Insurance Institute for Highway Safety
Highway Loss Data Institute

What factors lead to older drivers' crashes?

Older Driver Safety Summit
Boston, MA
June 16, 2015

Jessica B. Cicchino

iihs.org

IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from crashes on the nation's roads.

HLDI shares this mission by analyzing insurance data representing human and economic losses from crashes and other events related to vehicle ownership.

Both organizations are wholly supported by auto insurers.

Where are we?

National Motor Vehicle Crash Causation Study

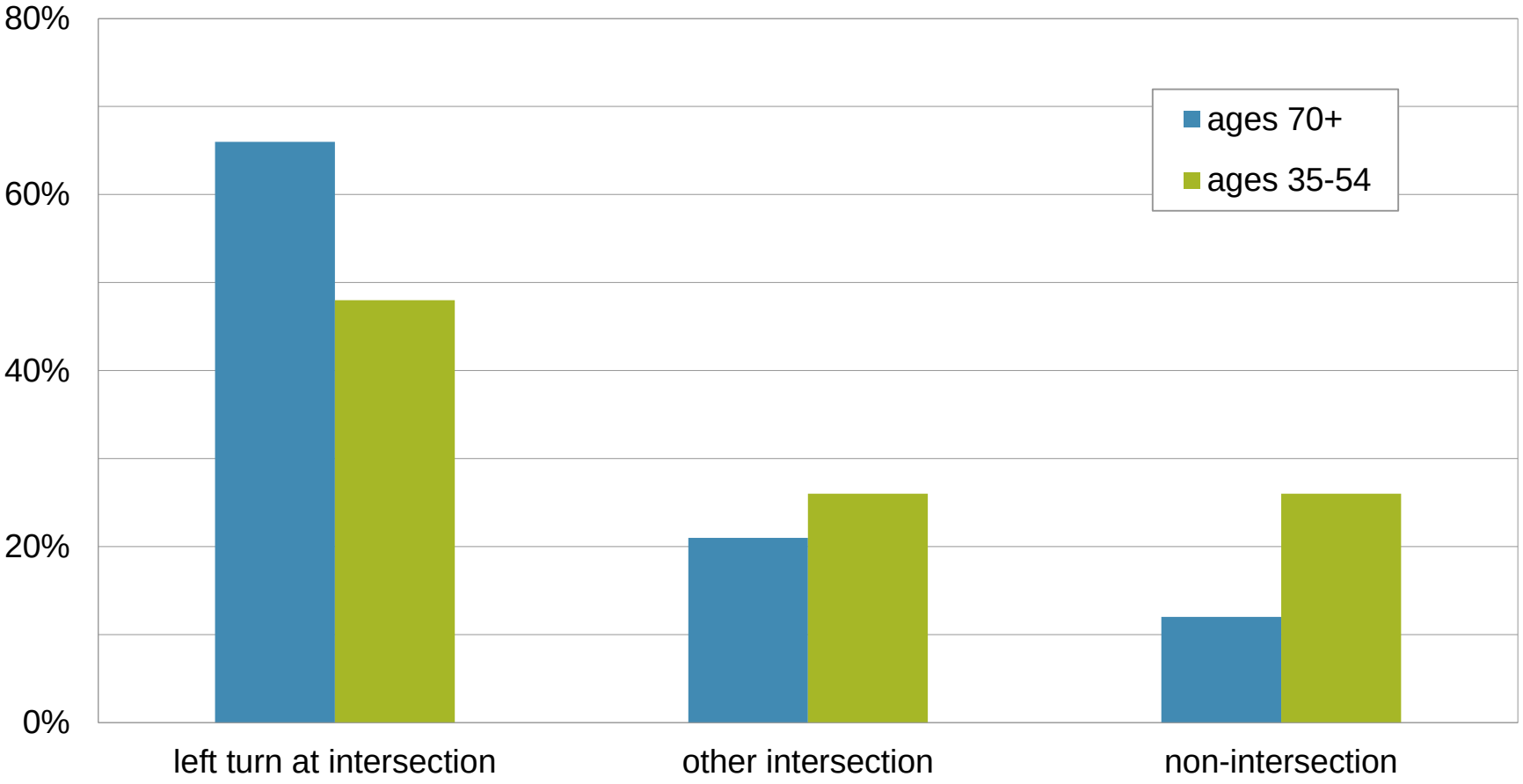
- 5,470 crashes during 2005-07, including 647 crash-involved drivers age 70+
- Critical reason: immediate reason for final event in causal chain leading to crash
  - Driver factor is critical reason in 97 percent of crashes involving drivers age 70+ and 94 percent of crashes involving drivers age 35-54

