AUSTRIA VIENNA 2024 IRSC INTERNATIONAL Railway Safety Council

Exploring the effectiveness of driver attention and alertness monitoring devices for GB railway

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Introduction

- Loss of attention and alertness can have significant impact on safety (e.g. Sandilands tram accident)
- RSSB study (2018) into SPADs revealed loss of alertness and attention to be a factor in 49% of events
- Evidence suggests that driver attention and alertness technology can reduce the risk

Croydon Trams: Overwhelmingly positive results	75% ↓ in fatigue events	30% ↓ in distraction events	300% ↑ in driver incident reporting

- The ORR set mainline rail (heavy rail) with a challenge: Invest research capacity to understand how this technology can be implemented and the safety benefits it could bring.

RSSB instigated this study to determine what driver attention and alertness monitoring technology would be suitable for GB mainline (phase 1) and determine the benefits of the technology through a live trial (phase 2)

Method

Phase 1

Driver alertness & attention technology

Indicators

Lessons Learnt from other industries

Application to mainline rail

Literature review
Interviews
Site visits
Workshops

Developed functional requirements for a GB rail specific device

AND

A good practice implementation model

Phase 2

Live trial

Three train companies

12 months

A&A = Attention & Alertness

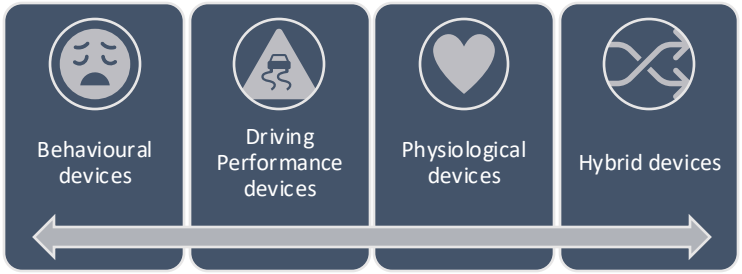
<u>Objectives</u>

Develop understanding of the cause of loss of A&A

Identify opportunities to improve A&A

Evaluate the technologies ability to ↓ the consequences of loss of A&A events

Phase 1 – Findings



Driver Alertness and Attention Monitoring Technology

- Four types of devices (n=61)
- Behavioural devices were identified as being the most suitable for GB mainline

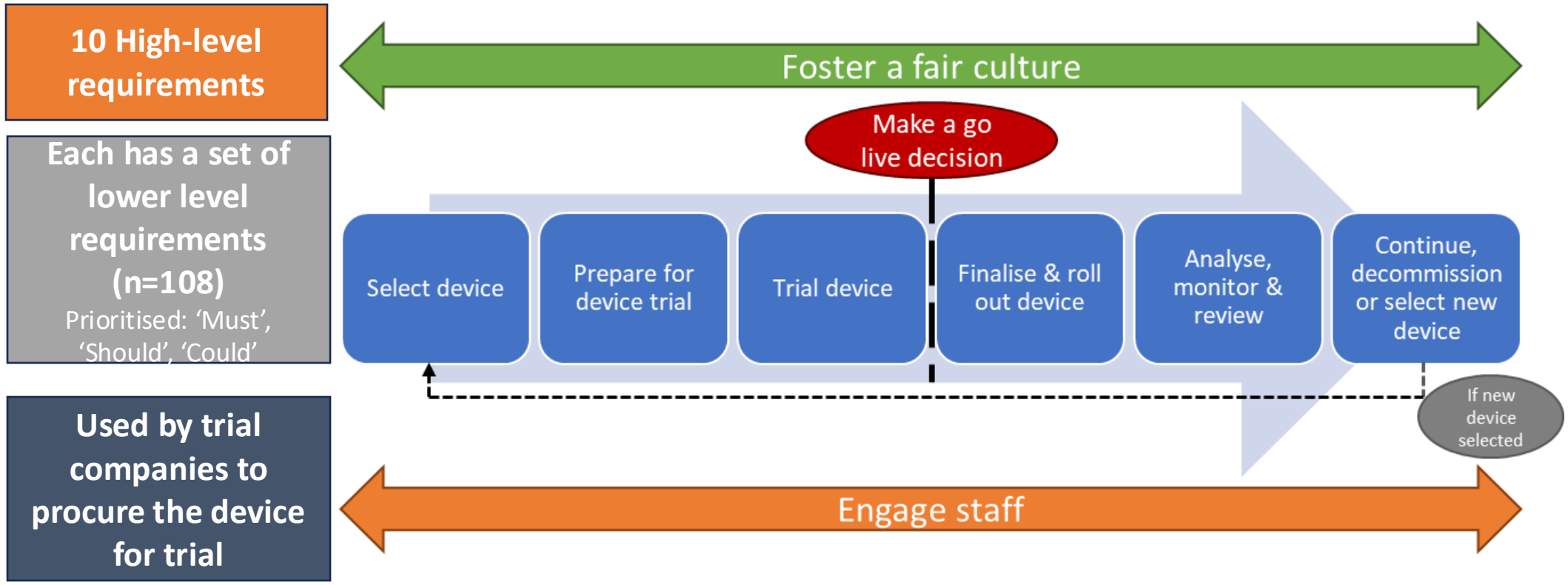
Least intrusive	**Monitors drivers physical features or movements for symptoms of loss of attention & alertness**	**Eye / facial feature movement, head position etc.**
Driving-facing camera mounted in cab		**Evidence on accuracy & effectiveness**

- **Psychophysiological and behavioural indicators of loss of alertness and attention**
- Indicators assessed for clinical performance and real world practicality (n=15)
- Eye closure, eye movement, gaze zone, foveation and pupillometry (camera / sensor)

Phase 1 – Findings

Functional requirements and implementation model

Requirements to inform selection of technology. Model setting out the activities organisations undertook to implement the technology. These were used for the phase 2 trial.



Phase 2 – Live Trial

Technology to be trialled

- Selected through a vigorous selection process: Consultations and in-depth analysis of tender documents against functional requirements

Detects microsleeps and visual distraction
(loss of alertness & attention)

Camera-based system
Sensor mounted in train cab.

Provides real-time feedback to driver and organisation

Audible and haptic alarm for microsleep

Audible alarm for visual distraction

Phase 2 – Live Trial

Trial plan

Three train companies	**12 month trial** 1 month ***silent monitoring*** period.	**Baseline data**
Types of data: Monitoring device data, Roster data, Operational data Fatigue reports, Safety event data etc.	**Pre-post trial survey** Perception of fatigue reporting, safety culture and behaviours	**Operational learning**
	Trial materials	**Data analysis plan**

Conclusions (so far....)

Driver alertness and attention technology may reduce loss of alertness and attention events and improve safety in rail transportation

Behavioural devices are the most suitable for a live trial (microsleeps & visual distraction)

GB rail specific device is required (108 functional requirements)

Facilitation of a fair culture and staff engagement are the two most important enablers

The phase 2 trial will provide detailed data to help understand the:

Causes of loss of attention and alertness | Individual and organisational solutions

Impact technology can have on reducing events & improving overall safety

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Thank you for your attention!