



The Advanced Technology Needs, Desires and Requirements of Older Drivers

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Who We Are...

Principal investigator:

- **Mike Bradley** - Product Design Dept at Middlesex - was head of Human Factors at Ford Motor Company

Co-investigator:

- **Suzette Keith** - Computer Science Dept at Middlesex - worked at ITT Human Factors

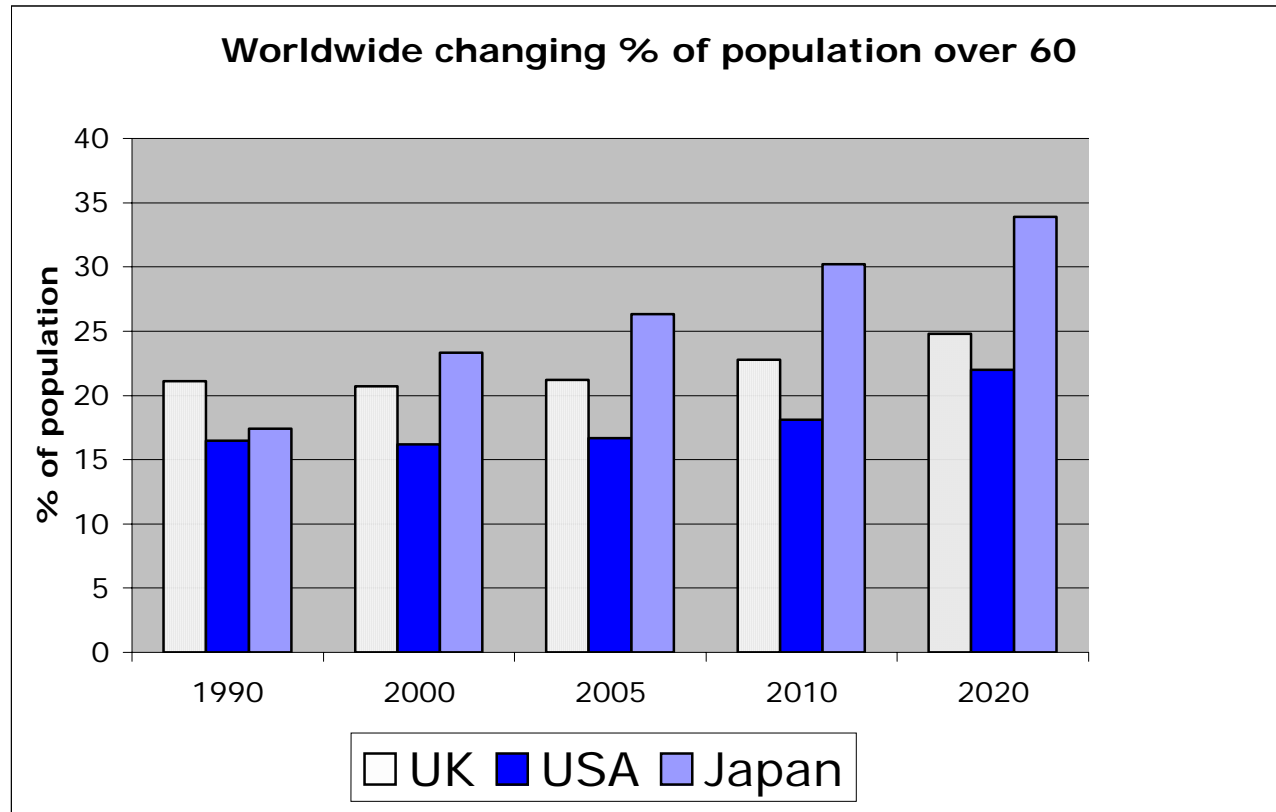
Project Partners:

- **Ford**, *Human Factors Dept*,
- **Brunel University**, *Design Group*

Populations are ageing eg UK, USA and Japan

- Increased longevity
- Low birth rate
- 'Baby-boomers'

UN statistics



UK predicted population trends

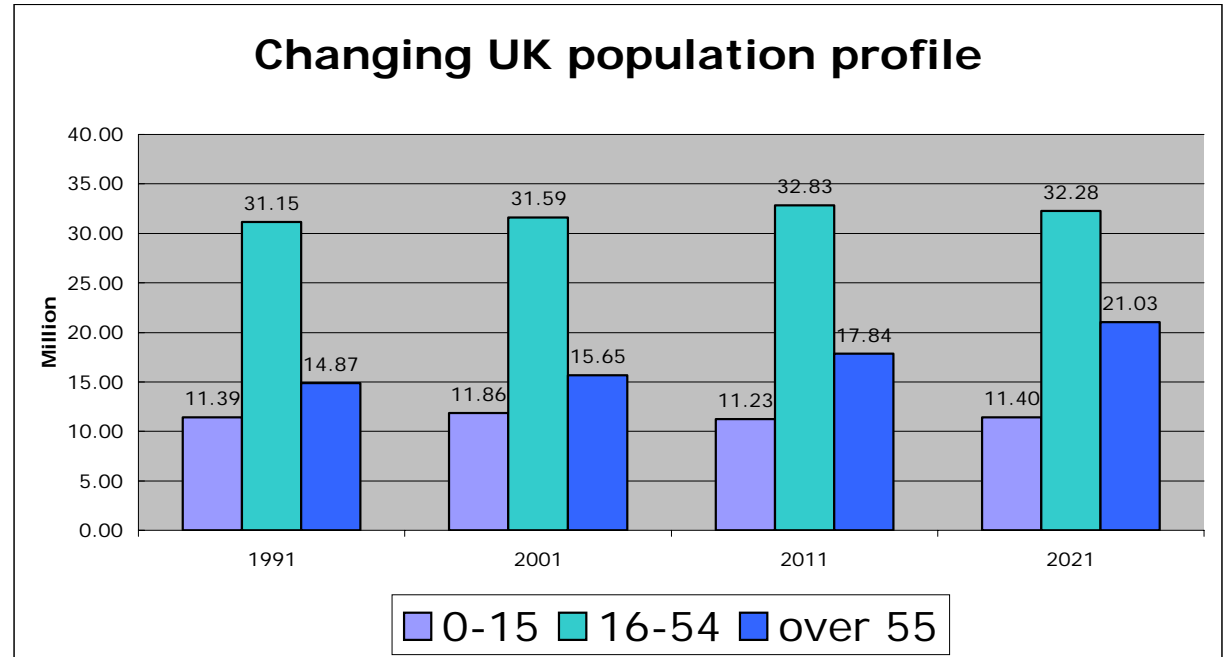
UK: over 60

The number of people over 60 exceeds the number of children under 16

UK: over 50

2002 = 19m

2020 = 25m



UK National Statistics and predicted trends

The older driver - a new phenomena

- Thirty years ago only 15% of those over 70 held a driving licence, now it has risen to 51%
- Gender differences are closing for the over 70's
 - 1992 (past)
 - 59% of men, 17% of women
 - 2005 (current)
 - 73% of men, 28% of women aged
 - 2020 (predicted)
 - 78% of men, 58% of women

