Driver Distraction AND Fatigue

Workgroup 3 of TC 3.2 „Design and operation of Safer Road Infrastructure“:

Brendan Marsh (Australia)
Uroš Brumec (Slovenia)
Jaakko Klang (Finland)
Keith Cota (United States)
Pierre Anelli (France)
Lise Fournier (Canada)
Bernhard Lautner (Austria)

6 November, Seoul, South Korea
What is your road safety priority?

• Reduce crashes?
• Prevent people from being seriously injured or killed?
• Prevent the devastation that results from a serious crash?

=> Prioritise the prevention of serious crash outcomes.
Safe Road System Framework (1)

Contain crash energies to within the human tolerances:
• 70km/h : frontal, rear end and roll over
• 50km/h : 90 degree side
• 30km/h : unprotected

=> Road users can potentially be sustainably safe even with the risk of driver distraction and fatigue.
Crashes are SAFE (people are not seriously injured or killed).

Road safety measures that reliably lower potential crash energies to within the human tolerances generally PREVENT serious crash outcomes.

Road safety measures that depend upon the road user (e.g. road rule compliance) or the post-crash response DO NOT reliably prevent serious crash outcomes.
Humans and Driving

Form mental model of road, traffic, conditions and objectives.

Gather inputs:
- check speed,
- scan road
- Read signs
- Scan mirrors
- etc

Does the next situation fall within an automated learned skill response?

Subconscious (Automated) Response

Y

Consciously orchestrated response (with combined conscious and subconscious elements)

N

Conscious brain activated

1. Identifies “sub” automated learned skill responses.
2. Calculates aspects of response beyond learned skills.
A driver can only focus on one thing at a time. Scientific observation of a driver travelling a roadway and monitoring their focal point over time
Humans and Driving

Decay of information from five and seven separately performed repetitive tasks
Monotony Fatigue - Driver Activation

Can be 7 seconds or more to re-activate, depending upon how de-activated the driver is.
Role of Road Engineering

1. Where possible contain potential crash energy to within tolerances:
   • Road safety barrier
   • Low conflict energy intersections (e.g. roundabouts)
   • Calm traffic where unprotected road user interactions are high

2. Manage driver activation
   • Short distractions can be beneficial
   • Don’t coincide public art / road information / other attractors of attention with high risk road locations – place them in advance
   • Interact with multiple human senses, e.g.: 
DRIVER DISTRACTION & FATIGUE
ENGINEERING SOLUTIONS

LOW COST ENGINEERING SOLUTIONS
• INCREASE VISIBILITY WITH SIGNAGE (CHEVRONS)
• OPEN GRADED PAYMENT
DRIVER DISTRACTION & FATIGUE
ENGINEERING SOLUTIONS

“TALK-TO-THE-DRIVER” STRATEGIES
• SPEED HUMPS
• RUMBLE STRIPS
• SIGNAGE
• TEXTURED PAVEMENT
DRIVER DISTRACTION & FATIGUE ENGINEERING SOLUTIONS

COMPETING COMMERCIAL ADVERTISING WITH TRAFFIC SIGNAGE
DRIVER DISTRACTION & FATIGUE
ENGINEERING SOLUTIONS

LOW COST ENGINEERING SOLUTIONS
IMPROVED PAVEMENT MARKINGS & SIGNS
INTRODUCTION OF ROADWAY GEOMETRY CHANGE WILL HELP TO REINGAGE THE DRIVER’S ATTENTION
DRIVER DISTRACTION & FATIGUE ENGINEERING SOLUTIONS

- ROADWAY SPEAKS TO THE DRIVER -
MILLED AUDIO TACKTILE LANES
AT SHOULDER AND/OR CENTER LINE
DRIVER DISTRACTION & FATIGUE
ENGINEERING SOLUTIONS

ESSENTIAL RECOGNISABILITY CHARACTERISTICS (ERC)

ROADWAY TRANSFORMATION TO INFORMATIVE AND RECOGNISABLE LAYOUT
DRIVER DISTRACTION & FATIGUE
ENGINEERING SOLUTIONS

REST AREAS AND WELCOME CENTERS
THE FUTURE

• Road authorities and engineering need to:
  • Re-focus onto ensuring CRASHES ARE SAFE.
  • Take greater responsibility for preventing serious injury and death when crashes occur
  • Implement the Safe Road System Framework
THE FUTURE

• We can no longer blame the road user for:
  • Many forms of Driver Distraction or Fatigue
  • Serious injury arising from a Driver Distraction or Fatigue crash

• Further work is required to redefine and unite the Human Factors elements of road engineering to:
  • Recognise the latest cognitive science findings
  • Design a road environment that consistently engages with both the subconscious and conscious brain operations and causes all the users to naturally use the road within its safety limitations
  • Maintain driver activation and increase activation ahead of serious crash risks.
For further information, contact:

- Brendan Marsh:
  +61 427 515 677
  Bren@bjmarsh.com.au

- Uros Brumec:
  +386 1 30 68 331
  uros.brumec@dri.si

- Jaako Klang:
  +358 400 824207
  Jaakko.klang@ely-keskus.fi