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RAIL INDUSTRY REQUIREMENTS AROUND NON-TECHNICAL SKILLS

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The aim of this study is to identify Rail Industry requirements for the incorporation of Non-Technical Skills (NTS) into current Competency Management Systems. A series of interviews and workshops with rail employees were conducted to identify these requirements. Results highlight the importance of training people in the support roles around an individual, in order to maximise their ability to provide individualised support and to understand the link between technical and non-technical competency. The issue of releasing those in safety-critical roles for training also emerged as a problem when trying to implement NTS training. Overall, the results suggest an individualised and adaptable approach will be required to incorporate NTS in the rail industry.

Introduction

Non-Technical Skills can be defined as "the cognitive and social skills that *complement a worker's technical skills*" (Flin, O'Connor, & Crichton, 2008). Researchers have for some time recognized Non-Technical Skills (NTS) and Human Factors Skills as having high importance in safety critical roles across industries such as aviation, petrochemical, and medicine (e.g. Diehl, 1991; O'Connor, Flin, & Fletcher, 2002; Patankar & Taylor, 2008).

Crew Resource Management (CRM) training has been used to improve NTS and performance in aviation teams since the 1980s. Reviews of CRM training effectiveness across aviation and other industries have shown that it is generally well received, and results in a positive change in attitudes and behaviours (O'Connor et al., 2002). Studies in military aviation indicate that CRM training decreased the accident rate for US Navy A-6 Intruder crew members by 81% (Diehl, 1991) and research has also shown a Return-of-Investment (ROI) of approximately 23% from the implementation of CRM for airline maintenance

workers (Patankar and Taylor, 2008). Feedback from pilot NTS training courses in the rail industry has been positive, with drivers finding the course useful and showing significant improvements across NTS over time (Bonsall-Clarke & Pugh, 2013). NTS are important for optimising safety and performance during routine work conditions as well as for managing critical situations or emergencies (Civil Aviation Advisory Publication, 2011).

There is no standardized methodology for developing CRM training but core skills modules often include teamwork, leadership, situation awareness, decision making, communication, and personal limitations. Skills are identified from accident analyses, incident reports, trainers experience and simulator research studies (Flin, O'Connor, & Mearns, 2002). Training is generally delivered over two or three days, and tends to be classroom-based including lectures, practical exercises, role play, cases studies, and films of accident re-enactments (O'Connor & Flin, 2003). Research in the medical industry has shown that that the impact of this type of training varies with participant specialty (i.e. surgeons, anesthesiologists, nurses etc.) (Suva et al., 2012), and rail industry research suggests that employee engagement is dependent on the relevance of course content to a specific Train Operating Company or depot (Russell, Bailey, & Moore, 2013). It is therefore very important that any training regimes are designed around the specific requirements of a trainee's job.

Project T869 by the RSSB has provided a thorough analysis of the NTS required to help UK train drivers to anticipate, identify and mitigate threats and error (RSSB, 2012a). From this analysis a total of 7 NTS have been identified as having vital importance to the driver role, along with 26 underlying behavioural markers. The 7 NTS are situational awareness, conscientiousness, communication, decision making and action, cooperation and working with others, workload management, and self-management. The RSSB recommend that NTS should be integrated across the business to all relevant staff at key stages of the 'life cycle' (recruitment, initial training, ongoing training and support, measurement of competence and incident investigation). Training courses should not be delivered in isolation, and the principles of the course must be reinforced throughout the organisation (Bonsall-Clarke & Pugh, 2013). It is also recommended that this not be a purely top-down exercise – participants must drive the discussion, and feedback suggestions for how organisations can help them in their role. Finally, the RSSB does not recommend that NTS are assessed in isolation. As is the case in the aviation industry, a pass/fail decision should be based on technical competence, and NTS should be used to help inform that decision (RSSB, 2012b).