Top driver factors among older drivers, by driver age (percent)

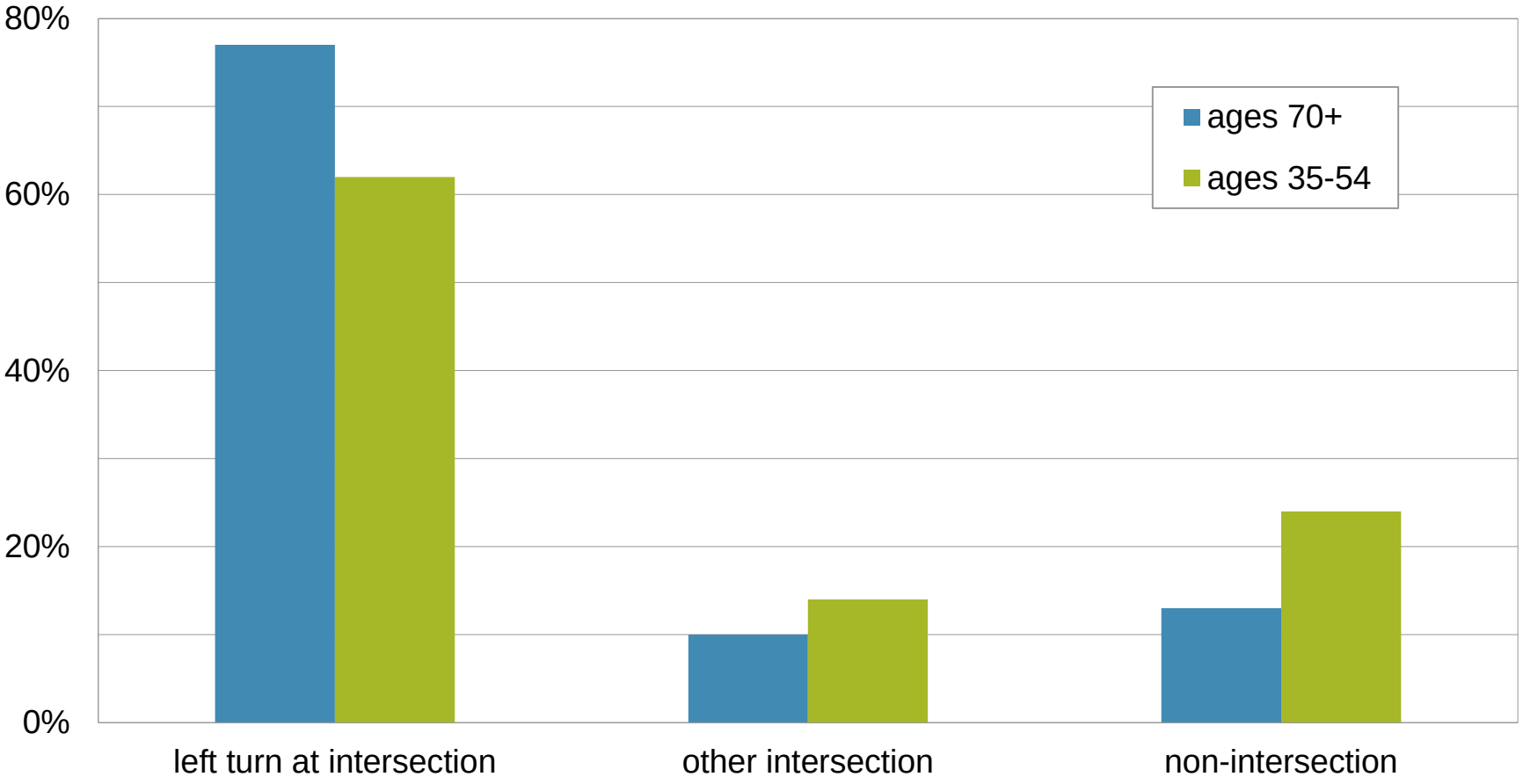
	ages 70+	ages 35-54
inadequate surveillance	33	22
gap/speed misjudgment	6	3
medical incapacitation	6	4
failure to obey traffic controls or other illegal maneuver	6	4
daydreaming	6	4

Type of inadequate surveillance error among drivers who made them

Where did drivers make inadequate surveillance errors?