Research questions

- What do older drivers think of the potential of new technologies in cars?
- What are their experiences of advanced technology interfaces in cars?
- What can be done to design new technology interfaces to make them more appealing to older users?
- How can we make sure that the needs of older drivers are recognised?

So what have we done so far?

- Created a group of 228 car drivers born before 1956 who responded to our recruitment questionnaire
- Carried out focus groups and telephone interviews with 30 members of user group to investigate driving experiences, critical incidents and everyday issues
- Designed, developed and assessed usable interfaces for devices that help drivers to 'not speed'

Our approach...towards participation

- User-led
- Users define the topic
- Users involved in development process
- Users involved in dissemination
- Ethical



Our user panel

- Recruited through contact with local social groups
- Major metropolitan and suburban drivers in Northwest London, and Borehamwood, Lincoln and Nottingham
- Age: 50-59 (21%), 60-69 (32%), 70-79 (33%), 80+ (11%)
- Balanced for gender
- Miles driven per year: range from 1000 to over 20,000
 - 65% of over 80's drive 5000m per year or less
 - 66% of 50-59 drive over 10,000 miles

Background to research

- Driving highly valued
 - Independence and freedom
 - Convenience, fewer restrictions, flexibility.
 - Safety, peace of mind

Quotes from focus groups:

"My car is an extension of me, I don't know what I would do if I couldn't drive"

"There are so many things I wouldn't be able to do without my car"

Problems of speeding - skill or luck?

Quotes from telephone groups on speeding and speed cameras:

"Motoring used to be a pleasure..but no, the pleasure has gone out of it because of the roads, speed cameras and volume of traffic"

"(I stick to the speed limit).. To an annoying degree because the traffic behind you seems to pile up if you stick to the speed limit"

(I would be) 'mortified to get points on my licence'

"I like to drive fast.."

What do we have planned?

- To use data collected and analysed to help set design requirements
- To develop simple test prototypes
- To learn more about the needs of older drivers and how to find out more about them

Why do people speed?

- *84% of people disapprove of speeding but 70% admit to doing it...*
 - 45% react to speed cameras by braking automatically regardless of their speed
 - 74% found they tended to 'creep' above 30mph without realising
 - Most popular reason for speeding is that it was 'unintentional'

