Research Programme
Operations and Management

Non-technical skills required in train driver role:
Developing an integrated approach to NTS training and investment
Non-technical skills required in train driver role: Developing an integrated approach to NTS training and investment

Executive summary

Non-technical skills (NTS) are consistently shown to underpin the technical tasks of safety-critical staff, and so investment in appropriate training and development of these skills is an important part of the ongoing pursuit for improved safety.

This document complements the RSSB NTS training materials that have been designed for train drivers (applicable to all safety critical staff) and their managers. These materials were piloted in spring / summer 2011 and the initial results of the evaluation are very positive.

The current document has been written for people responsible for setting company policy with regard to competence management, and those responsible for planning and implementing changes to the competence management system (CMS). It is designed to assist in decisions about how NTS can be effectively integrated within the company.

The message across the report is that for NTS training and development to be a success, 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).

To enable organisations to prepare for effective integration, the three sections of the report provide advice and relevant background including; advice on putting together a business case for NTS training and other reinforcement activities, planning implementation, and an outline of the methodology of the RSSB T869 NTS study.

1 These materials are available from
Acknowledgements

RSSB would like to thank all of the representatives from various companies across the rail industry for their input into the T869 project. In particular, we would like to thank the following for delivering the pilot training courses:

- Judith Dickinson, Northern Rail
- Paul Robinson, Northern Rail
- Rod Raymond, Arriva Trains Wales
- Paul Bell, Arriva Trains Wales
# Table of Contents

**Executive summary**................................................................. i  
Acknowledgements ...................................................................... ii  
**Introduction**  
What are non-technical skills and why are they important? .......... 1  
Overview of the project ............................................................ 1  
Overview of the NTS training developed as part of this project ....... 1  
Purpose and scope of this document ........................................... 2  
Part A: The case for investment 5  
1 Part A Introduction ....................................................................... 5  
2 Why NTS are important and how they relate to safety .......... 6  
   2.1 The key role of NTS in safety ................................................. 6  
      2.1.1 Evidence from the Human Factors Database ....................... 6  
      2.1.2 Analyses of incidents at Network Rail: the relevance of non-technical skills ............................................ 7  
      2.1.3 Analyses of incidents at Northern Rail: the relevance of non-technical skills. 7  
3 NTS training provision in the rail industry today: where does your company fit in? ............................................................. 9  
   3.1 Lack of formal NTS training ...................................................... 9  
   3.2 Developments since the start of the project ............................... 9  
   3.3 The importance of training as well as measurement .................. 9  
   3.4 The importance of training in context .................................... 11  
   3.5 Checklist for NTS integration ................................................. 11  
4 A business case for NTS: benefits and costs ............................. 13  
   4.1 Introduction........................................................................... 13  
   4.2 Producing a business case ...................................................... 13  
      4.2.1 Outline how the training manages risk ................................ 13  
      4.2.2 Outline predicted safety and financial benefits .................. 14  
      4.2.3 Include other less tangible benefits to support the case ......... 14  
      4.2.4 Outline what investment and support is needed to realise the benefits ......... 14  
   4.3 Improving safety performance: what is the evidence? ............. 15  
      4.3.1 Reduction in railway incidents .......................................... 15  
      4.3.2 Reduction of incidents in other safety-critical industries ........ 16
4.4 Cost benefits: what is the evidence? ................................................................. 16
  4.4.1 Avoided costs .................................................................................................. 16
  4.4.2 Reduced costs ................................................................................................. 17
4.5 Other benefits ....................................................................................................... 17
4.6 What cost could there be to the business in integrating NTS development? .................................................................................................................. 18
4.7 Tips in developing a business case for NTS ....................................................... 20

Part B: Planning for implementation ........................................................................ 23

1 Part B Introduction .................................................................................................. 23

2 Training course for drivers / front line staff .......................................................... 23
  2.1 Who should be trained? ....................................................................................... 23
  2.2 Who should train NTS in front line staff? ........................................................... 24
  2.3 Materials ............................................................................................................. 25
  2.4 How should the materials be delivered? ............................................................. 27
  2.5 Integrating NTS and technical training ............................................................... 27
  2.6 Adapting materials to suit individual companies and learners ......................... 28
  2.7 Adapting the materials for other front-line roles ............................................... 29

3 Training for managers ............................................................................................ 31
  3.1 The key role of managers ................................................................................... 31
  3.2 Who should train NTS in managers? .................................................................. 33
  3.3 Materials ............................................................................................................. 33
  3.4 How should the materials be delivered? ............................................................. 34
  3.5 Adapting materials to suit individual companies and learners ............................ 35
  3.6 Adapting the materials for managers of other roles .......................................... 35

4 Integrating NTS across the competence management system and other company processes ............................................................................................................. 36
  4.1 Introduction ......................................................................................................... 36
  4.2 NTS in selection .................................................................................................. 36
  4.3 Ongoing competence measurement ..................................................................... 38
    4.3.1 Building NTS into competence standards ...................................................... 38
4.3.2 Periodic revision of performance criteria and corresponding competence standards

