Role of Human Factors in Supporting Safety Learning from Accidents

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Introduction

Human Factors - Supporting Safety Learning from Accidents

Human Factors and the RSSB Research Programme

Role of Human Factors in Incident Investigation

Example results on Verbal Communication Issues

Human Reliability
Human Factors

- The optimisation of human performance in the workplace.

- Considers the working environment from a human-centred viewpoint, looking at the whole system and its influence on the way people behave and interact with the railway.
RSSB R&D Programme

- Funded by the UK Department for Transport; ~£9 million per year
- Managed for industry by RSSB
- Programme scope: engineering, operations and management
- Research that no one company or sector could solve on its own
- A balanced programme of tactical improvements and strategic change
- SPARK for railway knowledge sharing and information:
  - free to access and open to anyone, anywhere
  - access to a range of international publications
  - information on research projects and initiatives
  - pointers to test facilities and centres of expertise.
  - www.sparkrail.org
Development Process: HF and Incident Investigations

1. Demonstrating the value of human factors data from investigations
   – An analysis of formal investigation and inquiries (SPARK Ref. T635)

2. Creating the software and framework to record human factors data in the national incident reporting system
   – Development of an incident factor classification system for SMIS (SPARK Ref. T994)

3. Supporting industry decision making and strategy with the data
   – Fatigue and its contribution to railway incidents
   – Developing a safety critical communication training package (SPARK Ref. T1078)
   – Human Factors causes of SPADs (SPARK Ref. T1128)
   – Train Driver Route Knowledge (SPARK Ref. T1108)
Investigation Framework

SMIS Classification System

Human Performance

1. Slip/lapse
2. Intentional rule breaking
3. Decision error
4. The person was asleep or unable to respond to the situation

10 Incident Factors

- Verbal Communication
- Fatigue, health and wellbeing
- Processes and procedure documents
- Written information on the day
- Competence management
- Infrastructure, vehicles, equipment and clothing
- The person’s environment
- Workload (real or perceived) and resourcing
- Teamworking and leadership
- Risk management
10 Incident Factors

**Verbal communication**
The exchange of spoken information concerned with how safety critical information is communicated between staff.

**Fatigue, health and wellbeing**
The individual’s fatigue, health and wellbeing which is the joint responsibility of the organisation and the member of staff.

**Process and procedure documents**
Written rules, standards, processes and methods of working which guide and structure activities undertaken.

**Written information on the day**
Information that can be renewed day-to-day or week-to-week, and supports people in carrying out an activity or task.

**Competence management**
The company competence management systems regarding selection, training and assessment.

**Infrastructure, vehicles, equipment and clothing**
The infrastructure, vehicles, equipment or clothing used to undertake or support a task.

**The person’s environment**
The environmental stressors such as lighting levels, noise and temperature which can affect the performance of a person.

**Workload (real or perceived) and resourcing**
Workload is the demands on a person which are influenced by the task, its context, the individuals who carry out the activity, and resourcing.

**Teamworking and leadership**
How people are organised to work together, and how they relate to and influence each other to undertake their work safely.

**Risk management**
The processes used to identify, assess, reduce and monitor potential safety concerns.
Results on verbal communication issues
Example Analysis Output – Safety Critical Communications

- Verbal communications contributing to incidents:
  - What types of communication issue?
  - What safety management issues contribute to communication issues?

- Sample of 95 GB investigation reports involving communications as a factor (SPADs, track worker near miss, derailment, collision)

- Applied the HF framework in the SMIS database

- Identified 541 incident factors in 95 incidents (average 6 per incident)
  - 383 communication issues
  - 158 underpinning safety management issues from the 10 incident factors
Communication Factors Issues

A. Not communicating 15%

B. Communicating with wrong person 3%

C. Person talking leaves out important details, says something that is vague, wrong or overly complex 31%

D. Person is talking too quietly, or with a strong accent or dialect 0%

E. Person receiving the communication doesn’t hear, mishears or misunderstands 14%

F. Rule Book communication protocols are not followed 32%

G. Problem with communication method 4%
## Underpinning Safety Management Factors

<table>
<thead>
<tr>
<th>Incident Factors</th>
<th>Total</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workload (real or perceived) and resourcing</td>
<td>22</td>
<td>18%</td>
</tr>
<tr>
<td>Infrastructure, vehicles, equipment and clothing</td>
<td>22</td>
<td>18%</td>
</tr>
<tr>
<td>Fatigue, health and wellbeing</td>
<td>21</td>
<td>17%</td>
</tr>
<tr>
<td>Competence management</td>
<td>19</td>
<td>15%</td>
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<tr>
<td>Processes and procedure documents</td>
<td>16</td>
<td>13%</td>
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<tr>
<td>Written information on the day</td>
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<td>12%</td>
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<tr>
<td>Teamworking and leadership</td>
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<td>3%</td>
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<tr>
<td>Risk management</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>The person's environment</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>125</td>
<td>100%</td>
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</table>
What did we do with the data?

• Fed in to a national training package to support consistent communication competence development across the GB rail industry
• Project: “Developing a safety critical communication training package” (SPARK Ref. T1078)
• Following slides use the incident data to provide background for the national training course
01 Safety Critical Communications

MODULE: FOUNDATION
1 in 5 accidents involves a communication error.
Errors include:

- Leaving out important details
- Saying something vague
- Not communicating when you should
- Not following basic protocols
Analysis done as part of this training shows that communications mistakes occur across the rail industry and are not the fault of one group of workers.
Human Reliability
Understanding human performance reliability: the data

- Generic: Skill-based, opportunity for confusion
- SPAD
- Generic: Best reliability
- Fail to call
- Station over-run
- Wrong side door release at a station

Probability (Log base 10)
Tools To Develop Our Understanding of Performance Reliability

- Railway Action Reliability Assessment (Spark Ref. T270)
  - Supports human reliability assessment, quantification of human performance and provides generic estimates of human performance reliability

- Red Aspect Approaches to Signals (RAATS, Spark Ref. COF-UOH-24)
  - Allows Rail companies to harness the power of big data to identify the signals which are most frequently approached at red, thanks to a new on-line tool developed by rail industry body RSSB and the University of Huddersfield.
Conclusions: Role of Human Factors in Supporting Safety Learning from Accidents

▪ Human factors central to the incident investigation process

▪ Human factors investigation outputs used to inform industry strategy and develop cross-industry support

▪ Process enabled by the GB Research Programme funded by the Department for Transport and managed by RSSB:
  – Development of HF approach
  – Development of software
  – Research used to deliver changes to industry (eg SPAD strategy, standards for on-train camera monitor systems, communications competence)
Thank you