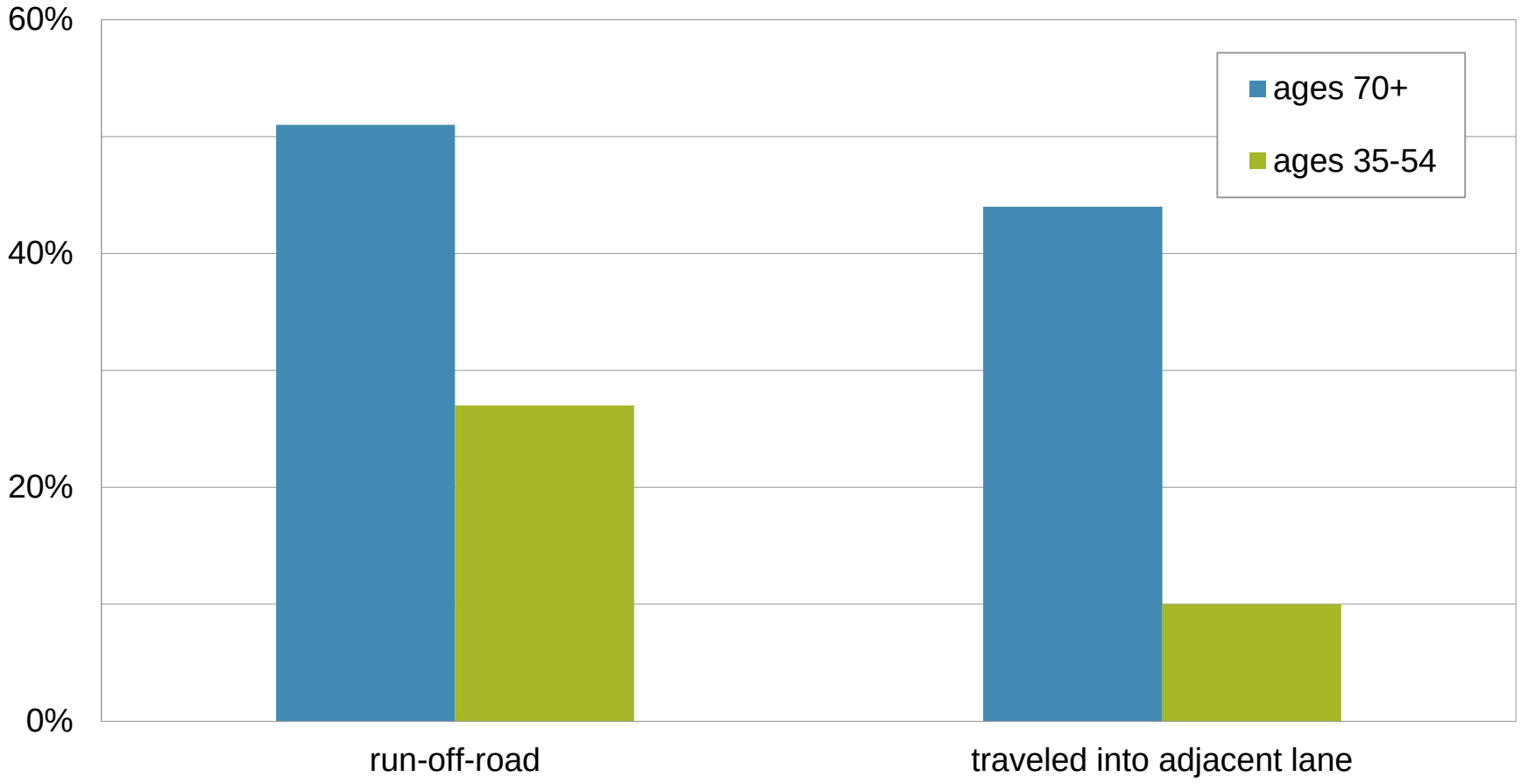
Where did drivers make gap/speed misjudgment errors?



Top crash types among drivers attributed critical errors, by driver age (percent)

	ages 70+	ages 35-54
intersection	58	37
run-off-road	16	22
rear end	14	18
traveled into adjacent lane	8	13

