ADAS and Drivers with Cognitive and Visual Impairments
Challenges and Opportunities

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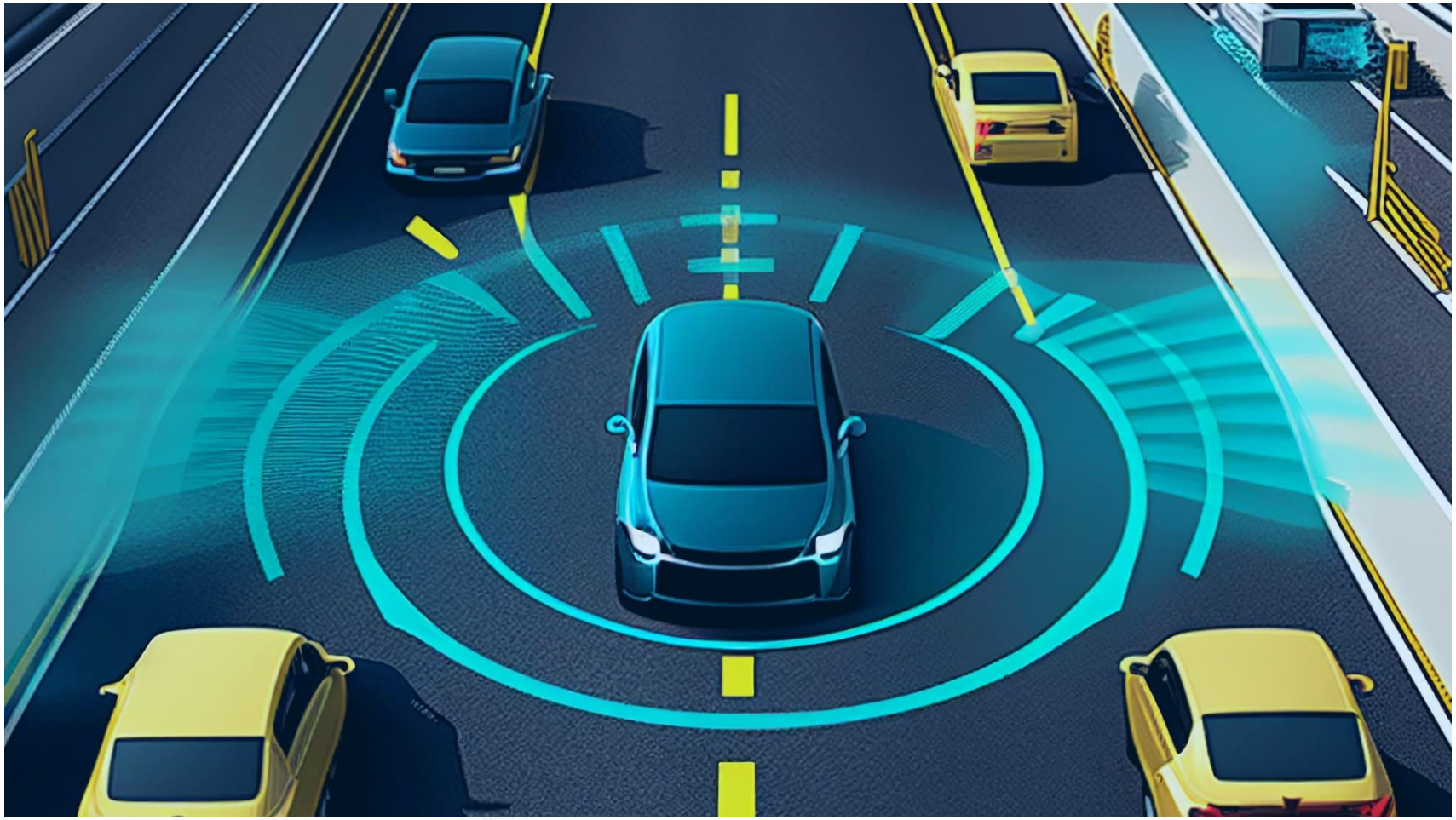
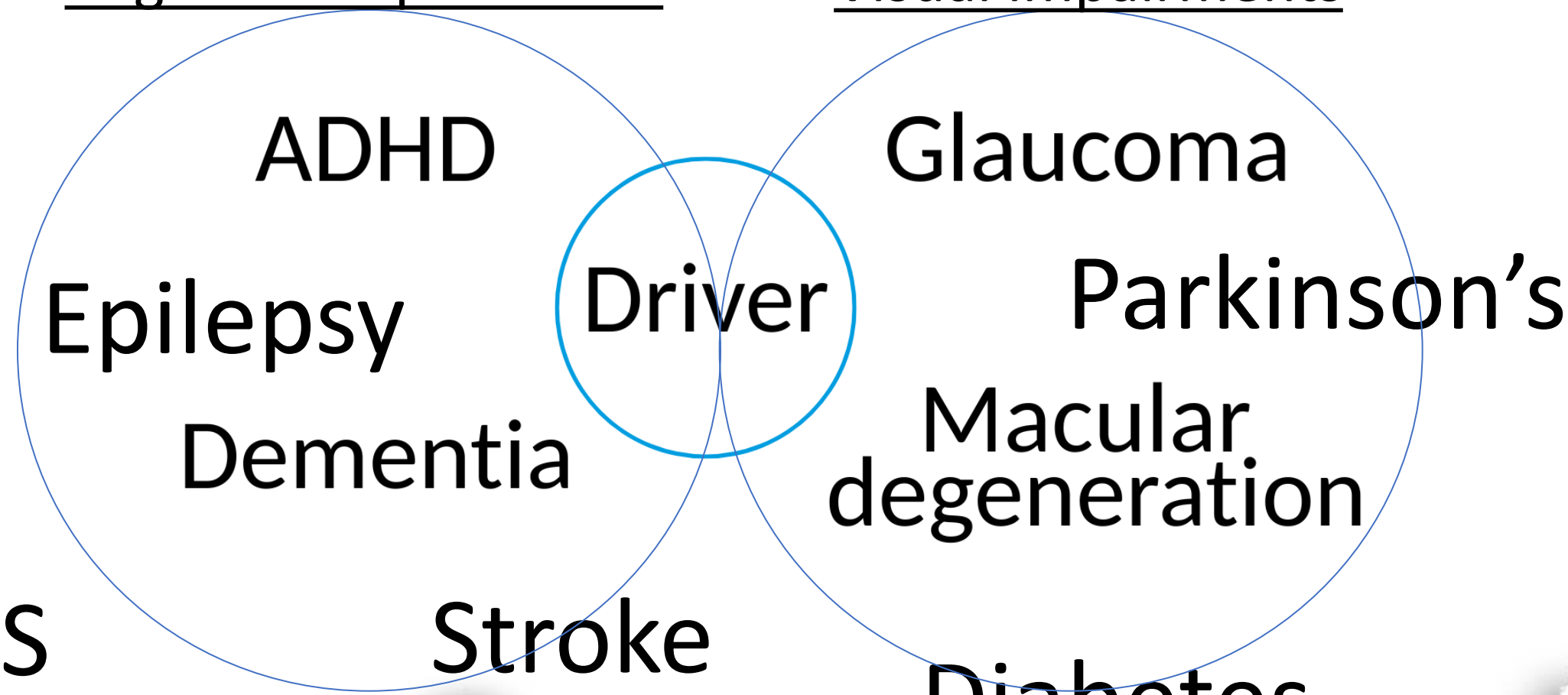
Vehicle automation