The 2012 Office of Rail Regulation (ORR) Railway Guidance Document recommends that all rail companies consider whether there may be elements of NTS they should incorporate into their Competency Management Systems (CMS). They emphasize the need to ensure that NTS training is integrated into the wider CMS, rather than included as a stand-alone "add-on", along with the

importance of committing to on-going development and reinforcement of staff NTS, rather than a one-off fix.

The development of such an integrated approach raises a number of issues for rail companies around how to develop the skill-sets within the company to manage and assess NTS, and how to ensure that employees understanding of these skills are increased given the constraints around having workers released for training on a continuous basis. The current study provides a first step in addressing this issue, through the identification of industry requirements for the incorporation of NTS into CMS. The specific research questions this study aims to address are as follows:

- What is the current understanding of NTS across different roles within the rail industry?
- What are the current gaps in rail companies' performance, particularly in relation to NTS, both at individual and organisational levels?
- What requirements do Rail Industry members have for the incorporation NTS training into current competency management frameworks?

Methodology

Data collection consisted of workshops and interviews with industry representatives. The workshops were based within two meetings of an industry advisory board for University of Nottingham and Arcadia Alive Ltd.'s Knowledge Transfer Partnership (KTP) project. These meetings included representatives from nine Train Operating Companies (TOCs), Network Rail, NSARE, ASLEF and RMT. The aim of these meetings was to identify the main concerns rail companies have around the incorporation of NTS into CMS.

The interviews were conducted with 22 participants from various roles across the industry. Participants included 2 Operations Standards Managers, 1 Depot Manager, 1 Routing Instructor, 6 Driver Managers, 3 Conductor Managers, 6 Drivers, and 3 Conductors. The interviews were semi-structured and lasted between 14 minutes and 80 minutes. Questions revolved around three main areas of interest:

- Participants' understanding of NTS.
- Identification of the current gaps in companies' performance, particularly in relation to NTS, both at individual and organisational levels.
- Requirements for NTS training.

Results

Industry Requirements from Workshops
The two workshops identified a number of industry concerns regarding the incorporation of NTS into current CMS including:

- The importance of training people in the support roles around an individual, to ensure that they fully understand NTS prior to assessing or training.
- Ensuring NTS training is targeted at specific roles, as the type of training required will vary across roles.
- Uncertainty as to the best manner in which to integrate NTS and technical skills within current competency frameworks.
- Uncertainty as to how NTS policies would fit in with company's current procedures around issues such as fatigue management and sickness management.
- Concerns around ownership and responsibility – the risk that NTS is perceived as another point of compliance that front-line staff (e.g. drivers) need to adhere to, rather than a set of skills that will enhance their job.

Participants of the second Focus Group (N=7) were also asked to evaluate which of the RSSB's 7 NTS were required for each of 34 competency statements (measuring 17 categories) that are used in a current technical skills assessments.
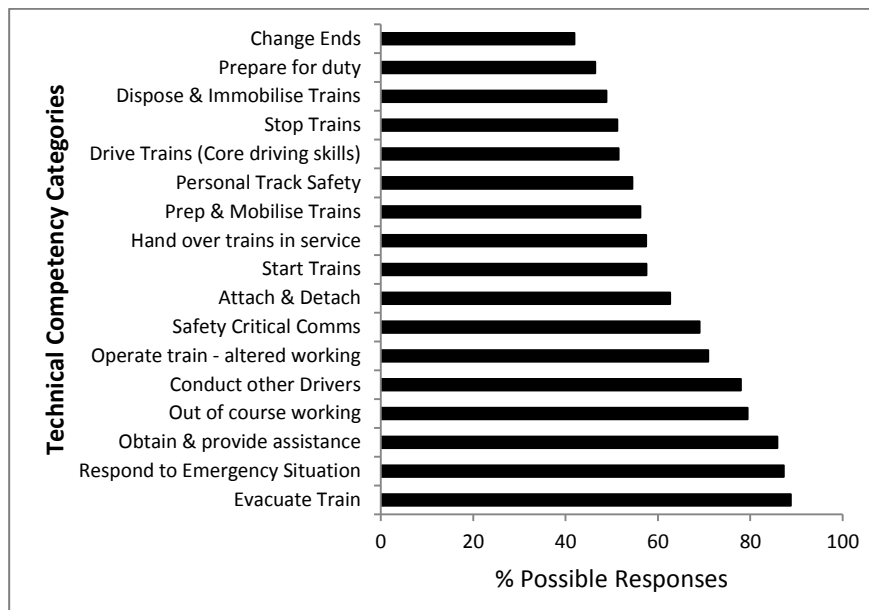
Figure 1: Average NTS Contribution