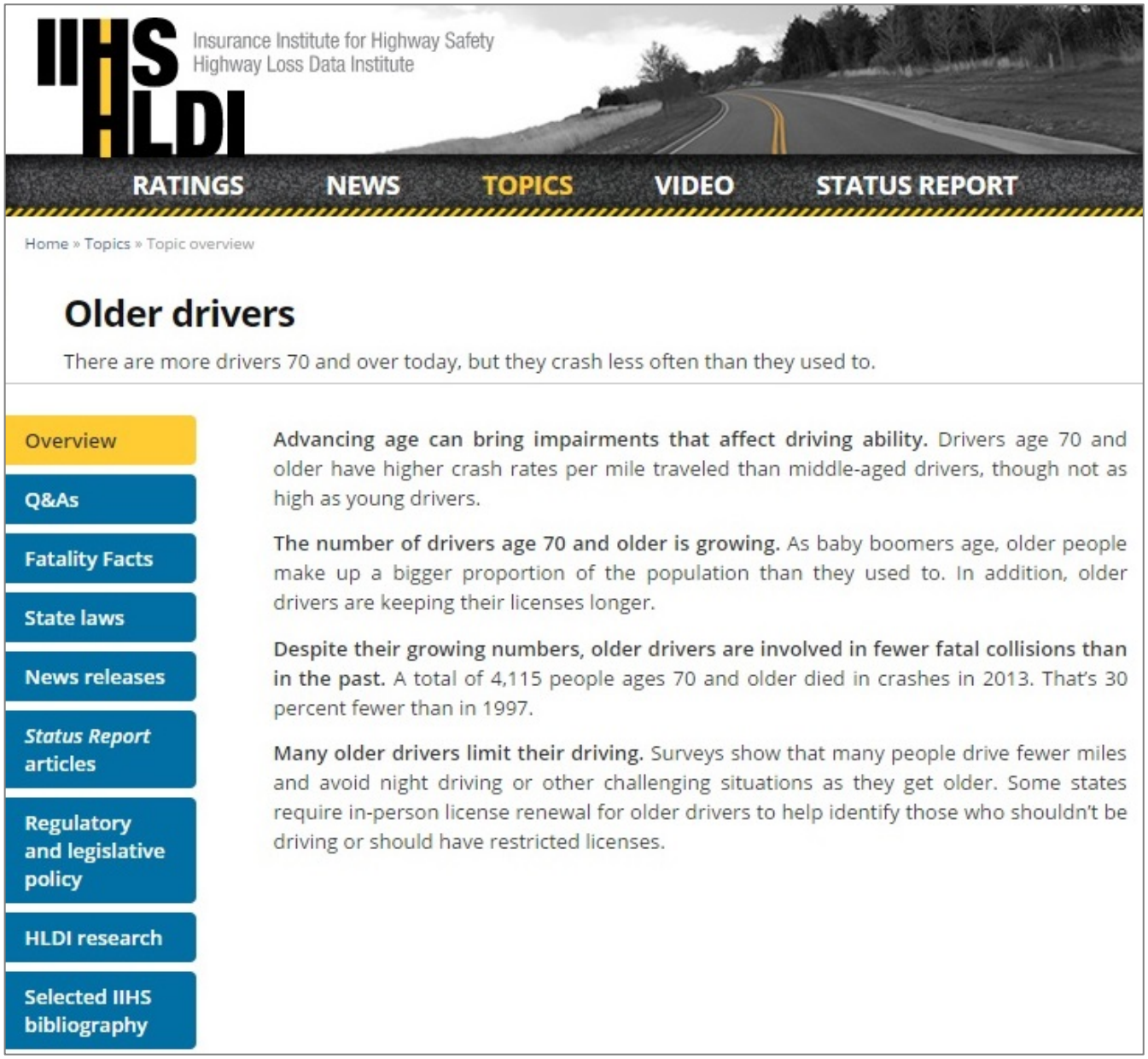
Lane departure crashes attributed to physical factors, by driver age



Conclusions

- Inadequate surveillance and gap/speed misjudgment errors more prevalent among older than middle-aged drivers
- Efforts to reduce older driver crash involvements should focus on diminishing likelihood of the most common driver errors
- Focus on countermeasures that remove left turns across traffic or simplify them, such as:
  - Protected left-turn signals (green arrows)
  - Roundabouts
  - Diverging diamond interchanges
  - Vehicle-to-vehicle and vehicle-to-infrastructure communications, cross-traffic alert
- Lane departure crashes among older drivers more often due to physical factors than among middle-aged drivers

For further information visit www.iihs.org



- Fatality Facts
- Q&As
- State laws
- IIHS research

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More information and links to our YouTube channel and Twitter feed at iihs.org