4.3.3 Building NTS into measurement procedures

4.3.4 Assessing NTS

4.3.5 Storing and using the NTS results

4.4 NTS in incident investigation

5 Success factors: A supportive learning culture and gaining buy-in

5.1 Importance of a supportive environment

5.2 NTS and the competence culture

5.2.1 Safety culture within the company, how to measure readiness

5.3 Gaining buy-in to NTS implementation

5.3.1 Taking a phased approach

5.3.2 Involving Trade Unions and employee representatives early on

5.3.3 Involving staff across the company

5.3.4 Sharing good practice and communicating progress

5.3.5 Identifying champions

6 Potential challenges and misperceptions

6.1 Resourcing issues

6.2 Misuse or exploitation of NTS development by managers

6.3 Impact on the manager role

6.4 Effectiveness of NTS development interventions

6.5 What will happen if areas for NTS development are identified?

6.6 Keeping records

7 Evaluation of NTS integration

7.1 Introduction

7.2 Measuring success against KPIs and related factors

7.3 Timing of evaluation

7.4 Sharing evaluation results

Part C: Further information on the T869 project methodology

1 Part C Introduction

2 Design of the NTS course materials
2.1 Situation analysis ......................................................................................................... 61
2.1.1 Requirements ........................................................................................................ 61
2.1.2 Analysis of the target audience .............................................................................. 61
2.1.3 Review of practical constraints and opportunities ............................................... 62
2.2 Method of development .............................................................................................. 63
2.2.1 Course for managers of front line staff ................................................................. 63

3 Pilot courses .................................................................................................................. 64
3.1 Delivering the courses ............................................................................................... 64
3.2 Who participated in the pilot courses ........................................................................ 64
3.3 Refinements following the pilot courses .................................................................... 64

4 Evaluation of the pilot courses ...................................................................................... 65
4.1 Evaluation methodology ............................................................................................. 65
4.2 Evaluation results ........................................................................................................ 66
4.2.1 Analysis overview ................................................................................................ 66
4.2.2 Manager reactions ................................................................................................ 66
4.2.3 Driver reactions ..................................................................................................... 67
4.2.4 Manager attitudes and behaviour - NTS and KSAs .............................................. 68
4.2.5 Driver attitudes and behaviour - NTS ................................................................. 68
4.2.6 Managers' perceptions of safety culture ............................................................... 69
4.2.7 Incident and accident rates .................................................................................... 69
4.3 Summary of evaluation .............................................................................................. 69

Appendix 1: Pre-course knowledge exercise ..................................................................... 71
Appendix 2: Extract from Northern Rail's NTS integration strategy document .............. 73
Appendix 3: Attitudes Survey ............................................................................................ 76
Appendix 4: Culture Survey .............................................................................................. 82
Non-technical skills required in train driver role: Developing an integrated approach to NTS training and investment

Introduction

What are non-technical skills and why are they important?

Non-technical skills (NTS) have been defined as the cognitive, social and personal resource skills that complement technical skills and contribute to safe and efficient task performance. NTS are more general than technical skills and can be applied to a range of tasks and procedures. Examples of NTS are conscientiousness, communication, rule compliance and workload management.

There is growing evidence highlighting the key role of NTS in safe and effective performance. Analyses of accidents in a range of safety critical industries suggest that NTS are important in helping drivers and other front-line staff to identify, manage, mitigate and recover from threats and errors. Analyses from the rail industry support this finding, and reports from industries who have already introduced similar training suggest that it can be associated with a number of significant benefits (please see Part A for more information).

Overview of the project

RSSB research project T869 was commissioned by the Rail Industry Skills Forum to develop and pilot NTS training courses and other reinforcement activities for front line staff and their managers.

The scope of the project was to focus on the driver role but develop the materials in such a way so that trainers of staff in other operational roles can adopt and modify the content.

Overview of the NTS training developed as part of this project

Two training courses were developed as part of this project, one for train drivers (and other front line staff) and one for their managers.

Both courses share the same core content - the NTS that underpin all technical tasks, the reasons why things can go wrong, and how NTS can be used to anticipate, manage and mitigate these risks. This core content has relevance across the rail industry, and in other safety critical industries.

The managers’ course also covers the observation, measurement and effective feeding back of NTS. This is vital for the effective integration of NTS, enabling the manager to support his or her staff on an ongoing basis.

**Purpose and scope of this document**

The implementation of these training materials and reinforcement activities requires careful planning and an integrated approach within competence management systems (CMS).

This document has been written for people responsible for setting company policy with regard to competence management, and those responsible for planning and implementing changes to the CMS. The report aims to provide both a view of the ‘bigger picture’ of NTS, and to highlight points for consideration in planning and maximising the effective implementation of NTS training and reinforcement activities.

The document is divided into three parts:

**Part A** outlines the case for investment in NTS integration.

- **What it covers**

  It appears that there is increasing pressure for those responsible for training decisions to justify investment in any new training programme, and often a business case will need to be produced. This part of the document aims to support this process by outlining why and how NTS relate to safety, by summarising current NTS integration across the rail industry (and providing a checklist to help establish your company’s position) and presenting evidence in support of the investment. An overview is also provided of the likely costs of NTS integration – the initial and ongoing activities required to maximise the effectiveness of the training courses.

- **Who it is for**

  This high-level summary is relevant for those wanting a ‘bigger picture’ of NTS investment and what it is likely to mean for their company. The information on how NTS underpin safety, and evaluation evidence, is likely to be of interest to any person wishing to understand the value of NTS.
Part B provides recommendations on how to go about integrating NTS into all areas of the company.

