RSSB and the role of human factors in supporting railway system safety

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RSSB
Overview

- Introduction to RSSB

- Human factors and system safety

- Collecting data on human factors for system safety

- Understanding human reliability

- CIRAS – A confidential reporting system for industry
Purpose

To support its members’ (the rail industry) to achieve their objectives of improving safety and performance and value for money across the industry, with a focus on...

• Reducing safety risk so far as is reasonably practicable
• Increasing capacity (where appropriate)
• Improving operating performance and customer satisfaction (where appropriate)
How do we support the industry?

- Understanding risk
- Guiding standards
- Collaborating to improve
- Managing research, development and innovation
Understanding risk

- Risk analysis
- Risk models
- Reporting systems
- Safety intelligence
- Learning from experience
Collaborating to improve

- Passenger, public, workforce safety
- Support for systems and assurance
- Sustainable development
- Change management
- Human factors
- Engineering improvement
Guiding standards

- Shared, consistent, specifications for technical compatibility at the interfaces on the railway
- Avoiding duplication and conflict
- Translating European requirements
- Technical experts
Managing research, development and innovation

• Cross-industry research and development

• Knowledge searches

• Technology transfer

• Partnerships to leverage funding and share expertise

• FutureRailway programme
Context – Safety is improving

Fatal train accidents

Source: ORR for historic data, SMIS for recent data.
Why do we need human factors specialists?
The three levels of human factors

Individual
- Distraction
- Fatigue
- Physical and mental well-being
- Work-related attitudes
- Experience
The three levels of human factors

- **Individual**
  - Equipment
  - Workload
  - Communication and teamwork
  - Practices, processes and information
  - Work environment

- **Job/workplace**
  - Equipment
  - Workload
  - Communication and teamwork
  - Practices, processes and information
  - Work environment

- **Organisation**
The three levels of human factors

Organisation
- Safety culture
- Knowledge and skills (CMS and training)
- Supervision and management
- Change
RSSB’s contribution to GB Rail Human Factors

Human Factors

- European legislation and standards
- National standards and rules
- Good practice guides
- Research and development
- Information publications

Duty holder practices and process
R&D activities

Control, Command and Signalling

Innovation

Energy

Safety Policy and Risk Management

Vehicle/Track Interaction

Infrastructure

Sustainable Development

Road/Rail Interface

Health

Rolling Stock

Public Behaviour

Workforce Development and Competence

SPARK
Supporting safety process management...

- Safety Management has become an integral part of business management
Why classify incidents?

- Safety learning must include looking across events to identify trends and patterns
  - Changes in train collision rates over time
  - Train accident risks versus passenger injury

- To look at trends across incidents we need to classify them
The Incident Factor Classification System

- Event details: What, when, where

- Event causes: How, why

Sample of about 300 incidents per year

Human Error Classification

IFCS Database

Underlying factor classifications
Incident factors

**Incident Factors**

1. The planning process identified a protecting signal which couldn’t be used for the intended purpose [G1.1]

2. The diagrams used by the COSS were out of date and didn’t show the correct site layout. P492 was shown as a controlled signal were following resignalling it was an automatic signal [G1.2]. Network rail do not have a reposity of these diagrams and they are developed by most depts, but because there is no control any errors or changes can go unnoticed.

3. The signaller was a fully competent signaller for another location but was a trainee in this box [G4.1]

4. The trainee signaller felt under time pressure to grant the possession as it was after the booked time [F1.1]

5. The trainee signaller didn’t ask all the relevant safety questions regarding the line blockage ie whether work would effect safety of trains and what additional protection would be used [G2.1, 3.3]. This conversation should have identified that the automatic signal wasn’t fitted with SPRS and couldn’t protect the work when the trainee signaller and COSS discussed the line block.

6. The trainee signaller erroneously identified P492 as the protecting signal and placed the lockout device in free and a reminder annuance over the exit button at P492 but the routing was set from D530 to D532.
What is an incident factor?

• Any factor identified in a report which describes a system weakness which we can learn from:
  – Causal/contributory factors
  – Failures after an incident
  – Performance shaping factors - non-optimal states which are accepted features of a task, management system or design.
  – ‘Matters concerning safety’

• Factors are summarised as text in the database
Incident factor coding – Human errors

There was some sort of failure HE by staff

Perception slip
Action slip
Memory lapse
Decision Error
Routine violation
Situational violation
<table>
<thead>
<tr>
<th>Incident Factor level 1</th>
<th>Supervision and management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incident Factor level 2</td>
<td>Resource Management</td>
</tr>
<tr>
<td>Incident Factor level 3</td>
<td>Inappropriate resource allocation</td>
</tr>
<tr>
<td>Equipment Failure Mode</td>
<td>Not Entered</td>
</tr>
<tr>
<td>Company</td>
<td>Network Rail Scotland</td>
</tr>
<tr>
<td>Factor to event</td>
<td>Event</td>
</tr>
<tr>
<td>Factor importance</td>
<td>Contributory</td>
</tr>
</tbody>
</table>

Incident factor coding – Management error/system failure

Communications
Practices and Processes
Information
Workload
Equipment
Knowledge, skills and experience
Supervision and management
Work environment
Personal
Teamwork

shortages meant that inspections had been carried out in a train cab rather than on foot [G5.9].