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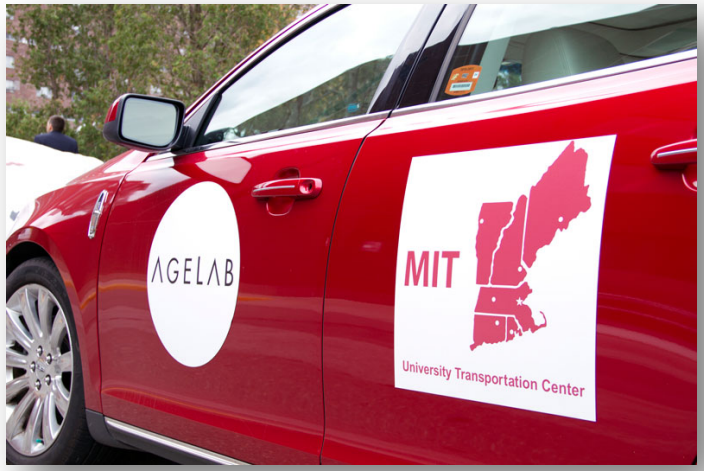
Human Factors and Automated Vehicles:
A Cross Road in Transportation Policy

Bryan Reimer, Ph.D.
MIT AgeLab & New England University Transportation Center

Older Driver Safety Summit
University Of Massachusetts Boston

June 16th, 2015



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Benefits of Vehicle Automation

"Autonomous cars may seem like a gimmick, he begins, but when you consider all the **time** that people won't be devoting to their rear view mirrors, and all the **efficiencies** that come from cars that could be zipping between errands rather than idling in parking lots, the world looks like a very different place. Car ownership would be unnecessary, because your car (maybe **shared** with your neighbors) will act like a taxi that's summoned when needed. The **elderly** and the **blind** could be thoroughly integrated into society. **Traffic deaths could be eradicated**. Every person could gain lost hours back for working, reading, talking, or searching the Internet."

Google co-founder Sergey Brin as reported by Brad Stone of Bloomberg Business Week – May 22, 2013

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Vehicle Automation

National Highway Traffic Safety Administration

- Level 0 – No Automation
- Level 1 – Function Specific Automation
- Level 2 – Combined Function
- Level 3 – Limited Self-Driving Automation
- Level 4 – Full Self-Driving Automation

Ceded to automotive history (i.e. ABS, ESC etc.)

Differences / limitations between levels may not be clear to an “operator”

Some would say this may be the only way to achieve all of the mobility and safety benefits

We are seeing level 2 in production. However, it remains to be fully understood how “we” will use these systems

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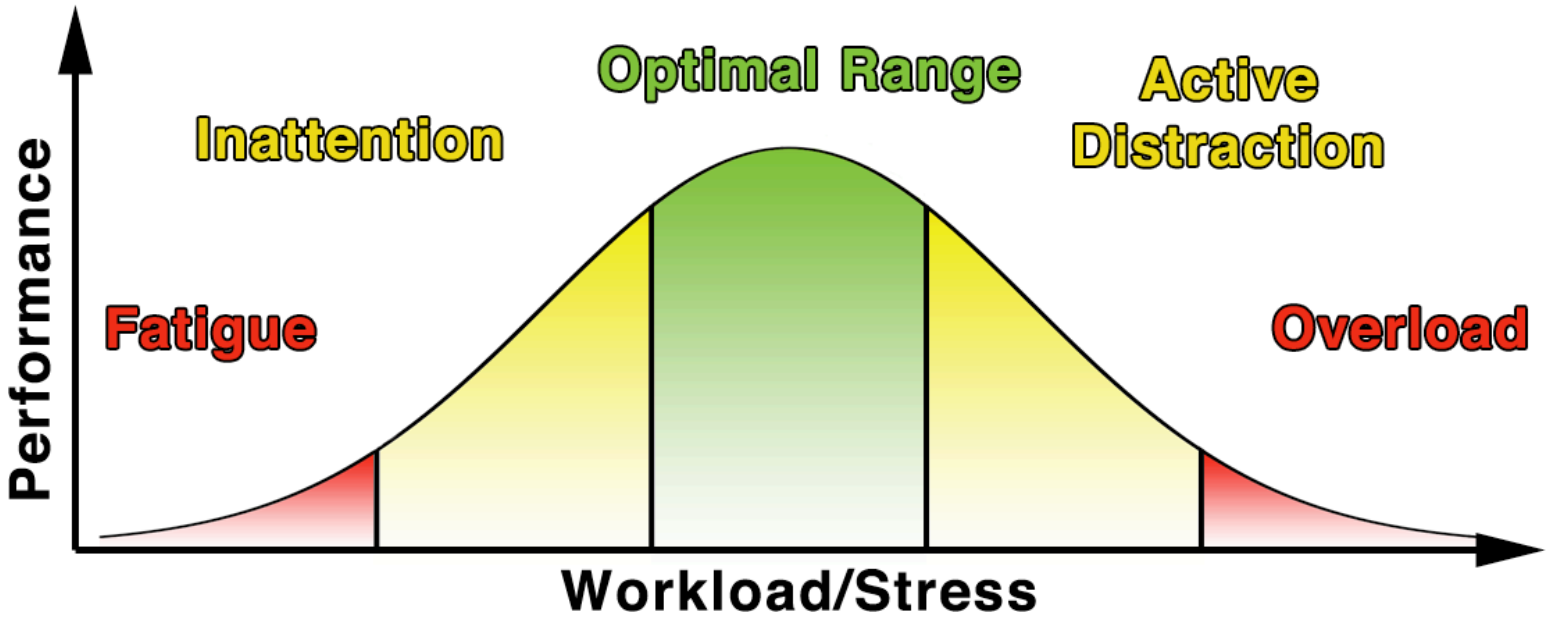
Workload & Performance