- What it covers
  
  The section begins with considerations and recommendations for delivering the training programmes (including, for example, the competence required of facilitators themselves), and then looks to the wider picture of CMS and how other areas of CMS should support the objectives of the course. The section also outlines the key factors in successful implementation (including the company’s attitude to competence development), challenges that may be faced and suggestions for addressing these. The section finishes with recommendations for evaluating the NTS course and reinforcement activities.

- Who it is for

  This section is relevant to any person with a role in designing or implementing any aspect of competence management systems. Facilitators will find the sub section on implementation of the course very relevant, and standards managers, recruitment staff and incident investigation staff will also benefit by reading the CMS section. All staff involved in NTS integration will find the success factors and challenges sections relevant.

Part C provides further information on the T869 project methodology.

- What it covers

  This includes an overview of the design and development of the course materials, piloting of the courses, the approach taken to evaluating these courses, and the results.

  Further detail is available in a separate report\(^1\) which provides background on the development of the original NTS list and behavioural markers.

---

\(^1\) RSSB (2012). Non-technical skills required in the train driver role: skills, behavioural markers and guidance notes (v2.0).
Who it is for

This section will be of interest to anyone wishing to know more about the background to the development of the training materials.

Parts A and B include advice from the companies involved in the development and piloting of the materials. Their experience in delivering and integrating the training has been collated into practical advice and tips for other companies going through or planning to go through NTS integration. For convenience this information has been formatted into boxes:

Information from Northern Rail is provided in dark green text

Information from Arriva Trains Wales in provided in purple text.

Information from Network Rail is provided in orange text.
Non-technical skills required in train driver role: Developing an integrated approach to NTS training and investment

Part A: The case for investment

1 Part A Introduction

Effective training can be regarded as an investment, with the potential to provide benefits in relation to business performance, financial returns and workforce productivity\(^1\).

In this chapter the following topics are covered:

- Why NTS are important and how they relate to safety
- NTS training provision across the industry
- The business case for NTS: benefits and costs

\(^1\) RSSB (2011). Training as an investment: final report.
2 Why NTS are important and how they relate to safety

2.1 The key role of NTS in safety

NTS are used with technical skills to enhance the way that a task or procedure is carried out and can increase safety by helping to manage threats and errors when they occur. By developing these skills, drivers can learn how to deal with a range of situations, including situations that are more novel. This is known as adaptive expertise.

Human error is inevitable but people can develop skills and expertise that can help them to mitigate risks. For example, a driver who shows signs of being conscientious might be more likely to quickly notice threats as they occur and if they are good at managing workload and communicating with others they might effectively mitigate that threat. Evidence from similar training courses that have already been evaluated suggest investment in this area can result in significant benefits (see Part A section 4.3).

There is a growing appreciation within the rail industry of the importance of NTS as evidence grows on the key role of NTS in safety.

2.1.1 Evidence from the Human Factors Database

Analysis of incidents and accidents recorded on the Human Factors Database at RSSB shows that of all errors recorded (human, management and design), 63% were human errors. When errors in engineering/design are compared with human errors, the former account for only 2% of all errors in the database. This highlights the key role of human error and management support in contributing to incidents and accidents.

There are several types of human error, underpinned by issues relating to perception, attention, memory, and understanding, which relate strongly to NTS. The information in the database illustrates the prevalence of these issues and the importance of NTS. For example:

- The task of observing or acting on a signal at danger accounts for 32% of the driver errors in the database. Observing or acting on a signal at caution accounts for

10.2%. These errors are mostly due to either having an incorrect mindset (i.e. situational awareness) [27%] or getting distracted (by required or unrequired tasks) [26%].

- Decision making errors (where an inadequate plan is followed) account for over 30% of all of the human errors in the database.
- Other tasks, including reporting an accident, fault or problem, and observing and acting on cab warnings each account for around 10% of driver errors in the database.
- 20% of SPAD incidents included a driver error in reporting of some form. Of these errors, the majority (26%) are violations. Training to address perceptions of risk/confidence may help reduce the tendency to violate.

As the measurement of NTS becomes integrated across the industry, the number of case study examples that can be used to illustrate the role of NTS in safety is likely to grow. For example, these findings are echoed by incident data collected on an annual basis by Northern Rail.

2.1.2 Analyses of incidents at Network Rail: the relevance of non-technical skills

At Network Rail, recent analysis of irregular working events has shown some interesting issues in relation to NTS. For example, the analysis of level crossing incidents showed that 33% of all irregular working events have communications as a factor and the other two significant categories (persons or vehicles being trapped and permission to cross granted with a train still in section) have attention and awareness as a major causal factor.

In addition, Network Rail has recently seen an increase in line blockage irregularities, with 40 events occurring between Jan 2011 and Dec 2011. The pattern of causes of these incidents involves, predominantly, failures in NTS such as attention, communications and workload as factors. In the vast majority of cases operators have the right level of technical skill and competence and it is a weakness in their NTS that had led to the error.

2.1.3 Analyses of incidents at Northern Rail: the relevance of non-technical skills

Every calendar year, Northern Rail undertakes a detailed analysis of category ‘A’ SPAD incidents, and the reasons they occur. This includes identifying the type of human error that led to the unsafe
Part A: The case for investment

act (lapse, slip, mistake or violation) and identifying the key human factors that were the underlying reasons this error occurred.

