A cognitive analysis of train driver information requirements

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Abstract

There is a paucity of research that takes a systems view of the train driver within the wider operational environment. By including the work in signalling, control and other operational functions we can build a more complete picture of the systems level cognitive processes thereby identifying information critical to the efficient, safe and profitable provision of rail services. We can also more fully understand the distributed temporal and spatial location of this information within the system, thus supporting operators' information and communication requirements through innovative technological, social and organisational interfaces. This paper reports on some early products of a train driver work analysis designed to elucidate the skill, rule and knowledge requirements of UK drivers. Initial findings indicate considerable shortfalls e.g. in information support, workload management, system monitoring and communications. The possibility of addressing these and other problems through an enhanced cab interface for high speed train systems that makes use of ecological design principles is explored. Such a system would allow drivers to make better use of perceptual information to manage speed and journey trajectories more efficiently, and perhaps provide safer, faster and more efficient rail services.

Introduction

The work reported in this paper was conducted as part of a project to develop a macrocognitive model of integrated rail operations (Bye et al., 2005). The rail domain is a complex environment in which humans and machines create joint cognitive systems that distribute work among multiple agents and locations (e.g. Woods et al., 1990; Hollnagel & Woods, 2005). This creates complexity not only for the operators who are responsible for delivering safe and efficient rail services, but also for the human factors (HF) practitioners attempting to support them. The project aimed to help HF specialists cope with this complexity and with the additional challenges observed in other projects and through reviews of existing rail research (e.g. Hockey et al., 2005).

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