Presentation of "Putting safety in the driving seat"

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Putting Safety in the Driving Seat

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Ergonomics & Safety Research Institute (ESRI)

Vehicle Safety Research Centre (VSRC)
- Accident investigation
- Crash worthiness
- Occupant protection
- Safety research
  25 staff

Transport Technology Ergonomics Centre (TTEC)
- Vehicle telematics
- Physical ergonomics
- Vision/conspicuity
- Mobile comms
  12 staff

Human Focused Design Centre (HFDC)
- Product design
- Safety Strategy
- Inclusive design
- Usability
  13 staff
In-vehicle systems

STANDARD
Primary driving controls
HVAC
Vehicle status
ICE

FUTURE
ACC
Collision warning
Vision enhancement
Driver status

EMERGING
Navigation
Traffic information
Mobile office
Tolling
The potential for overload

Information:
- Business appointment, unfamiliar town, late
- Multi-lane roundabout, take 4th exit
- Heavy traffic, wrong lane for exit
- Phone call from office re. the meeting

Result:
- Near miss on lane change
- Lose track of exit, take wrong turn
- Forget figures given by office
The informed passenger...

- “You need to move into the right-hand lane”
- “Watch out for the car on your inside”
- “Exit is the one after the church”
- “I’ll take the phone call for you”
The informed passenger embodied in a system

- Natural interaction
- Managed information
- Novel solutions
If you need convincing...

% of journey time glancing towards areas of visual scene

Passenger vs (Navigation System)
More evidence?

Reaction time to pedestrian (seconds)

No display | Top of dash | Mid-console | Low-console

0.8 | 1.6 | 2.0 | 2.0
Solutions

- Natural interaction: Navigation study ‘REGIONAL’
- Manage information
- Novel solutions
Information used by drivers

Frequency counts

General info category

- Direction sign (nav)
- Direction sign (object)
- Distance
- Environment
- Junction
description
- Junction
name/number
- Landmark
- Lane change
- Node geometry
- Path geometry
- Road marking
- Road type
- Street
- name/number
- Time

Categories:
- all information
- main
- secondary
Improved safety

Road trials comparing different HMIs (Burnett, 1998)

HMI using distance-to-turn

Typical in-vehicle display views

Typical voice instructions

“Turn right in 200 m”

Average number of glances to Navigation Display on final approach to turning

5.0

HMI using landmarks

“Turn right at the Postbox”

Postbox

1.6
Solutions

- Natural interaction
- Managed information Integration study ‘VIVID’
- Novel solutions
The integration issue

- Reduce driver workload
- Increase usability
- Minimise safety implications
- Increase acceptance
The VIVID Tool

- Environment
- Driver behaviour
- Rule base
- Priorities
- Timing
- Road layout
- Messengers
- Waypoints

Transport Technology
TTEC
Ergonomics Centre
Loughborough University
Application of VIVID

1. Dealing with conflicts
2. Scheduling of information
3. Mental models
Solutions

- Natural interaction
- Managed information
- Novel solutions
  Speech recognition study
  ‘SPEECH IDEAS’
Telephone speech dialling

- Digits from memory
- Manual
- Speech (audio feedback)
- Speech (audio and visual feedback)
- Tracking task
Effects on tracking performance

- Manual
- Speech audio
- Speech combined

Mean tracking error (RMS pixels)

- Driving only
- Driving + phoning
Some current activity

- **European Statement of Principles**
  - HMI for in-vehicle information and communication systems

- **ISO/TC 22/SC 13/WG 8**
  - Visual distraction
  - Assessment of system suitability for use while driving
  - Message prioritisation
  - Driver-system integration