Their breakdown of the 22 SPAD incidents Northern were involved in during 2010 reveals the following:

- Nine incidents caused by a lapse of attention
- Six incidents caused by a slip (incorrect execution caused by distraction, for example)
- Four incidents caused by a mistake (incorrect planning eg reading across at a gantry)
- Three incidents caused by an unsafe condition (eg sunlight on a signal, adhesion)

Northern have linked the causes of 100% of the lapses, slips and mistakes to NTS, and believe strongly that investment in NTS development will help to mitigate this.

Lack of situational awareness has been identified as an underlying cause of 11 incidents (for example, when drivers have failed to maintain concentration due to a train on the opposite line, and when drivers have not anticipated the risks of a situation, for instance when starting from a station).

Workload management, another key NTS, has been identified as an underlying cause of seven incidents (for example when a driver has not multi-tasked effectively, or has incorrectly prioritised tasks).

Conscientiousness, which is about checking and being methodical, has been related to one incident in which a driver failed to check the correct signal on a gantry.

Clearly, several factors can contribute to an incident, and not all of these relate to the individual's NTS, but the data from the Human Factors Database and Network Rail and Northern Rail's records serves to demonstrate the value of doing something proactive to develop NTS within the industry.
3 NTS training provision in the rail industry today: where does your company fit in?

3.1 Lack of formal NTS training

At the start of the project, RSSB set out to gain an idea of how much NTS training already existed in the industry.

The review of driver training undertaken as part of RSSB research project T718\(^1\), and discussions with representatives from across the industry demonstrated that generally speaking, training is heavily rules and compliance based, and coverage of NTS is sparse and informal, if covered at all. As outlined above, NTS are vitally important to safety, and so this should be reflected in the training agenda.

A limited number of companies had begun to introduce elements of human factors into their training programmes – but rarely did companies build on this to provide more information on the ‘individual’ within the system, and how his or her NTS can help to mitigate errors.

3.2 Developments since the start of the project

In the few years since the start of the project in 2009, the number of companies who have begun to train and measure NTS has increased, and the appreciation of the key role of NTS in safety is improving.

A number of train operating companies are revisiting their training programmes in line with the risk based training needs analysis (RBTNA) methodology outlined by the RSSB T718 project, and are seeking to ensure that NTS are an integral part of staff training programmes.

3.3 The importance of training as well as measurement

Some companies have introduced NTS measurement (where managers rate driver’s behaviours) but this is not supported by thorough training for managers, or initial training for drivers. This can lead to misapplication by managers, and suspicion amongst drivers who are being measured against something that they themselves do not necessarily understand as being related to their role.

---

\(^1\) RSSB (2009). Review of driver training programmes in Great British railways: Cross-industry leading practice research.
For the success of NTS development programmes, it is important that front line staff are trained so that they can understand:

- The risks in their role
- How NTS can help
- How NTS support technical tasks

As well as being trained in the above, managers should be trained in:

- How to use behavioural indicators to measure NTS
- Appropriate questioning and feedback methods to support driver development

Without training, managers may appraise NTS in a very subjective way that is not based on evidence, this will significantly limit the effectiveness of the feedback session.

In introducing NTS into performance measurements, Network Rail did not originally offer specific training to managers. Whilst assessment of NTS, in simplest terms, is about providing a structure to make judgements about performance which good managers do anyway, it is important that managers understand the importance of NTS, the link to incidents, how to use behavioural markers and, most importantly, how to develop an individual's NTS if weaknesses are identified during assessments. Without this background and guidance there is resistance to and misuse of the process. Network Rail is now developing a NTS Assessment training programme and creating more resources for line managers so they know how to support and develop NTS.

The training should provide a structure for professional discussions around how to anticipate and mitigate risk, raising awareness of human limitations and how these link to challenges in the role. It is vital that the training encourages a learning approach to errors so that these discussions provide maximum benefit.
### 3.4 The importance of training in context

Training courses should not be delivered in isolation. To gain maximum benefit from the courses, the principles of the course should be supported back on the job. This is achieved by managers integrating NTS appraisals into their measurement of performance (see above) and the provision of other supportive activities (such as the reference to NTS in safety briefs and the opportunity to practice NTS on a simulator). This enables staff to put into practice what they have learnt on the course.

More guidance on the integration of NTS into the CMS is provided in Part B, Section 4.

### 3.5 Checklist for NTS integration

The aim of the RSSB NTS project is primarily to provide the industry with training tools to assist with the effective integration of NTS, and also, through this report, to provide guidance on what to consider in effectively integrating NTS.

Please use the checklist below as a guide to help establish your company’s current position with regard to NTS.

<table>
<thead>
<tr>
<th>Does your company:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base NTS training upon a sense-checked list of NTS relevant to the risks in the role in question</td>
</tr>
<tr>
<td>Offer formal NTS training to front line staff, including:</td>
</tr>
<tr>
<td>The risks in their role</td>
</tr>
<tr>
<td>How NTS can help</td>
</tr>
<tr>
<td>How NTS support technical tasks</td>
</tr>
<tr>
<td>Offer formal NTS training to managerial staff</td>
</tr>
<tr>
<td>Offer managerial staff training in the effective observation, measurement and feedback of NTS, including:</td>
</tr>
<tr>
<td>How to use behavioural indicators to measure NTS</td>
</tr>
<tr>
<td>Appropriate questioning and feedback methods to support driver development</td>
</tr>
<tr>
<td>Use facilitators with a sufficient understanding and appreciation of NTS to deliver training programmes</td>
</tr>
</tbody>
</table>
Part A: The case for investment

RSSB recommend that companies aim to address each of the points in the box above, and aim to assist companies through the guidance provided in this report, and by making the NTS training materials available. The RSSB NTS materials have been designed to meet these requirements and provide companies with materials that can be easily adapted and integrated into existing training systems. This provides consistency across the industry and minimises duplication of effort.