Yerkes-Dodson Law

The relationship between performance and physiological or mental arousal



(Source: Coughlin, Reimer & Mehler, 2011)

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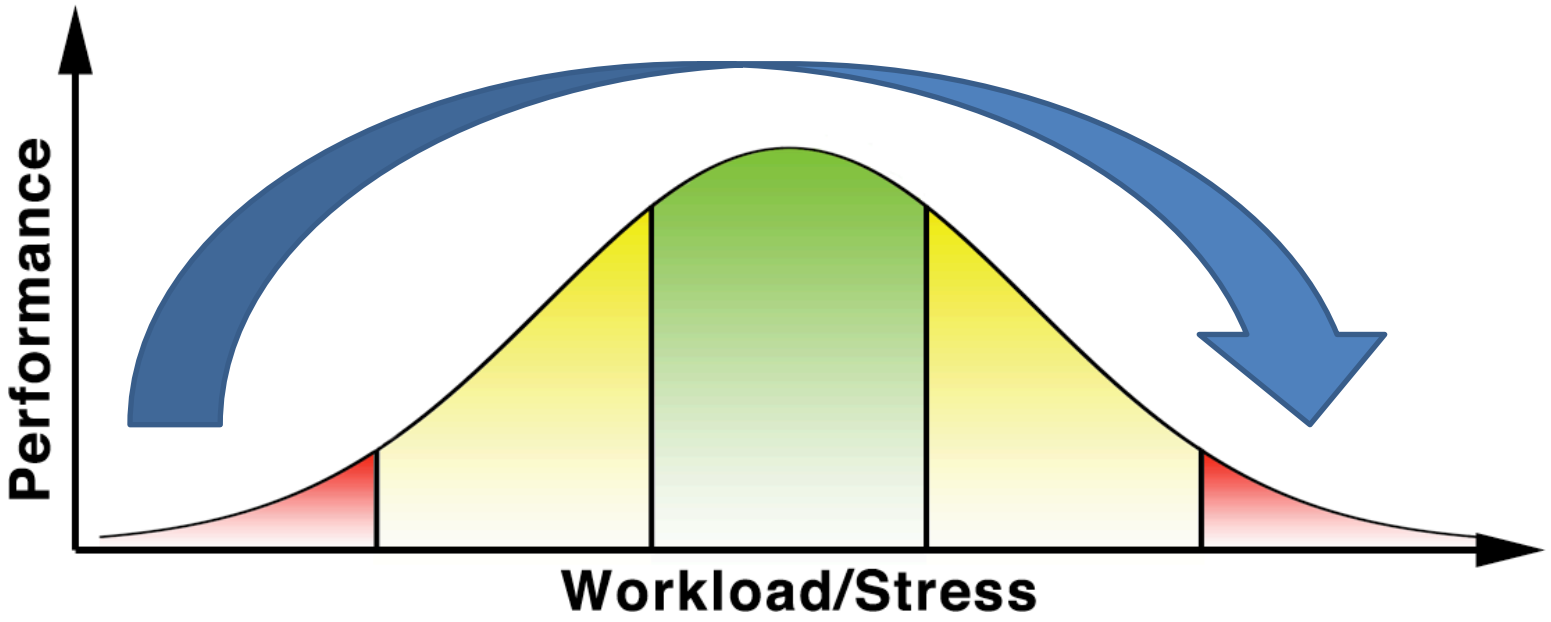
Workload & Performance