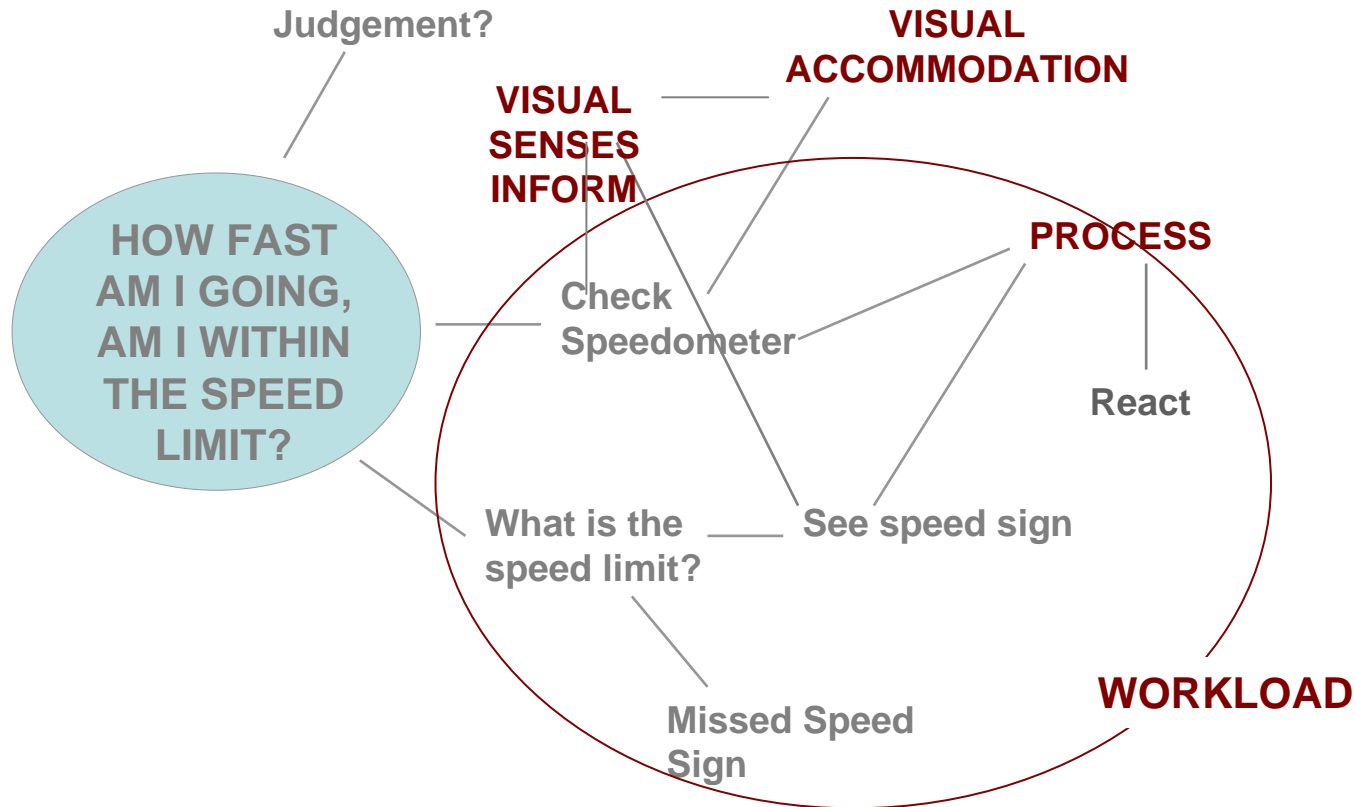
Unintentional speeding

Modern vehicles feel safer - quieter,
more comfortable at high speeds

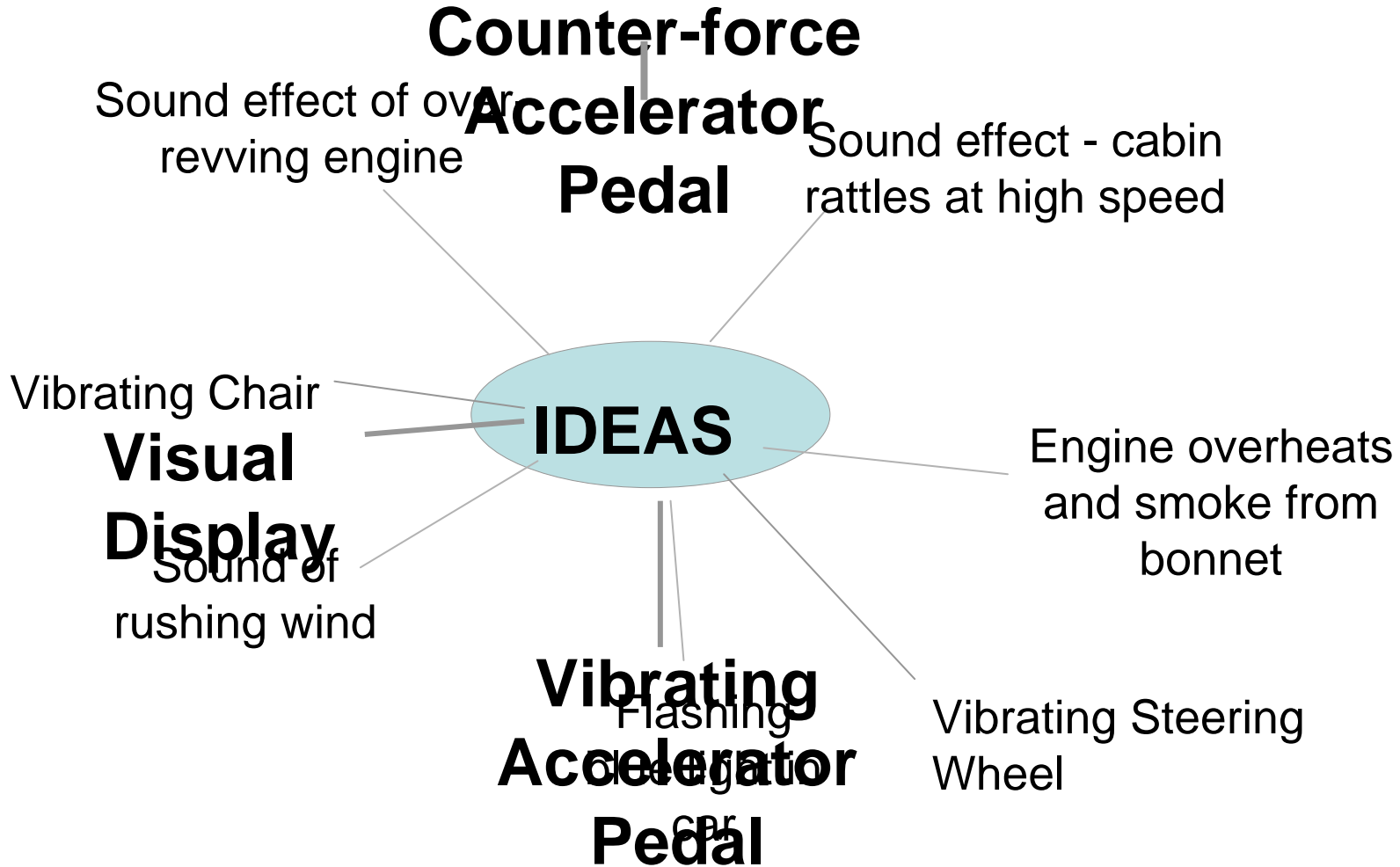
- Wrong gear choice for speed
- Reluctance to check speedometer
- Safe driving - keep eyes on the road
- Distance to speedo difficult to focus on

"I try to stick to 30 but it is so difficult because of the power of the cars today, it's so easy to get to 40"

