The perils of vehicle automation:
Lessons from other transport sectors for driver training

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CAS

Levels of Automation

Levels	Name	Definition
Level 0	No Automation	Driver completely controls the vehicle
Level 1	Driver assistance	Some activities (e.g. steering, acceleration / deceleration) have assisted execution
Level 2	Partial automation	Some activities (e.g. steering, acceleration / deceleration) are automated
Level 3	Conditional automation	All driving activities automated but human expected to intervene when needed
Level 4	High automation	All driving activities automated and can cope with human not intervening when needed
Level 5	Full automation	All driving activities automated with no need for human intervention

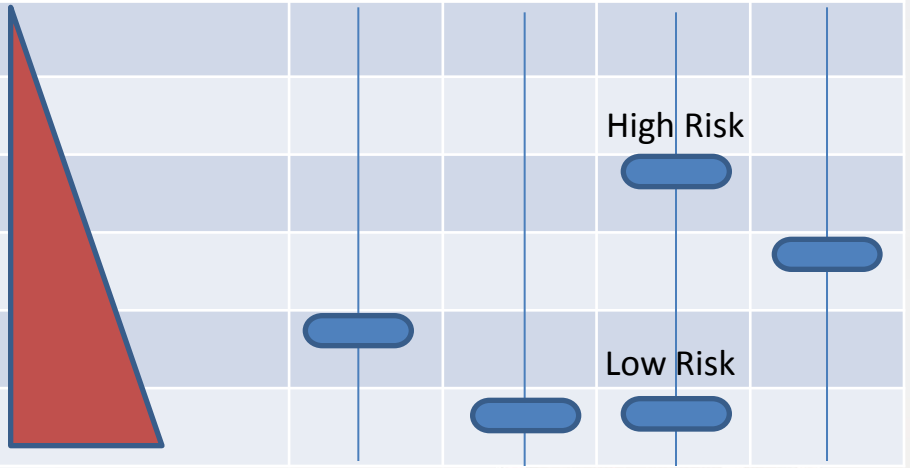
Adapted from Society of Automotive Engineers standard J3016 (2014)

Levels achieved in other transport sectors

Levels	Name	Sector level
Level 0	No Automation	
Level 1	Driver assistance	
Level 2	Partial automation	
Level 3	Conditional automation	
Level 4	High automation	
Level 5	Full automation	

Why not full automation

Levels	Name
Level 0	No Automation
Level 1	Driver assistance
Level 2	Partial automation
Level 3	Conditional automation
Level 4	High automation
Level 5	Full automation



Automation philosophies

Automation Centric
- focus on avoiding human error

Human Centric
- focus on optimum use of human capabilities

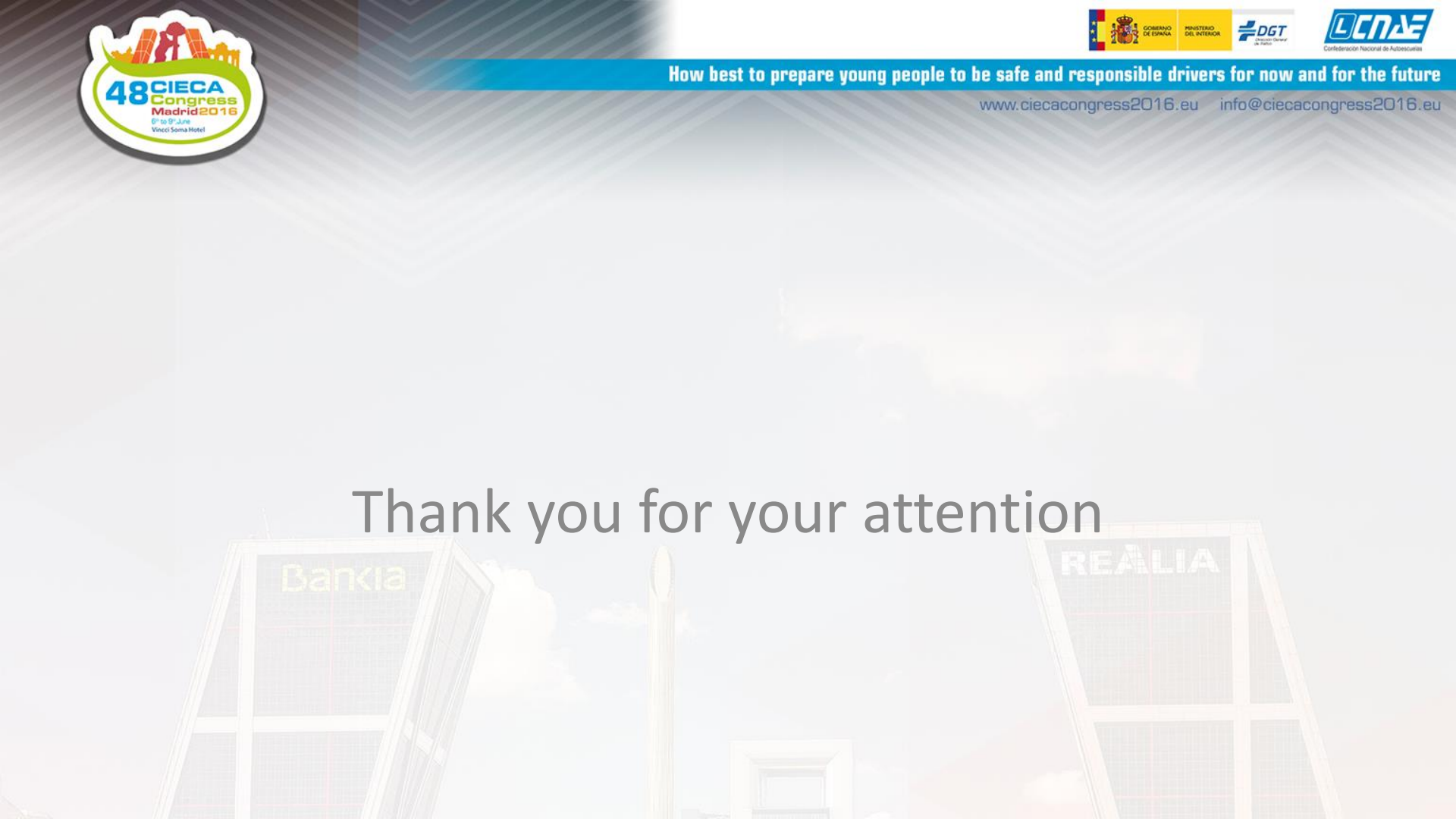
Transient difficulties that arise

- Adaption
- Design change (e.g. information, alarms)
- Learning new skills
- Reluctance to change
- Aids as traps

Long-term difficulties that arise

- Skill fade (automation dependency)
- Boredom
  - Fatigue
  - Attention lapses
  - Loss of situational awareness
  - Violations
- Complacency
- Failure to take control
  - Real-time reprogramming
  - Fault finding

Necessary Training

- Understand the full system functionality (full, partial and degraded)
- Monitor expected automation functioning
- Identify and use appropriate automation level
- Improved manual control
- Recurrent training to maintain competence
- Understand automation policies and philosophies

Thank you for your attention