Figure 1 shows participant's evaluation of the importance of NTS to each of the competency categories.
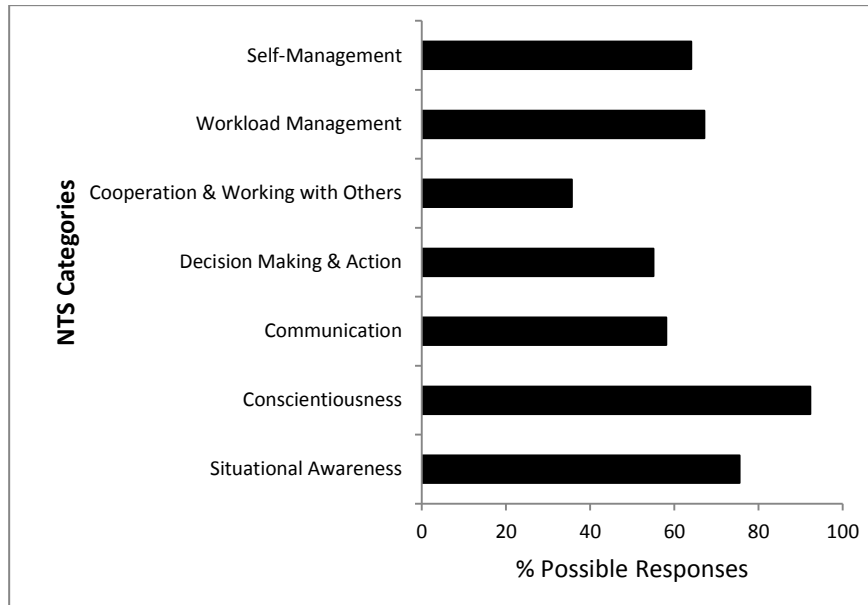
Figure 2: Average Technical Competency contribution to NTS

Figure 2 provides a synopsis of the perceived impact of each NTS category on the technical competency statements.

Rail Employee Perceptions of NTS

The interviews with rail employees identified a number of NTS and Human Factors skills which were believed to be vital to the drivers' role. These included concentration, preparation, professionalism, communication, the ability to adapt to the driver lifestyle (i.e. sleeping and eating properly, adapting social activities), awareness, and ability to work alone. A number of interviewees mentioned the importance of a professional attitude and careful preparation for work as being key indicators of a "good" driver. The majority of drivers believed that NTS were important for their role, and felt that technical and non-technical competencies were linked.

For managers, a number of concerns about the implementation of NTS arose, including:

- The lack of systematic training for managers to ensure that they fully understand NTS and how to support them
- How to identify which NTS were being used within a given task, particularly as the current NTS evaluation for a lot of companies is in a separate section to the technical evaluation.
- The importance of providing examples that drivers/guards can relate to when trying to understand the contribution of NTS.
- Difficulties in tailoring assessments or feedback to an individual's needs.

- Difficulties in releasing drivers for training because of the shortage of people to cover their routes.

Discussion

This study aimed to identify rail industry requirements for the incorporation of NTS into current CMS. Through the focus groups and interviews with industry representatives a number of requirements have emerged.