The task of checking speed

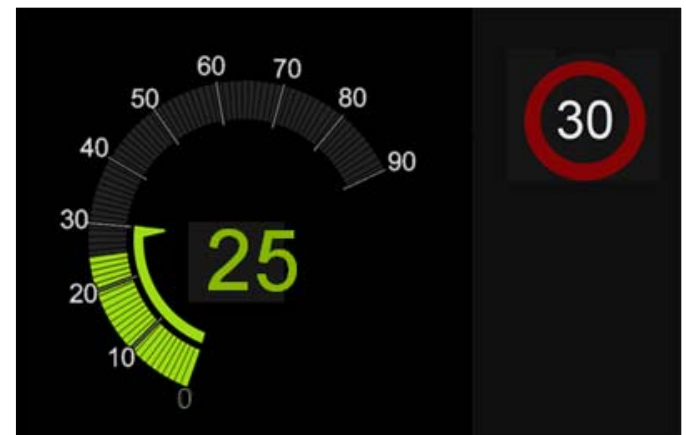


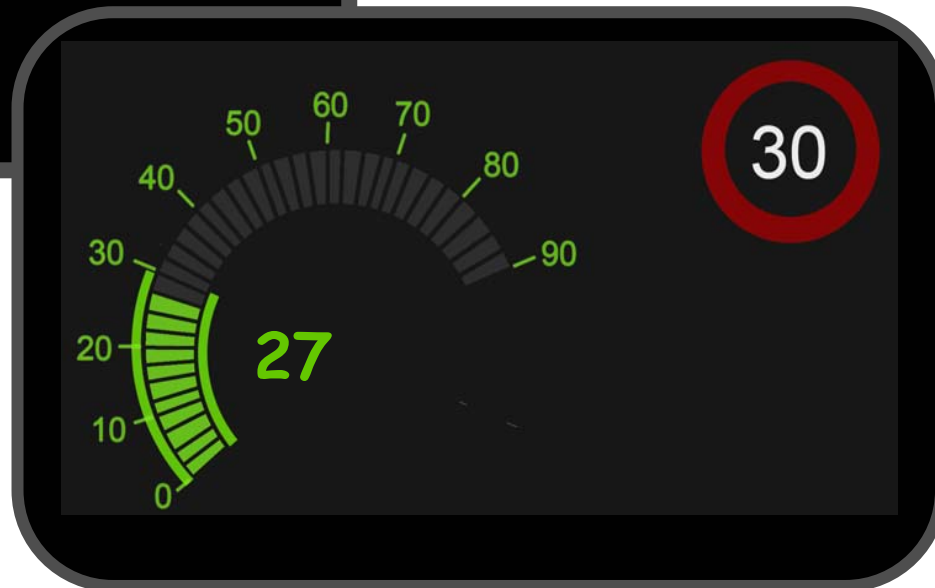
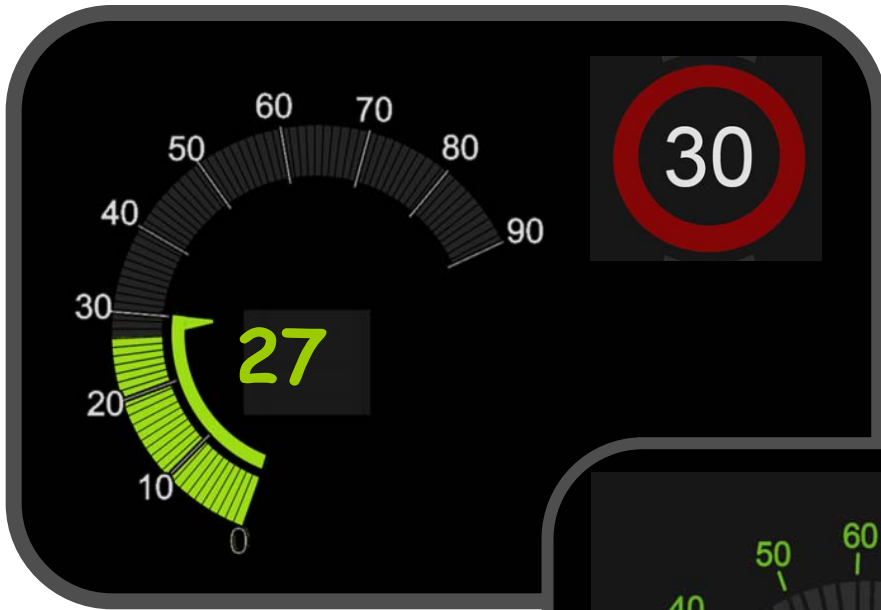
Design concepts

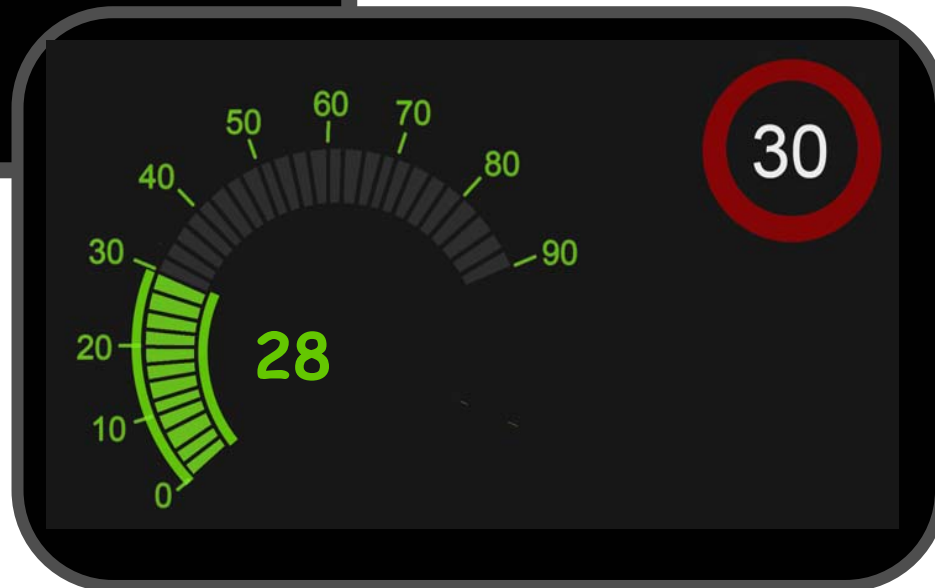
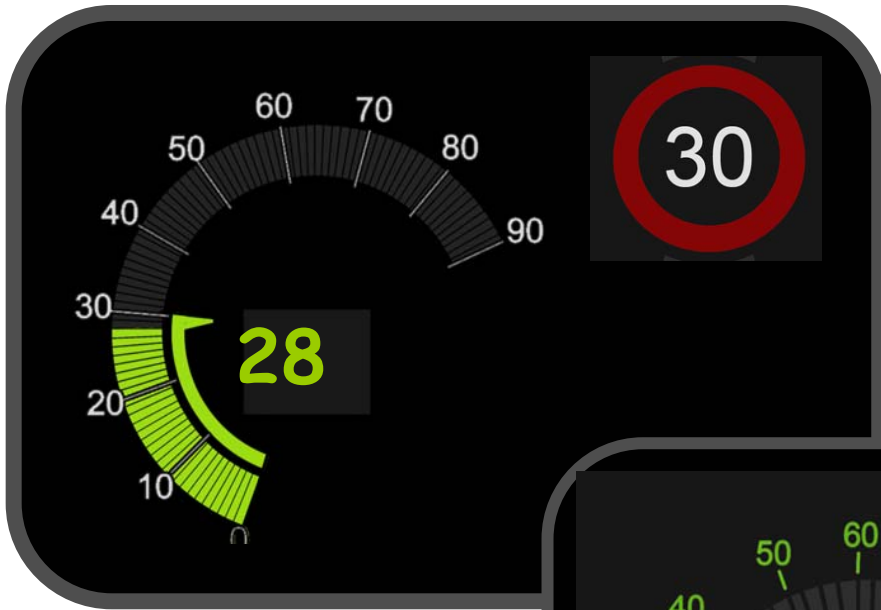


