Developing a method for measuring Situation Awareness in rail signalling

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Abstract

This paper presents work to develop methods for measuring Situation Awareness in rail signalling, based on the Situation Present Assessment Technique (SPAM) and the Situation Awareness Rating Technique (SART). The paper describes the rationale and design features of the methods used, before presenting the outcomes of an exploratory trial using a simulated workstation and experienced signallers. While the results found no differences due to the independent variable (automation versus no automation), the process of developing and using the methods highlighted a number of features of real-time probe measures in the rail control domain, and points to further validation of the SPAM approach.

Introduction

The following paper presents an exploratory study of measuring Situation Awareness (SA) for the domain of rail signalling. Rail signalling is a key role in the safe and punctual operation of the railways. The signaller (sometimes a 'dispatcher' outside of Great Britain) is responsible for monitoring the progress of trains within a given territory. This understanding serves as the basis for setting signals and points in order for trains to proceed safely and in accordance with the timetable. Signalling is typical of dynamic, safety-critical control domains where SA has been proposed as a relevant construct (Endsley, 1995a) but, to date, has received relatively little attention in comparison to domains such as ATC or driving (Golightly et al., 2010). Having a good understanding of both the elements of SA, and the processes used to build and maintain SA, could be of benefit in defining requirements for future signaling interfaces, in assessment, or in training. Building a more complete understanding of SA in signalling is closely linked to developing appropriate methods for examining SA. Such methods can be used as tools to explore what constitutes SA for signalling, and how this may change based on factors such as different interfaces, levels of experience, workstation layout, or the introduction of automation.

The following work had the aim of understanding the viability of a method, and specifically a quantitative *measure*, of SA for rail signaling. This fitted within a larger programme of work to investigate the relevance of SA for rail signalling

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