The remainder of this report provides further detail on each of the above, starting with an outline for building a business case which should help enable your company to address any existing gaps in its NTS integration.

- Represent the links between NTS and technical tasks within the competence management system (integration of NTS and technical training, appropriate performance standards)
- Enhance formal NTS training programmes with support ‘back on the job’ (eg informal NTS discussion, reference to NTS in company magazines, offering further training support through simulator sessions).
- Use evaluation evidence from the training, and information from incidents and accidents to refine NTS training programmes
4 A business case for NTS: benefits and costs

4.1 Introduction

This chapter begins with an overview of the points that should be included in a business case for NTS training and support.

The subsections outline the evidence for improved safety performance, costs and other benefits.

The chapter finishes with an overview of the cost investment required to realise these benefits, and advice from Northern Rail (one of the companies involved in the RSSB NTS course pilot) and Network Rail (also involved in the project) for creating a business case.

The subsequent chapters provide more detail on implementation, including advice from companies involved in the piloting of the RSSB NTS course.

4.2 Producing a business case

4.2.1 Outline how the training manages risk

Training should be based on relevant risks\(^1\), and should link clearly to the maintenance or improvement of a company’s Key Performance Indicators (KPIs).

The NTS training programmes are based on the risks that staff face in their roles (as explained in section two), and are designed to improve safety by increasing staff awareness and performance in managing risks in the role. As such, NTS training should form an important part of safety strategy.

At the start of the RSSB project, the role of the driver was broken down into tasks and subject matter experts considered the possible risks associated with each task, and how NTS might mitigate these.

In devising a business case, companies are advised to examine the key areas of risk faced by the company (by looking at incident reports, amongst other sources of information), and use the information included in Part A, Section 2 to demonstrate how NTS integration can help mitigate these risks.

---

Part A: The case for investment

This advice is echoed by Network Rail, who said that the error analyses they conducted on key activities in the signaller role formed a good basis for their business case. They were able to highlight the sorts of errors that could be made and the influencing factors which were clearly related to NTS.

4.2.2 Outline predicted safety and financial benefits

NTS training is expected to improve safety performance by improving staff knowledge, skills and attitude to safety, and in doing so, their ability to anticipate, manage and mitigate risks to safe performance.

When it comes to business results, it is always difficult to put specific figures directly against training outcomes. This is because:

- Training is rarely evaluated beyond simple feedback sheets (reaction level questionnaires) at the end of a course.
- If business changes are found, this could be due to a number of factors (e.g., organisational change, numbers of new and therefore inexperienced recruits, quality of existing training and assessment regimes, existing culture, or external factors such as weather) and it is not possible to put this down to any one intervention.

Where efforts have been made to evaluate similar training at the business results level, there have been some encouraging results.

4.2.3 Include other less tangible benefits to support the case

Other benefits that are more difficult to quantify are also expected. These include improvements in knowledge and attitude, as well as the competence culture within the company.

To realise these benefits, NTS training should be implemented effectively. More information is provided on this in Part A, Section 4.6 and throughout Part B.
4.3 Improving safety performance: what is the evidence?

The evaluation of the RSSB NTS pilot courses suggested that there were improvements in knowledge, attitude, and skills on the job. The findings also suggested that the courses contributed to an improved safety culture. In time, these findings are expected to translate into improved safety performance.

The pilot trials were undertaken relatively recently (spring/summer 2011) and so no safety performance information is available at the time of publication of this report. However, evidence is included from other sources below.

4.3.1 Reduction in railway incidents

Canadian Pacific Railway reported a 46% decrease in human-caused incidents and the lowest incident rate for Class 1 Railways in North America and attributed this to the Rail Resource Management Program that they implemented in 2002.

Queensland Rail in Australia report that their investigation of driver SPAD rates suggest RRM training can help improve safe driving behaviour. They looked at SPAD records and summative assessment records from 2007 to 2011. SPAD rates were compared for two cohorts of trainee drivers in their first 12 months of driving (when Queensland Rail report drivers are more likely to have a SPAD). The first cohort did not complete RRM as a trainee (n = 95) and the second cohort did (n = 125). Findings showed that trainee drivers were more than twice as likely to pass a signal at danger in their first 12 months if they had not completed the RRM training (compared to if they had) - 26.3% compared to 13.71%.

However, Queensland Rail add that it is not possible to definitely attribute the reduction in SPAD rates to the effects of the training as a number of other organisational changes were made at the same time, and so the reduction could reflect wider system improvements. Nevertheless, they report, the results are promising.


Part A: The case for investment

Network Rail has begun to train its signallers in attention and awareness, and to measure NTS in assessments. It reports anecdotal evidence that where they have assessed signallers who were having repeated safety and performance events using the NTS framework, this enabled them to identify targeted action plans and specific strategies for managing those individuals (such as improved scanning strategies and strategies for managing distractions). These individuals have not been involved in incidents since.