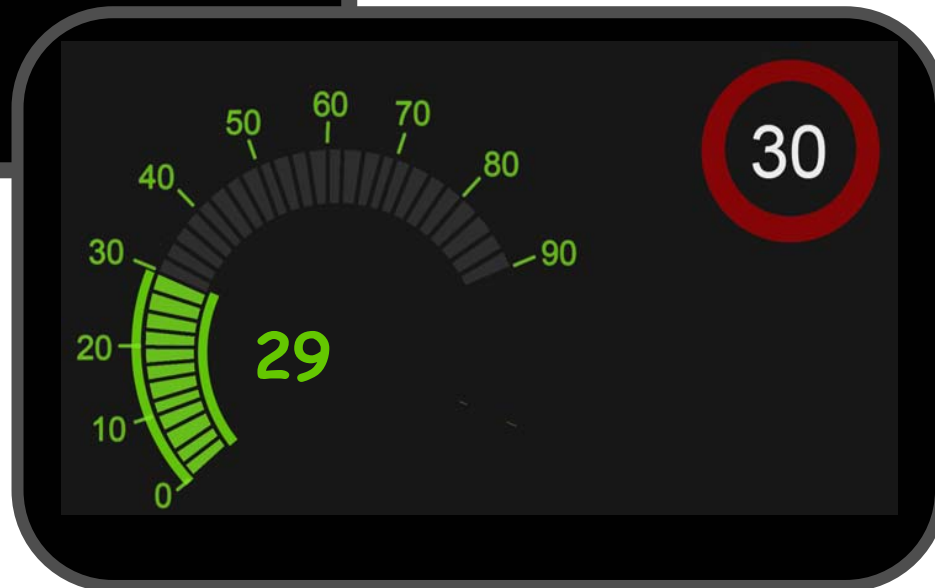
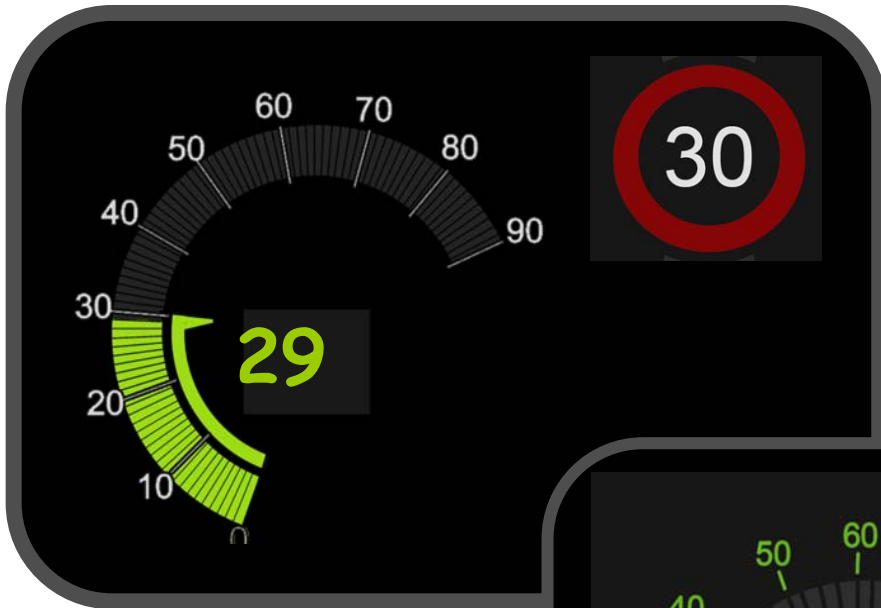
Visual display concepts

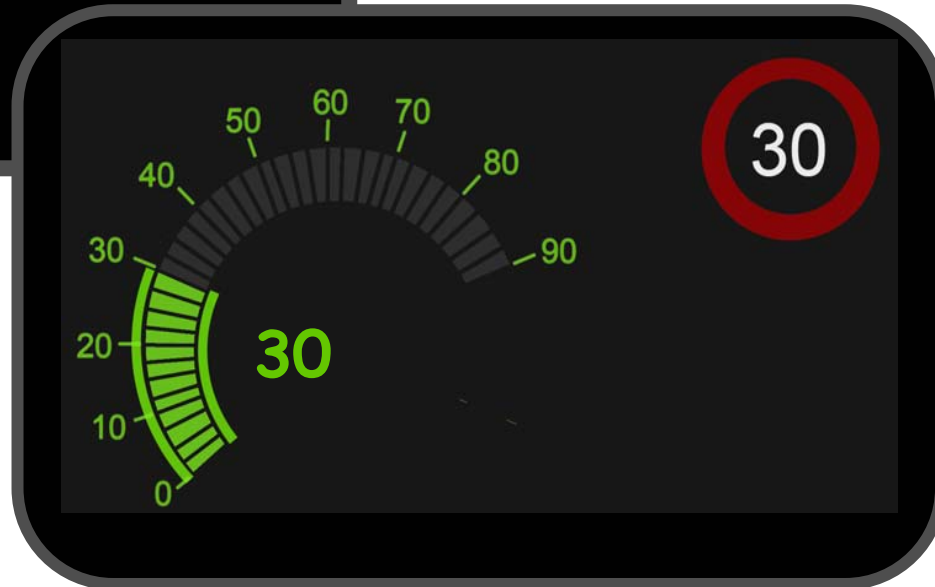
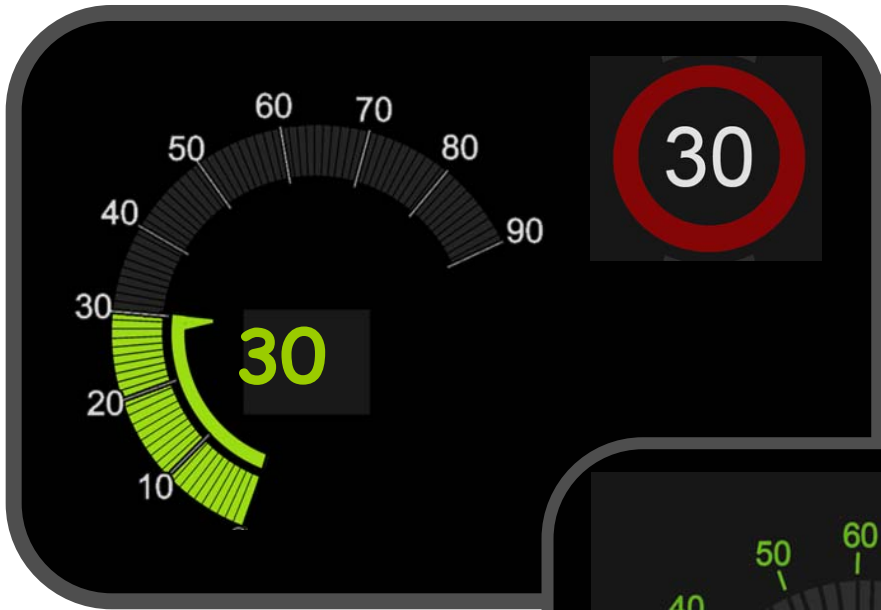
- Making salient non-speed limit compliance