More Information in the Vehicle Tends to Increase Workload



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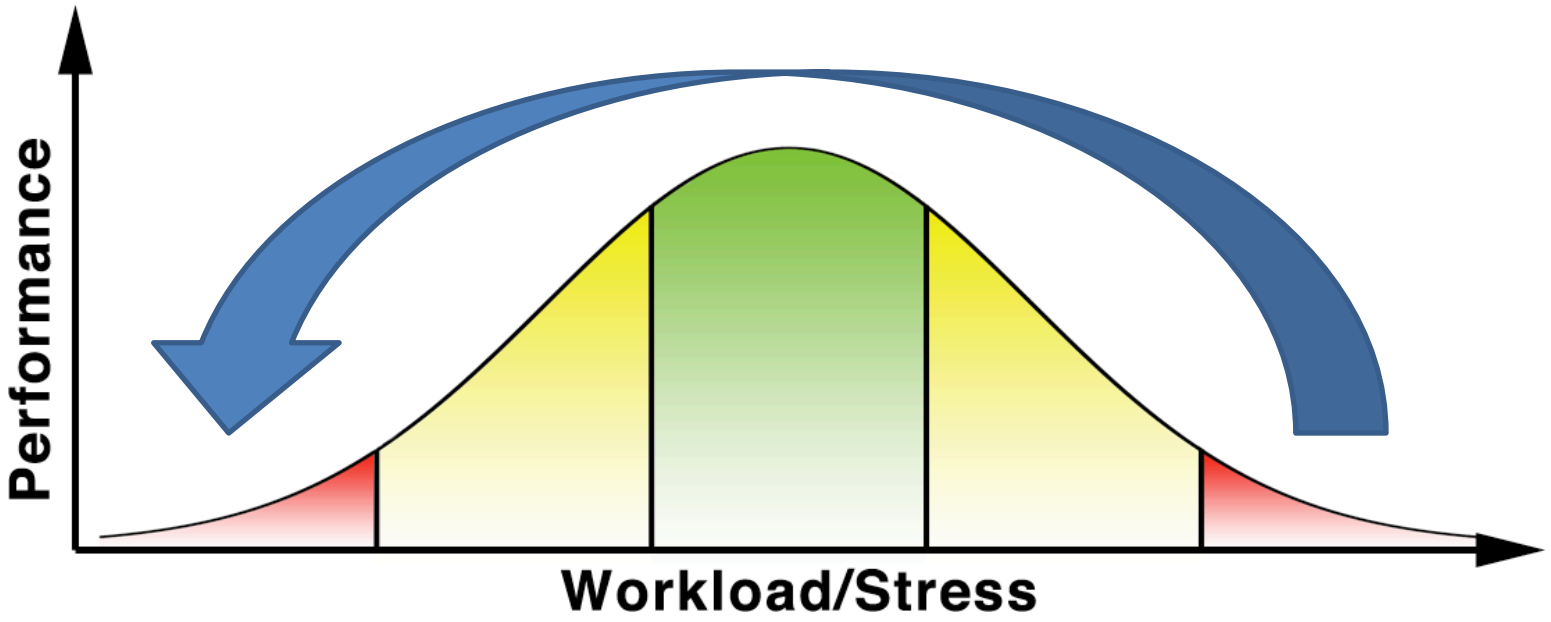
Workload & Performance

Automation Tends to Lower Workload



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The Future May Be One of More Relatively "Novice" Drivers

Vehicle Miles Traveled (VMT)

Vehicle Miles Driven (VMD)

Today	Tomorrow?
VMT = VMD	VMT ≠ VMD

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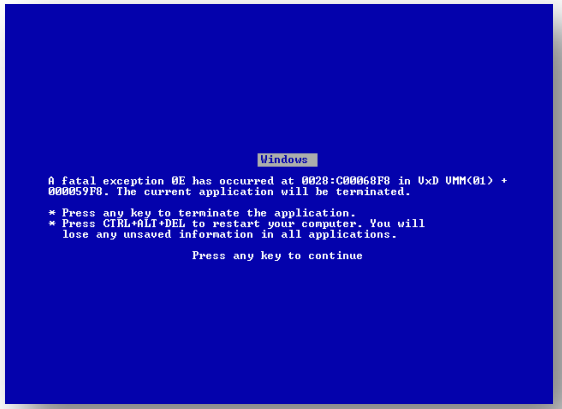
Trust in Technology

- **Lack of trust can result in lost benefit**, i.e. failure to use automation when it can effectively support the driver
- **Over trust can result in misuse**, i.e. use of automation in situations beyond design limits
- **Trust is learned over time**
  - Takes investment on the part of the human
  - May not be acquired based upon intuition alone
  - Is easily eroded by failure



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Education

"One of the myths about the impact of automation on human performance is as investment in automation increases, less investment is needed in human expertise"

David Woods as quoted by Robert Sumwalt, 2012

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Liability

No system is “truly perfect”

“The first time that a driverless vehicle swerves to avoid a shopping cart and hits a stroller, someone’s going to write, ‘robot car kills baby to save groceries,’ ” he said. “It’s those kinds of reasons you want to make sure this stuff is fully tested.”