4.3.2 Reduction of incidents in other safety-critical industries

NTS training is relatively new to the rail industry, where it has been in existence in other safety critical industries for a number of years. There are positive results from similar training within other sectors where NTS are also vital to the role of safety critical staff.

Within the military aviation sector, reports suggest that the occurrence of accidents has reduced by 81% after the introduction of similar training

Within the shipping industry, it has been reported that major safety occurrences have decreased by a third.

4.4 Cost benefits: what is the evidence?

4.4.1 Avoided costs

- Fewer incidents (costs of which include time stood down whilst investigation proceeds, cost of managers to investigate, cost of drugs and alcohol testing, medicals, re-briefing/re-training costs).
- SPAD costs (which can range from approximately £2,000 upwards depending on the severity of the consequences and various factors including compensation claims through injury to people, damage to trains and/or infrastructure,


performance delays to other trains, whether a driver needs to be removed from duty).

- Cost of sending a driver to behavioural training offered by third party consultancies. Experience suggests these are expensive.
- Costs associated with reputational damage.
- By ensuring the right staff are selected in the first place, avoiding the costs associated with managing ineffectiveness in staff (the cost of which can be significant to the company and to the individual).

### 4.4.2 Reduced costs

- Reduced insurance prices (insurance policies have dropped by one third in shipping).
- Reduced maintenance and damage costs by 66%. Ground maintenance costs reduced by 66% at Continental Airlines\(^1\), and reduced ground damage costs\(^2\).

As with many investments, it may take some time to see these benefits, which may be of some concern to companies operating under a short-term franchise agreement.

### 4.5 Other benefits

Some benefits are less tangible, and more difficult to convert into monetary value. However, this does not mean these benefits are not important, and they can be very powerful in supporting the implementation of training.

**Protecting / increasing revenue**

- A more engaged and motivated workforce which should contribute to a positive organisational culture. This in turn may lead to improved train service performance, lower staff turnover and lower loss time due to staff sickness.

---


Part A: The case for investment

- Reputational benefits eg improved interaction with customers.
- Improvements in knowledge, skills and attitudes.

4.6 What cost could there be to the business in integrating NTS development?

Although the NTS materials are freely available to all RSSB members, integrating NTS into your business - as with any change process - is a medium to long-term strategy, and there are various potential costs involved.

A range of people need to be involved in the integration of NTS:

- All front line staff, and the managers that support them should be trained.
- For lasting effects it needs to be reinforced throughout the organisation.
- Not purely top-down - participants must drive the discussion and feedback suggestions for how organisations can help them in their role. These suggestions should then be acted upon.

The US Federal Railroad Administration (1997) conducted a utility analysis into NTS-style training, considering both the costs and benefits of implementing the programme. It was concluded that this training can be expected to have net positive benefits at both the industry and company level.

So what investment is required? Individual companies will need to make the following investments to ensure success:

**Time to customise the training materials (as required)**

- Although the courses have already been developed, the best courses will include some additions to the standard course asset list to include examples of relevant case studies from the company. Where the course is to be provided to staff other than drivers or driver managers, additional assets become necessary.
- Integrating within existing training programmes: Looking forward, NTS training should be integrated with technical training, and so facilitators should allow time to co-ordinate this. For example, NTS should be a core topic on safety briefing days.
Preparing for course delivery

- Time to upskill training staff who will deliver the courses.
- Familiarisation and building confidence: Facilitators will need time to read through and familiarise themselves with the course materials. RSSB will be offering 4-day train-the-trainer courses to support companies with this. This will incur a nominal fee to cover materials and refreshments, and time away from the day job for the facilitators.

Release of staff to facilitate learning and staff to attend the training course

- The front-line staff course will take an average of two consecutive days to deliver. The manager course will take an average of three days.
- The courses are designed to allow flexible delivery so it is not necessarily the case that staff will need to be released for consecutive days for the course. Modules can be integrated into existing training programmes or company activities such as company briefing days.

Training facility cost

Providing a location for course delivery.

Administration costs

To cover the administration tasks required to arrange any training course.

Supporting the course principles 'back on the job'

- Managers will need to integrate NTS appraisal into CMS and performance assessments.
- To reinforce what the frontline staff have learnt on the course, managers should be observing, questioning and feeding back on NTS as part of regular performance assessments. This may extend the time required for a performance assessment, but will provide more value and offer development to the member of staff. Decisions will need to be made by individual companies about how to document NTS. More information is provided on how to do this in Part B section four.
Arriva Trains Wales reports that as well as using the RSSB NTS course materials to integrate NTS into technical training, it also intends to make NTS a key component of scenarios on its simulator training days.