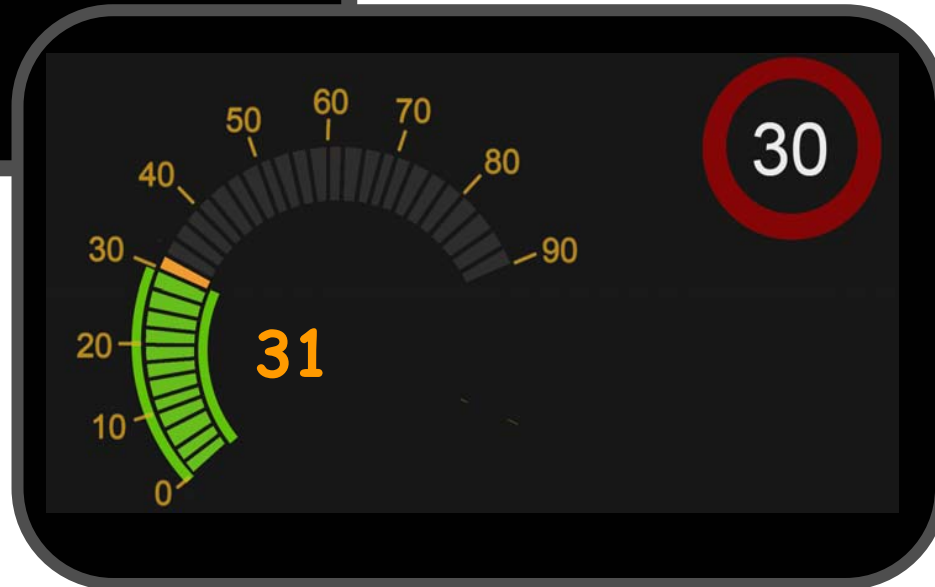
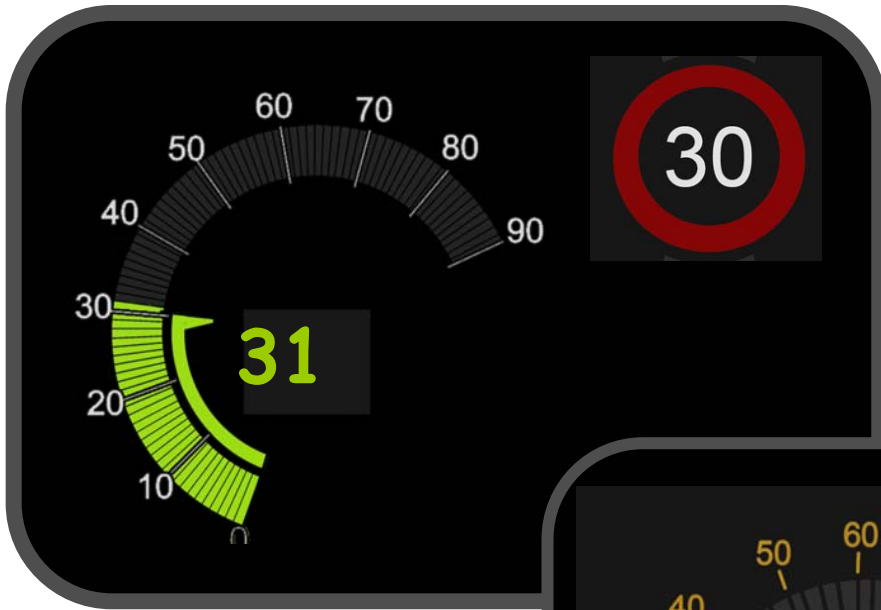


