Operations

NetworkRail

What is the situation?

Operations relies on front line staff having the data, tools, equipment and systems to make informed decisions to manage the operational, safety and performance risks. There are a number of factors to considers for the operational challenge.

Firstly the challenge is to reduce the risk to employees working on the infrastructure from being hit by trains due to operational errors. There is also a significant risk to members of the public from poor decision making at level crossings, during dispatch duties and when trespassing on the infrastructure.

The next element is the train accident risk and the potential for collisions, derailments or other operational incidents caused by decisions made by operational employees.

Finally the workload of operational employees is increasing with larger areas of control and additional systems and may lead to distraction or poor decision making. The challenge is to effectively manage these risks to staff, passengers and trains through the automation and integration of operational systems to reduce the chances of human error due to poor information or excessive workload.
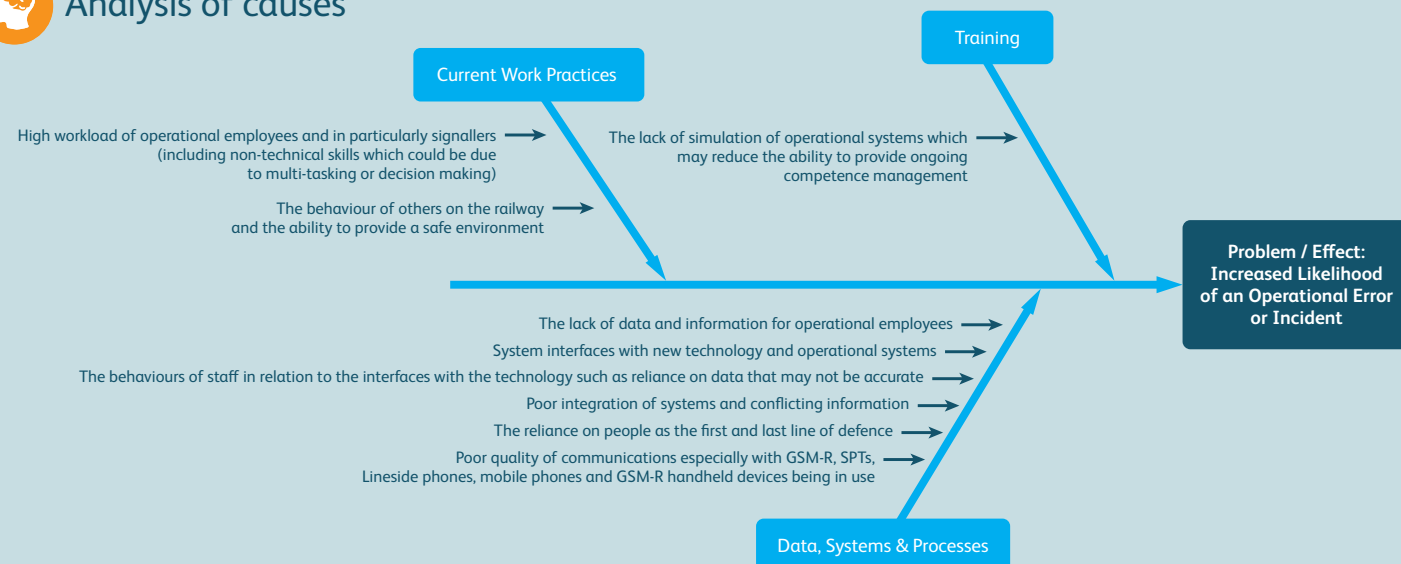
The primary objectives are as follows:

- Reduce the potential for operational errors made by Signallers, Electrical Controllers, Route Controls, Station Staff and Mobile Response Staff.
- Reduce the number of Operational Close Calls within the following categories:

Category	Definition
Protection	An OCC involving the work group (e.g. Controller of Site Safety (COSS) or a lookout) which results in incorrect or inadequate implementation of a line blockage, working outside of the protection limits or removal of protection.
Possession	An OCC involving implementation of a possession (i.e. Person In Charge of a Possession (PICOP), Engineering Supervisor, Nominated Person) which results in the incorrect placement of protection, inadequate or incorrect protection arranged, or irregularity in the removal of protection.
Operating	Any OCC as a result of an operator (e.g. a signaller or controller) giving permission for protection to be laid with a train not yet having passed the site of work; signalling a train into a possession / line blockage, vehicles or pedestrians trapped between gates at a level crossing or given permission to cross when the line is not clear; failure to caution trains; miscommunication when the signaller is in the lead; two trains in section; train routed into an isolated section, switching incident.
On Track Machine or Plant / Engineering Train / Equipment	Any OCC involving on track plant or engineering trains or involving incorrect use or placement of equipment or materials, for example unauthorised movements within possessions, machines or plant overturning, unsafe operation of machines or plant, equipment or materials fouling the running line, irregularities involving scaffolding on.