ADAS

- Blind spot monitor
- Driver drowsiness detection
- Driver monitoring system
- Electric vehicle warning sounds
- Forward collision warning (FCW)
- Intelligent speed adaptation (ISA)
- Intersection assistants
- Lane departure warning system (LDW)
- Parking sensors
- Tire pressure monitoring
- Vibrating seat warnings
- Wrong-way driving warning
- Crash mitigation
- Pedestrian protection systems
- Driving task assistance
- Adaptive cruise control (ACC)
- Automatic emergency braking (AEB)
- Anti-lock braking system (ABS)
- Automatic parking
- Collision avoidance system (pre-crash system)
- Crosswind stabilization
- Cruise control
- ESC control light
- Electronic stability control (ESC)
- Emergency driver assistant
- Hill descent control
- Hill-start assist
- Lane centering
- Lane change assistance
- Lane keeping assistance (LKA)
- Rain sensors
- Traction control system (TCS)
- Visual and environmental monitoring
- Automotive head-up display (auto-HUD)
- Automotive navigation system
- Automotive night vision
- Backup camera
- Glare-free high beam
- Omniview technology
- Traffic sign recognition (TSR)
- Vehicular communication systems

Our population



Methods

Literature

Attention

Working memory

Compensatory strategies

Reaction time

Expert meeting

Cognitive impairments – ADHD

- Alerts = double-edged sword.
- Risk of overstimulation → distraction.
- Risk of boredom → reduced vigilance.

Source: Reddit

Expert meeting

Cognitive impairments – Dementia

- Struggle to adapt to new systems.
- Memory loss → misinterpretation of alerts.
- Over-reliance → false sense of security.

Source: Eric Decetis

Expert meeting

Visual impairments – Glaucoma & macular degeneration

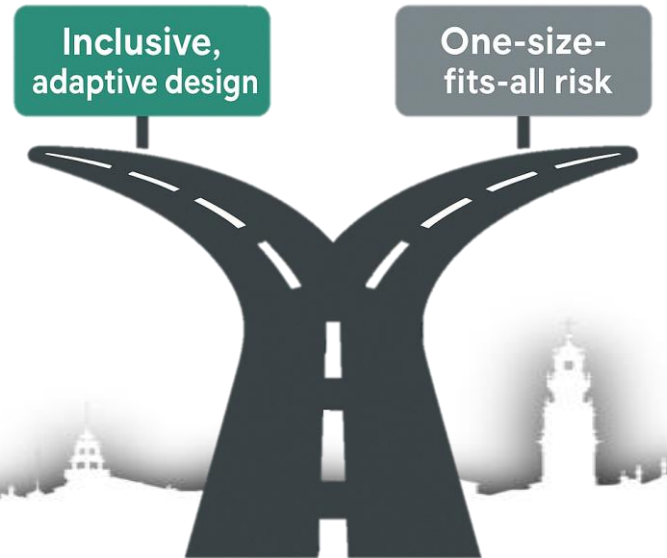
Source: employernews

Source: opmnj

Implications

Implications for technology design

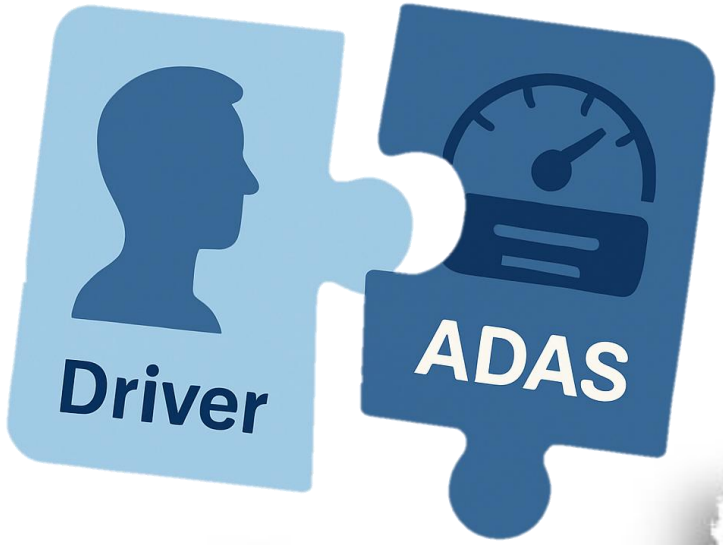
- Alerts should be clear, consistent, and non-overwhelming.
- Customization helps match system feedback to user needs.
- Design should support—not disrupt—compensatory strategies.



Implications

- <u>Implications for driver assessment</u>

- ADAS introduces new cognitive and sensory demands.
- Assessments should reflect real-world system use.
- Today's choices shape who benefits from automation tomorrow.



ADAS and beyond

Toward inclusive automation

- ADS challenges mirror those seen with ADAS, amplified.
- Inclusion must be built into system development from the start.
- We must build systems that support all drivers, not just the average.

Samen veilig vooruit

Thank you.

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