### 4.7 Tips in developing a business case for NTS

Steve Pugh, Head of Operational Safety at Northern Rail summarises his top tips for producing a business case for investment in NTS:

**Understand your current situation**

- Do a thorough analysis of incidents to fully understand causation and therefore direct your resources to the most useful and productive areas
- Explore the costs of incidents when they occur within your company

**Context is important. Be prepared to invest time beyond delivering a training package**

- This is a medium- to long-term strategy
- Integrate across the whole of your CMS to gain maximum benefit
- Most of this can be done without great expense, the only real cost is training and development

**Some valuable benefits are more difficult to quantify**

- Ultimately a well motivated workforce who understand the risk of not following procedures and recognise where they are prone to error will reduce incidents
- It is difficult to isolate effects of the training
- Investment in NTS adds to your company image – this is seen to be the ‘right thing’ to do, a progressive company embraces this type of initiative

Steve advises that with correct analysis, and an eye on the rolling average number of incidents, you should see an overall decline in incidents if all the above are in place.
Network Rail add that when making the business case for NTS you have to focus on the whole process and the benefits at selection, training, on-going competence assessment and job performance and investigation.

The other big selling point is that NTS training and measurement is already an established approach in other safety critical industries such as aviation.
Non-technical skills required in train driver role: Developing an integrated approach to NTS training and investment

Part B: Planning for implementation

1 Part B Introduction
In this chapter the following key aspects of implementation planning are covered:

- Training course for drivers / front line staff
- Training course for managers
- Integrating NTS across competence management systems (CMS)
- Success factors
- Challenges
- Evaluation

2 Training course for drivers / front line staff

2.1 Who should be trained?

All safety critical staff

The core content of the course is relevant to staff in all safety critical roles, and so these staff should be offered the training as part of their competence development.

All levels of experience

The front-line NTS training course is applicable to staff at all levels of experience, as they share many of the same risks in their role, as well as risks particular to their position:

- Inexperienced staff may be less aware of risk situations
- More experienced staff may become overconfident, bored or complacent

Feedback from the pilot courses suggested that some drivers felt the course would be most useful to new or trainee drivers. However, it should be noted that no significant differences were found between the NTS ratings (both from managers and drivers’ own self-reports) of experienced and inexperienced drivers (suggesting that both groups can equally benefit). Exposure to relevant experiences, and a learning approach are what is needed for staff to enhance their NTS. It is not always the case that those who have been in the role the longest will have had these opportunities and this approach.
Prioritising

There is a need to prioritise between staff groups receiving training. It is recommended that the staff facing the highest level of risk (as determined through a risk-based training needs analysis, including the analysis of incidents and accidents) receive the training first.

ATW chose to integrate NTS into driver training first, and in the near future intend to implement NTS training and ongoing measurement in to other safety critical grades.

2.2 Who should train NTS in front line staff?

It is important that the person delivering the training (the facilitator) has:

- A good understanding of NTS, including a basic knowledge of human factors and human vulnerabilities.
- A style which facilitates participation. The course consists largely of group discussion and exercises. The facilitator should set the tone for open and honest discussion, and be prepared to manage the course in a manner that reflects the learning styles of the participants. The facilitator should motivate participants, and make them want to contribute to and get the most from, the course.
- A good knowledge of the role(s) of the participants. To aid discussion, and to be credible, the facilitator should have a good knowledge of the role of the participants. Ideally, the facilitator will have occupational experience of this role themselves.
- A firm belief in the value of NTS. The facilitator plays a key role in communicating the importance of NTS. If the facilitator is unenthusiastic, the participants are unlikely to...

---


4  To reach a sufficient level of understanding, facilitators should read through the course materials and manager toolkit. In addition, RSSB will be offering a number of train the trainer courses. For more information on these courses please visit the human factors pages of the RSSB website (http://www.rssb.co.uk/EXPERTISE/HF/Pages/default.aspx)
be motivated to listen and contribute. Experience of the RSSB T869 pilot course has shown that participants can initially put up some resistance, and so the passion and knowledge to meet these challenges is essential, as well as empathy with participants’ perspectives.

- An awareness of the company’s wider strategy for NTS so that he or she is able to answer participant’s questions on this topic.

Tips from Arriva Trains Wales:

It takes some time for training staff to really understand NTS. As well as the basic concept, they need to understand NTS to a point where they can deliver an NTS course that really adds some context in terms of the participants’ role.

Another challenge for training staff is being able to have enough personal understanding of NTS to coach, challenge and probe a participant’s level of understanding.

Be prepared to act as future support for both managers and drivers as you will be seen as an ‘authority’ on NTS.

Further useful information on the required competencies of a facilitator, and suggestions on how to recruit effective facilitators is provided within the RSSB Good Practice Guide on Competence Development which is being drafted at time of writing.

The front line staff course consists of a mixture of theory and practice that is designed to draw on relevant NTS experiences and uncover what can be learnt from these. A core set of course slides has been put together as a framework and leads into group discussions, activities and case studies.

A summary of the modules on the course is provided in Table 1.
Part B: Planning for implementation

Table 1 - Summary of the course modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>An introduction to the aims and objective of the course and what the participants can expect.</td>
</tr>
<tr>
<td>2A. What makes a good safety-critical member of staff?</td>
<td>The relevance of NTS to the role is explored through group discussion.</td>
</tr>
<tr>
<td>3. Action Model and what can go wrong</td>
<td>A brief overview of human factors is provided. The Action Model represents the four basic stages people go through when carrying out an action: 1. Observing / noticing information 2. Understanding it 3. Making a decision about what to do 4. Carrying out the action This module outlines the generic risks that occur at each stage, and uses a case study to demonstrate what this can look like in practice.</td>
</tr>
<tr>
<td>4. Workload Management and Self-Management</td>
<td>These NTS underpin all other NTS so their value is explored early on in the course.</td>
</tr>
<tr>
<td>5. Observe / Notice</td>
<td>Relating to the first stage of the action model – observation - the human limitations that can impair it, and the NTS that can enhance it are explored.</td>
</tr>
<tr>
<td>6. Understand</td>
<td>A similar approach to that taken in the observe/notice module.</td>
</tr>
<tr>
<td>7. Decide</td>
<td></td>
</tr>
<tr>
<td>8. Act</td>
<td></td>
</tr>
<tr>
<td>9: Front-line course only: Summary</td>
<td>Course summary.</td>
</tr>
</tbody>
</table>

Various assets, including handouts, video clips and practical tools are associated with the course.
### 2.4 How should the materials be delivered?