- Provide the required information to operations staff to allow informed decision making during normal and abnormal operational situations.
- Provide systems that automate the decision making processes to remove the potential for human error.
- Develop systems that do not adversely impact on the workload of operational employees.
- Provide systems that allow the operational teams to Predict, Prevent, Respond and Recover to various operational scenarios.

Analysis of causes

Training

Current Work Practices

High workload of operational employees and in particularly signallers (including non-technical skills which could be due to multi-tasking or decision making)

The lack of simulation of operational systems which may reduce the ability to provide ongoing competence management

The behaviour of others on the railway and the ability to provide a safe environment

Problem / Effect: Increased Likelihood of an Operational Error or Incident

The lack of data and information for operational employees

System interfaces with new technology and operational systems

The behaviours of staff in relation to the interfaces with the technology such as reliance on data that may not be accurate

Poor integration of systems and conflicting information

The reliance on people as the first and last line of defence

Poor quality of communications especially with GSM-R, SPTs, Lineside phones, mobile phones and GSM-R handheld devices being in use

Data, Systems & Processes

Priority problems

Specific priority problems

- The operation of User Worked Crossings and the Signaller interface
- The management of line blockages to prevent trains being signalled into protected areas.
- The management of possessions to reduce the risk of points being run through incorrectly placed protection or collisions between vehicles.
- The management of CCTV crossings to assist Signallers identifying objects through technological solutions.
- Management of degraded situations to the signalling system, switches & crossings, electrical systems and track.
- The management of isolations and areas blocked to electric traction
- The visibility of trains on the signalling system, especially in long signalling sections or during failures
- The management of systems to improve the ability to conduct robust safety critical communications and allow robust monitoring
- The management of the risks associated with passengers self-evacuating

Related goals

- Reduction in train accident risk.
- Improvement in workforce safety.
- Improvement in performance management.
- Reduce the risk to members of the public on railway infrastructure.
- Reduce the impact of reputational risk associated with operational scenarios.
- Allow more robust demonstration of our compliance to the legal framework.
- Better meet the expectations of the Office of Rail & Road.

Related benefits

- Improved data led information to operational employees.
- Improved automation and integration of operational systems.
- Remove the risks associated with human error.
- Ability to keep trains moving, even during abnormal working or incidents.
- Improved systems to better manage movement on the railway during engineering work.
- Improved systems to better manage isolated electrical systems.

Scope

In order to address some of the operational risks associated with the railway network the following research and development may be required:

- Development of new or existing technologies to identify the exact location of trains in relation to railway infrastructure such as User Worked Crossings.
- Development of technologies to prevent trains being signalled into sections of the railway that are protecting workforce, work activities or isolated electrical section.
- Development of technologies to better integrate operational systems to provide a consistent interface with the user.
- Development of systems that identify the position and status of infrastructure during failures of first line systems such as train detection, points or signalling.
- Development of systems to better manage the risks associated with stopping a train safetly when there has been an incident at the platform train interface during dispatch.
- Development of a tool to effectively assess the workload of operational employees and the potential impact of changes to work locations or practices.
- Development of common communication systems for all parties involved in safety critical communications and a single interface to allow voice communications to be retrieved

All the solutions developed for the operational railway shall be compatible with multiple operational systems and locations and are future proofed to align with the Digital Railway products.
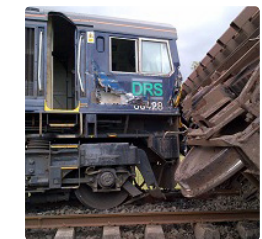

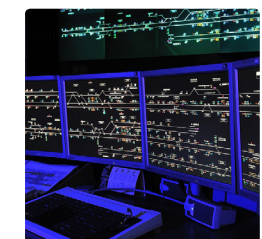fig. 1 - Collision & Derailment – Logan, Ayrshire, August 2015
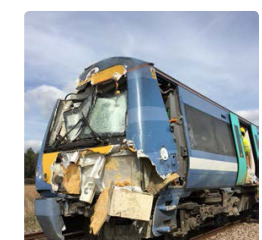

fig. 2 - Example of VDU signalling centre

fig. 3 - Collision at Hockram Road User Worked Crossing, Norfolk, April 2016