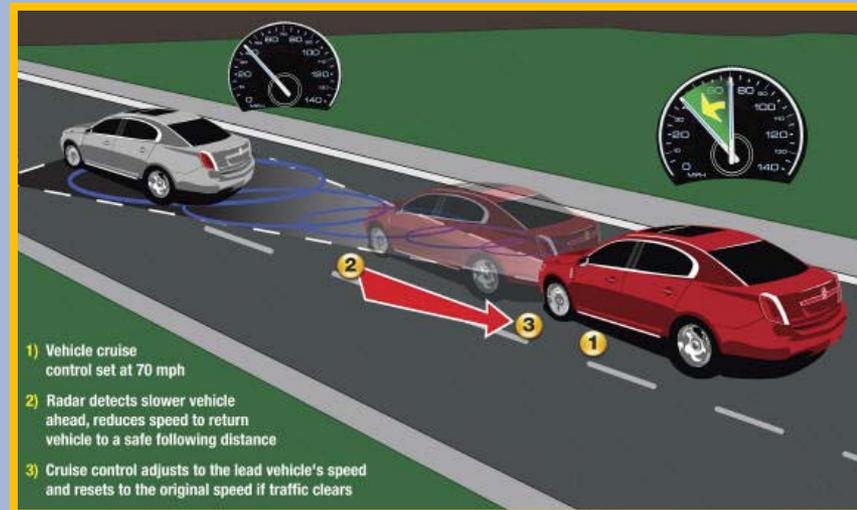
# Benefits of Technology

- **Manage the distraction source**
  - **Workload management systems (Examples: Saab Dialogue Manager, Volvo IDIS, SAVE-IT, AIDE).**



# Benefits of Technology

- Reduce workload of driving task
  - Navigation systems
  - Adaptive cruise control
  - Lane-keeping assistance



# Benefits of Technology

- Mitigate negative outcomes of distraction
  - Crash warning systems
  - Automatic notification systems



# Research Needs

- **Data**
  - Need to better link technology-related distraction to at-fault crashes.
  - Need better exposure data on technology-related distraction.
- **Model of Distracted Driving**
  - Link together the various components of distracted driving and how all types of driving performance are impacted.
  - Technology and task independent
- **Improved HMI design**
  - Common practices
  - Design for older adults (universal design)

# Policy Implications

- **Develop policy based on preponderance of research evidence;**
- **Policy should reflect how technology is used in vehicles;**
- **Policy should recognize trends (what will tomorrow's technology be?);**
- **Bring all stakeholder's to the table.**

# Thank You

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