Presentation of ‘‘Putting safety in the driving seat’’

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Putting Safety in the Driving Seat

Tracy Ross, TTEC
Loughborough University
t.ross@lboro.ac.uk
Loughborough University

Research School in Ergonomics & Human Factors

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
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
Solutions

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

General info category

- Direction sign
- 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

Frequency counts

- 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”

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

Environment

Driver behaviour

Rule base

Priorities

Timing

Road layout

Messengers

Waypoints
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

Mean tracking error (RMS pixels)

- Manual
- Speech audio
- Speech combined

- Driving only
- Driving + phoning

300
400
500
600
700
800
900
1000
1100
1200
1300
1400
1500
1600
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