Management error/system failure
1. Communications
2. Practices and Processes
3. Information
4. Workload
5. Equipment
6. Knowledge, skills and experience
7. Supervision and Management
8. Work Environment
9. Personal
10. Teamwork
Example: 10 Incident Factor Causes

- Communications
- Equipment
- Information
- Knowledge, skills and...
- Personal
- Practices and processes
- Supervision and...
- Teamwork
- Work environment
- Workload
How important is communications?

<table>
<thead>
<tr>
<th>All communication factors</th>
<th>Signalling</th>
<th>Maintenance</th>
<th>Freight</th>
<th>Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>56%</td>
<td>23%</td>
<td>32%</td>
<td>24%</td>
</tr>
<tr>
<td>Communication causes</td>
<td>25%</td>
<td>14%</td>
<td>20%</td>
<td>8%</td>
</tr>
</tbody>
</table>
CIRAS – A confidential reporting system for industry

- History of CIRAS
- So why a confidential reporting system?
- What is a corporate safety net?
- How does it work?
- Communicating what has been addressed.
- Learning opportunities
- Future
- Questions
History of CIRAS

• Started in 1996
• Piloted by a heavy rail operator – Scotrail
• Strathclyde University / Charity Trust
• Heavy rail industry rolled out after catastrophic Ladbroke Grove incident - 1999
• Lord Cullen report – Culture
• Completely independent and confidential
• Now diversifying into other areas, eg marine, aviation, light rail, tram, bus & coach, highways
• Comprehensive business review undertaken last year
Safety is the condition of a “steady state” of an organisation or place doing what it is supposed to do.

Systems are implemented to:

- Help provide more informed decision making
- Improve safety by reducing accidents
- Provides for better resource allocation
- Strengthens corporate culture and
- Demonstrates due-diligence
How does the scheme work?

Confidential and independent

1. **Your concern**
   Always try to report it internally. If you have or you feel you can’t then contact CIRAS

2. **Contacting us**
   You can do this by calling us, filling in a form and posting it or via our web site.

3. **Our response**
   We ensure complete confidentiality and are in an environment that ensures this.

4. **We take your call**
   An experienced reporter will listen to your concern and will ask your permission to interview and write a detailed summary.

5. **We contact your company**
   We write or call your company and advise them of the concern

6. **Your company investigates**
   Through your CIRAS rep we look to facilitate a resolution that remedies the concern

7. **Feedback**
   We get in touch with you and provide you with feedback

8. **We analyse**
   We look for lessons that others can learn from and with your company permission share this with others
Facts & figures

- Takes approximate 3000 calls a year
- Covers all of the UK Rail industry
- Now accessible to all UK transport, eg Bus, Tram, Marine
- Is 19 years old and has never had a breach in confidentiality
- Has 300 organisation members in 2014
- In 2015 this is to grow to 1500 after all Link up track side contractors will be mandated to join
## How does CIRAS make a difference?

<table>
<thead>
<tr>
<th>Industry Change</th>
<th>Percentage (1,000 reports)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triggered active monitoring</td>
<td>24%</td>
</tr>
<tr>
<td>Action planned</td>
<td>18%</td>
</tr>
<tr>
<td>Triggered an investigation</td>
<td>15%</td>
</tr>
<tr>
<td>Briefing provided</td>
<td>12%</td>
</tr>
<tr>
<td>Rules/Procedures clarified</td>
<td>6%</td>
</tr>
<tr>
<td>Audit conducted</td>
<td>4%</td>
</tr>
<tr>
<td>Equipment provided</td>
<td>3%</td>
</tr>
<tr>
<td>Roster clarified</td>
<td>3%</td>
</tr>
<tr>
<td>Infrastructure faults attended to</td>
<td>2%</td>
</tr>
<tr>
<td>Training provided</td>
<td>2%</td>
</tr>
<tr>
<td>Rule Book clarified</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>8%</td>
</tr>
</tbody>
</table>
Communicating lessons learnt
Governance & scheme details

• Governed by an industry Committee
• Levy structure & next 3 years
• Working with industry
• Lower cost membership
• Value for money – our services
• Operates a CIRAS member charter
Conclusions

- RSSB supports the GB rail industry to improve safety and performance

- Human factors is at the centre of system reliability
  - Train drivers, signallers, maintenance staff
  - System designers, managers, computer programmers

- Good investigation of system issues:
  - Consistent and accurate identification of immediate and underlying causes after thorough analysis
  - Objective and appropriate recommendations which are effectively implemented and necessary lessons learned.
  - The underlying causes that are further back in the organisation’s processes, such as appropriate training, when addressed, are likely to have the biggest impact on preventing future accidents.