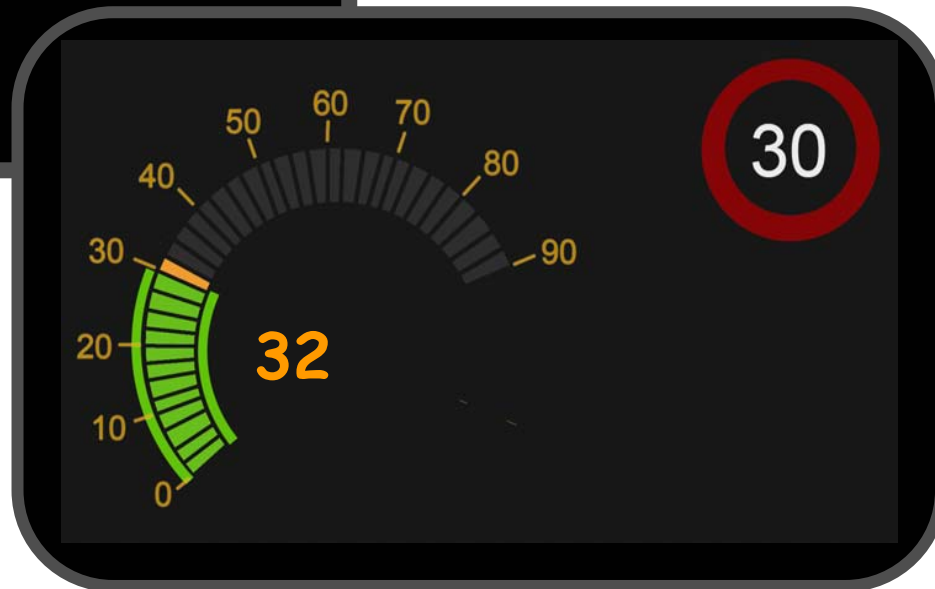
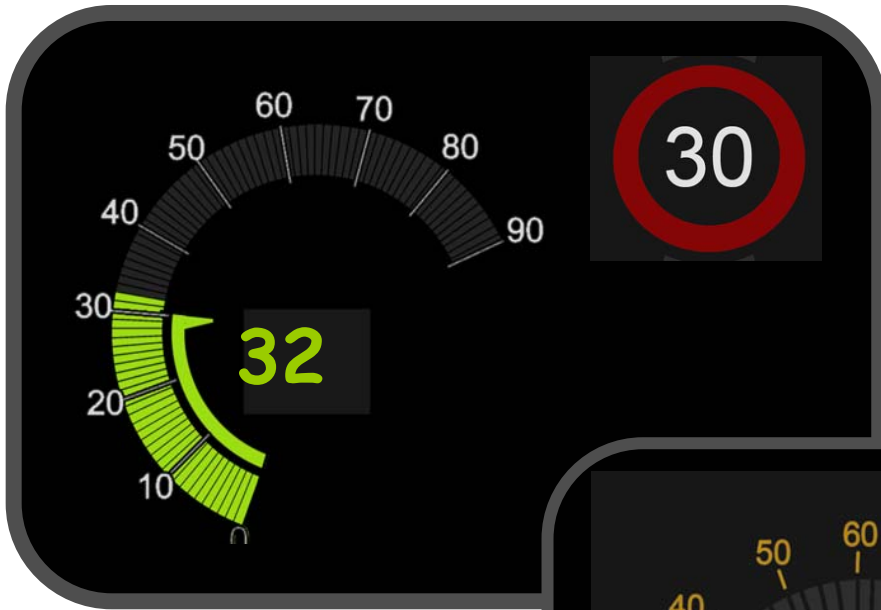


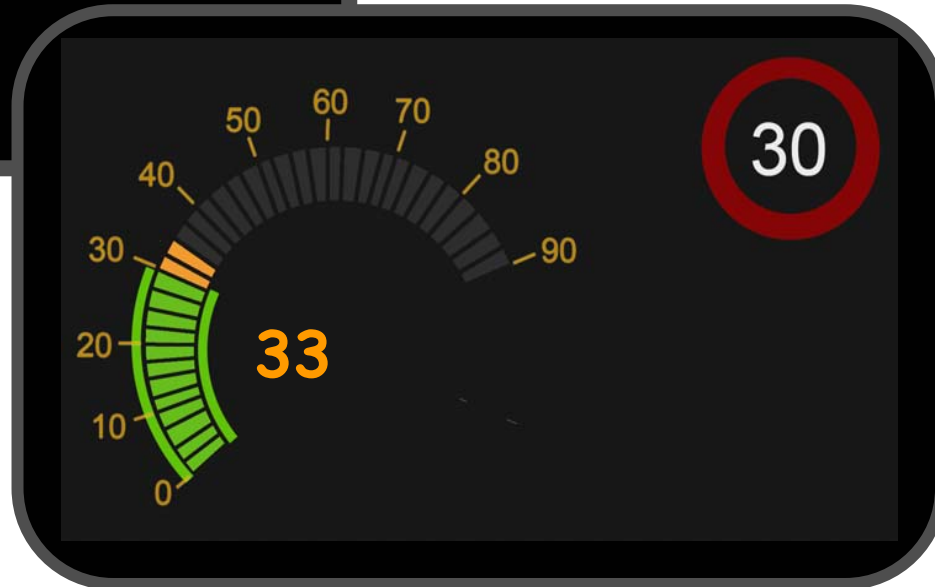
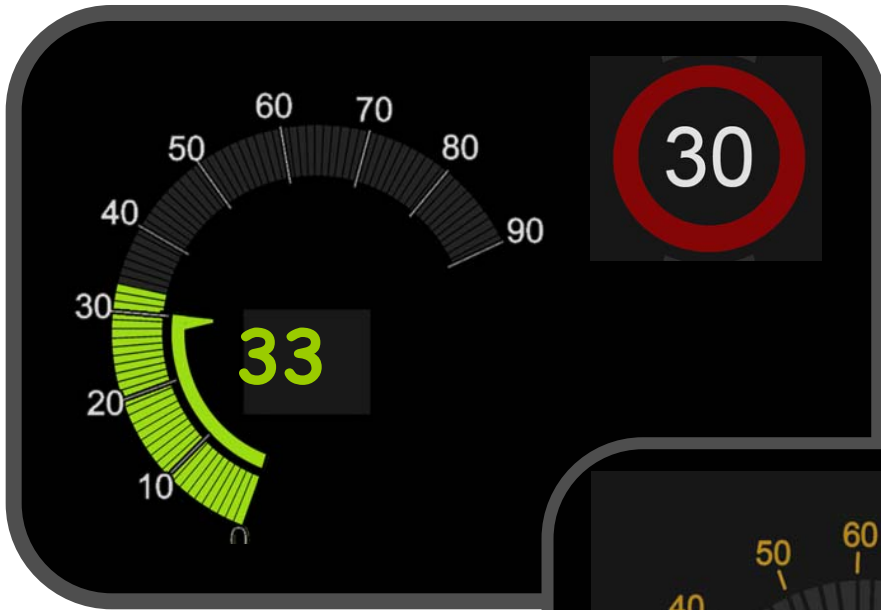












