Human Factors Operational Traffic Safety Review

CLIENT: CHRISTCHURCH TRANSPORT OPERATIONS CENTRE (CTOC)

YEAR: 2015–current

Christchurch traffic congestion levels are at an all-time high. CTOC sought the services of HFEx to help them to reduce and manage congestion levels through four different avenues:

- Real-time transport operation control centre
- Two in-vehicle smartphone applications for drivers
- Driver behaviour at intersections
- Temporary traffic management practices

CTOC requested that HFEx conduct human factors assessments to include the following:

- a cognitive ergonomics assessment of the real-time transport operation control centre
- a usability assessment of in-vehicle smartphone applications
- a human factors review of driver behaviour at intersections
- a human factors review of temporary traffic management practices

The following details how HFEx successfully conducted these human factors assessments in operational environments.

HFEx Ltd's approach

Cognitive ergonomics assessment of real-time transport operation control centre

HFEx conducted structured interviews with experienced control centre operators in order to extract detailed information about their tasks. Operational observations during high and low traffic congestion times were then conducted. The HFEx team obtained video graphic, verbal and observational data.

Usability assessment of two in-vehicle smartphone applications for drivers

In-vehicle trials of each smartphone app were conducted with naive participants. This involved multiple observations of a variety of drivers, from baseline (without app), to first-use of the apps, and finally to the point where they were experienced users of the apps. Think-aloud protocols were conducted at certain stages of each trial. During these, the driver verbalised an un-filtered stream of their thoughts. HFEx later analysed these to measure levels of situation awareness using established human factors methods.

Human factors review of driver behaviour at intersections

Firstly, online surveys were conducted to investigate why drivers make the choices they do at intersections. Over one week, approximately 300 Christchurch drivers representing the customer's desired demographic completed a survey designed by HFEx. A cost-free survey platform was used and participants were recruited through channels such as social media and word of mouth.

HFEx then observed traffic at several key intersections where problematic behaviours were commonly cited. This involved observing traffic from a suitable vantage point, taking notes, and recording video footage to later review.

Semi-structured interviews and focus groups were then conducted. All drivers represented the demographic of interest to the customer. Discussions with CTOC real-time operations staff were also conducted, given that these staff witness driver behaviours throughout the day via camera feeds to the control room.

Human factors review of temporary traffic management practices

HFEx interviewed both staff from within CTOC, and temporary traffic manage representatives themselves. This consisted of face-to-face interviews and phone interviews.

Challenges

Working operationally is quite different to working in a laboratory or simulated environment. HFEx is working with numerous challenges including availability of participants and the varying affordances that operational environments offer.

Benefits and outcomes for the client

The findings have provided the customer with:

- Suggestions to improve the layout of the operations control room
- Methods for improving communication between stakeholders and emergency responders
- Improved understanding of the magnitude of problems stemming from driver behaviour at intersections
- Recommendations for trialling road design changes
- Estimated impacts on traffic congestion that addressing driver behaviour at intersections may have
- Risks relating to user distraction and over-reliance following operational testing of smartphone apps
- Opportunities to improve the usability of two smartphone apps
- Underlying causes of communications difficulties between staff