Current understanding of NTS

The interviews and focus groups showed that the majority of participants have a basic understanding of what NTS are and believe that NTS play an important part in how safety critical roles are performed. The behavioural markers associated with Conscientiousness (e.g. preparation, professionalism) and Situational Awareness (e.g. concentration, awareness) consistently emerged as being of vital importance to the train driving role. However, it would appear that the behavioural markers associated with decision making and action, communication, and cooperation are not considered as vital. Thus, it would appear that the team-based focus of CRM training in the aviation industry (Flin et al., 2002) is not appropriate for the train driver role. Workshop participants rated NTS to be of more importance during out of course working and emergency situations, than in everyday working. This suggests that people are more aware of the need to maintain NTS in out of course situations, but may not be as conscious of the dangers in more routine conditions.

Current gaps in company performance relating to NTS

Both the RSSB (2012b) and the ORR (2012) have emphasized the importance of integrating NTS and Technical skills evaluation. However, the workshops and interviews show that there is uncertainty in the industry as to the best manner in which to do this, and current NTS evaluations are often placed in a separate section of CMS to the technical evaluation. If NTS are to be used to inform decisions around technical competence (RSSB, 2012b), companies need to understand the underlying NTS which can impact their current performance criteria. The results also highlight the need to provide adequate training for those in management roles prior to rolling out any NTS initiatives, as currently managers lack confidence in assessing NTS and providing feedback. Finally, it would appear that there is some confusion about the difference between NTS and other personal lifestyle factors such as fatigue, health and wellbeing etc. Interview participants included a number of these factors in their definitions of NTS, and it emerged from the workshops that there is currently uncertainty as to how NTS policies should fit in with company's current procedures around issues such as fatigue management and sickness management.

Industry requirements for the incorporation of NTS

Across both the interviews and the workshops the importance of training people in the support roles around an individual emerged. This suggests that rail

companies are aware of the importance of reinforcing NTS throughout the organisation (RSSB, 2012b). However, from the interviews it emerged that many managers struggle to explain NTS and feel it would be beneficial to be able to provide more examples and case studies for front line staff to relate to.

There are some concerns about the risk that NTS is perceived as another point of compliance that front-line staff (e.g. drivers) need to adhere to, rather than a set of skills that will enhance their job. Previous evaluation studies have found an improved attitude towards NTS after attending training (Bonsall-Clarke & Pugh, 2013; O'Connor et al., 2002) so it may be that this perception can be adjusted once training is rolled out. If course principles are reinforced throughout the organisation, providing a supportive culture for employees (RSSB, 2012b) this will aid the process. It also emerged from the interviews that the strong focus on compliance in current CMS means that managers find it difficult to tailor feedback to suit particular individual's requirements. As previous research has shown that the impact of NTS training will vary according to an individual's position (Suva et al., 2012), it is important to ensure that individual's receive training that is appropriate to their needs at a given point in their career.

A final issue which regularly emerged was the difficulty of releasing drivers for training because of the shortage of people to cover their routes. This makes it very difficult for companies to enable all those in safety critical roles to attend a two/three day training course plus refresher days. This suggests that NTS training in the rail industry may need to take a different format than is typical of the courses in the aviation and medical industries.

Conclusion

The aim of this study was to identify rail industry requirements for the incorporation of NTS into current CMS. The results indicate that there is currently a basic understanding within the rail industry of what NTS entail. However, there is uncertainty as to how these skills can best be integrated with technical skills evaluation, and where lifestyle issues regarding fatigue, health etc. should fit in. In addition, managers are currently struggling to provide individualized feedback and training for front-line staff, particularly as it is very difficult to release staff for training. Overall, the results highlight the importance of taking a systems approach to the implementation of NTS, ensuring that people at all levels of the organization gain an understanding of the skills required to support NTS. The difficulties faced in releasing those in safety critical roles for training suggests that the type of training programmes which have been implemented in other safety critical industries such as aviation and medicine may not be appropriate for the rail industry, and a more tailored and flexible approach may be required to ensure maximum effectiveness.

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