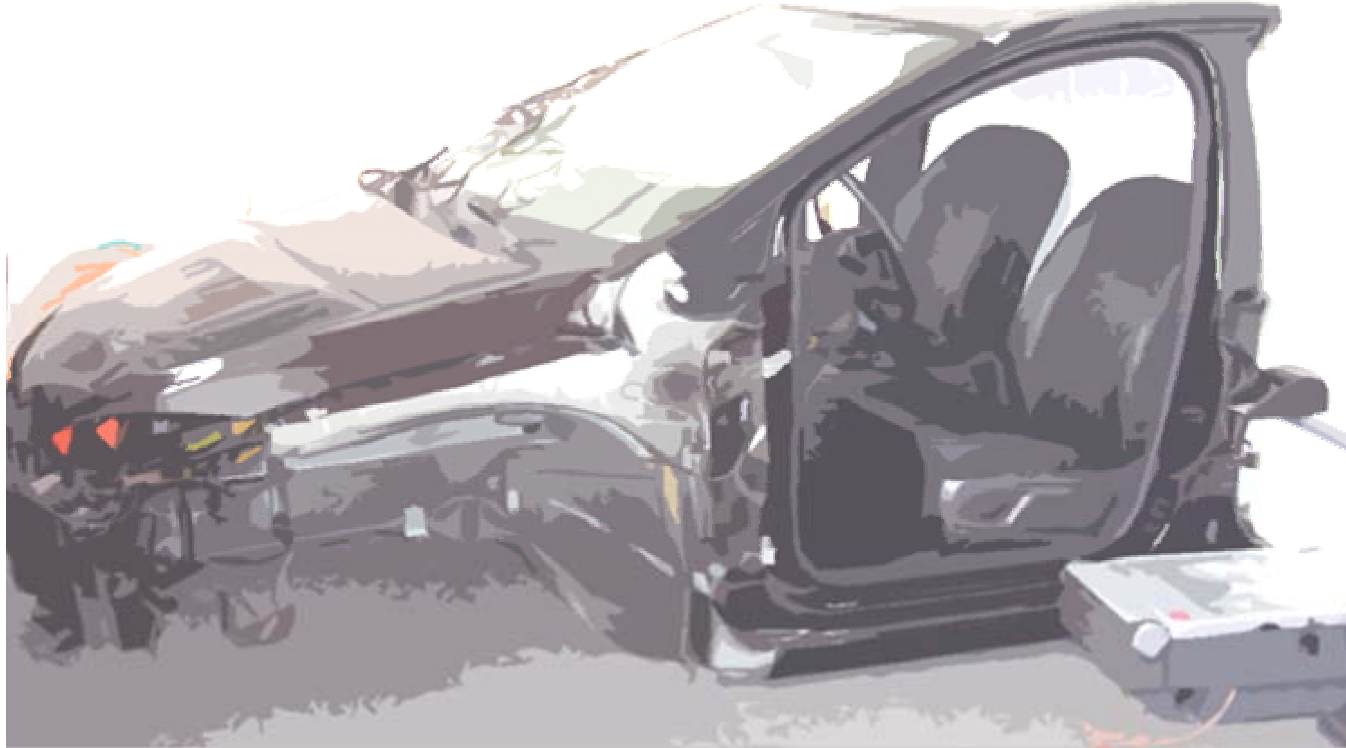
Visual display test rig



Visual display testing

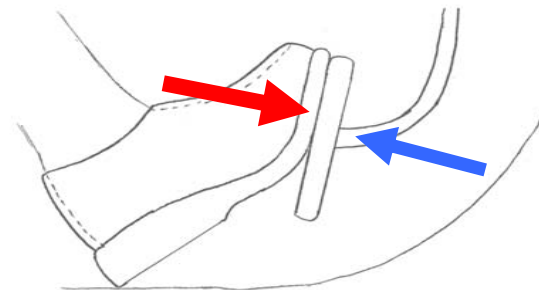
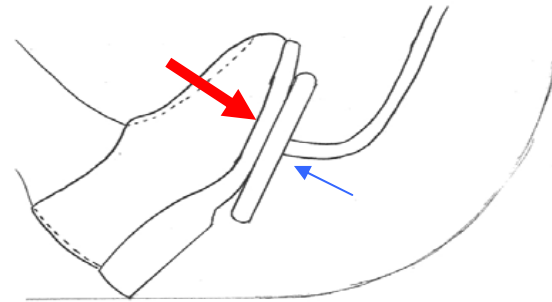


Haptic feedback test rig



Haptic counterforce pedal

- **Speed-limit exceeded - pedal 'pushes back'**
- **More force input required to accelerate**
- **Informative only**

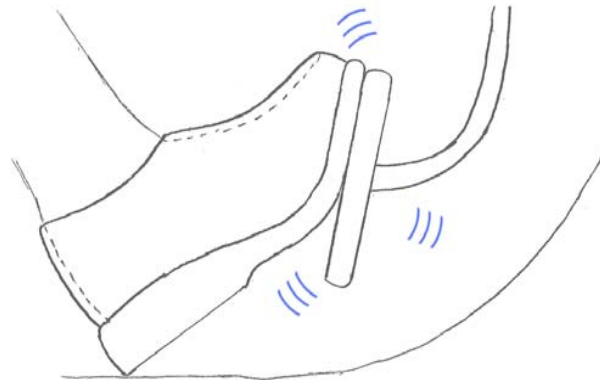


Haptic counterforce in action...



Haptic vibrating pedal

- **Speed-limit exceeded - pedal vibrates**
- **Informative only**



Haptic vibration in action...



Haptic testing



Results and conclusions

- Existing speedometer displays a problem for all participants
- Positioning of display and shifting focus a key issue
 - Head-Up-Displays mentioned
 - Prefer display to be higher up, more in field of view
- Colour changes in visual displays beneficial
 - For those with full colour vision

Results and conclusions

- Haptic feedback systems acceptable to older drivers with some reservations
 - Favoured system different for each participant
 - Optimise 'amount' of feedback (user set?)
 - Vibration feedback could become irritating over time?

Next stages

- **Development of the visual display speedometer**
 - Acceptable to colour blind and those with full colour vision
- **Development of improved haptic feedback**
 - Enable greater variation of feedback characteristics
 - Accurate determination of feedback values (i.e. frequency, amplitude)

Next stages

- Continue with participative design methodology
- Create a more immersive and interactive test environment
 - Integrate existing controls with a video game
- Test in driving simulator
- Unify visual and haptic displays for testing together

Impact of research

- Potential commercial benefit and influence on industry
- Capacity building
- Developing methodology
- Education of next generation of designers/engineers
- Developing body of knowledge
- User group available for industry
- Participation in the design/research processes

Thank you for your attention!

Questions? Comments?

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