(Ryan Calo, a law professor at the University of Washington who co-founded the Legal Aspects of Autonomous Driving Center at Stanford, 2013)

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A Successful Transition to More Highly Automated Vehicles

A need for policy change! – some concepts to consider

- Driver education
- A national licensure system
- Levels of licensure
- Defect investigation
- Tort reform / defining liability limits

A need to view the ecosystem of drivers, vehicle and the environment as a whole.

Today's distraction may be tomorrow's link to keeping drivers awake!

Older adult mobility may only be enhanced to the levels we strive for by looking at a balanced view of the "new" risks and benefits.

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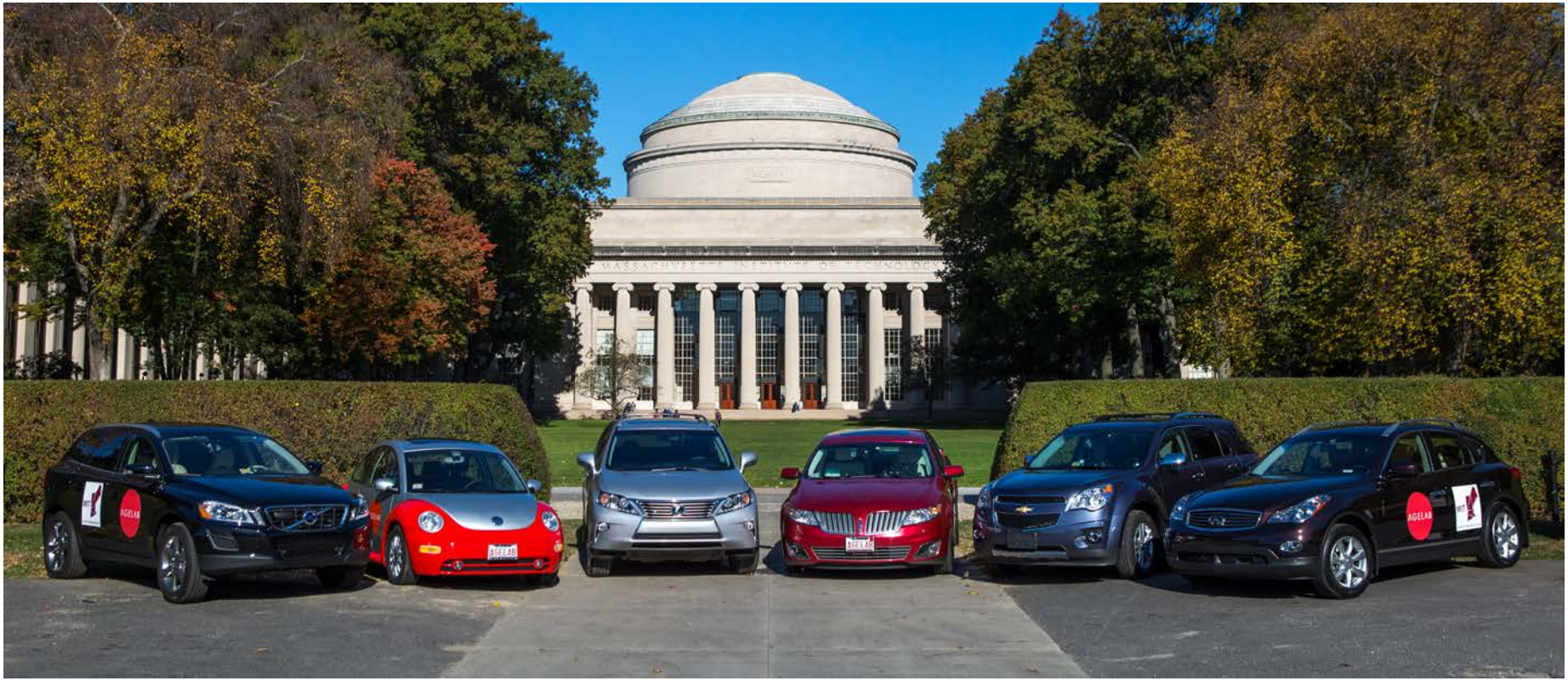
Questions



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