The materials are flexible and can be delivered either as a ‘block’ ie over two consecutive days, or can be dipped into alongside technical training, or on safety briefing days.

Where possible, companies should blend the training with opportunities for practical experience. For example, providing sessions in a simulator to practice workload management skills.

The training materials and the related tools can also be referred back to at a later stage and used as a refresher tool.

### 2.5 Integrating NTS and technical training

Performance of each task in the driver role (or other safety critical staff role) requires the following:

- Knowledge
- Technical skills
- Non-technical skills

Because knowledge, technical skills and non-technical skills are so closely related, it makes sense to train them together, at the same time. Ideally, training programmes should be blended together to illustrate how technical and non-technical skills interlink.

The RSSB NTS course encourages participants to think about NTS in the context of their working lives and technical tasks. Similarly, technical training courses could encourage drivers to think about their tasks in the context of NTS.

The RSSB course offers a thorough grounding for the facilitator and trainees (hereon in referred to as ‘participants’) in NTS which should help them both in understanding the human limitations and NTS that underpin a range of technical tasks.

As trainers within the industry become more comfortable with the concept and application of NTS it will become easier and easier to make the connections to NTS during technical skills and knowledge training, and vice-versa. This can be achieved by using NTS terminology on technical training programmes, and by discussing, when a technical task, rule or procedure is trained, the NTS that underpin this task, human limitations etc.

To interlink technical and NTS training effectively, there must be a clear understanding about which NTS relate to which technical tasks. This can be achieved by listing all the tasks required of the role, and considering what knowledge, technical skills and NTS are required for technical performance.
2.6 Adapting materials to suit individual companies and learners

This mapping process has already been carried out for the role of the driver by RSSB as part of the T718 and T869 projects, and forms an important part of the wider task of integrating NTS into CMS (this is discussed in more detail later in the section).

The core content of the RSSB NTS course is applicable to all front-line staff in safety critical roles, but it features assets that are specifically relevant to the driver role such as simulator video clips, and rail-based case studies.

The simulator video clips were kindly provided by Arriva Trains Wales, and filmed on a class 175 unit with a single power brake controller. The case studies in the asset list were kindly provided by Northern Rail.

These assets are relevant to drivers from other companies, but the message about the relevance of NTS and how it relates to risks in the role, might be more powerful if companies integrate their own case studies and clips.

More or less time should be spent on specific topics in line with the particular risks faced by individual companies. If, for instance, a company has recently seen a number of incidents in which decision making has been a major factor, more time should be spent exploring this on the course.

The course is a good opportunity to explain exactly what the company strategy is for NTS integration, and the relationship between NTS and the company’s performance standards. Clearly the specific details of this will vary between companies, and so the facilitator should be aware of this information, incorporating it into their customisation of the course delivery.

Research into adult learning/cognitive styles has shown that different people learn and process information in different ways, for example with some preferring verbal information and other visual information. The facilitator should tailor the delivery of the training to the needs of the individual participants, by providing information in a variety of ways. For more information please refer to the relevant RSSB reports.

5 To acquire a copy of the driver task inventory with mapped knowledge, technical and non-technical skills please contact enquirydesk@rssb.co.uk.

NTS are not new to safety critical staff. They apply these skills all the time, which is how they are able to carry out their jobs safely. However, some staff may be more aware of this already, particularly those with a proactive and ‘switched on’ manager. Nobody likes to be preached to on a training course, and so the facilitator should be prepared to accommodate existing knowledge levels, encouraging those who already have a good understanding to demonstrate this in the course discussions and activities.

Pre-existing knowledge levels can be measured using a pre-course questionnaire or exercise. An example of this is provided in Appendix 1.

### 2.7 Adapting the materials for other front-line roles

**Using relevant assets**

If the course is being delivered to non-driver staff, alternative assets will need to be sourced in place of the driver assets. This will ensure that the assets used to illustrate points on the course are relevant to the participants.

**Sense checking the RSSB NTS list for other safety critical roles**

Although the RSSB NTS list is likely to be relevant to all safety critical roles, more or less emphasis may be placed on certain NTS, depending on the specific demands and risks of each role. This may mean it is justifiable to spend longer on one area of NTS relating to that risk than it is for drivers. It will also be necessary to tailor assets to effectively illustrate these risks (eg use a recent industry-specific case study).

To determine how comprehensive the RSSB list is for a non-driver role (and subsequently, whether more or less time should be spent on each NTS during the course, or whether more NTS should be added):

- Create a task inventory (list all of the technical tasks required in the role).
- Get subject matter experts (SMEs; job incumbents and/or their managers) to work through this list, considering which NTS are required for effective performance of each task and to mitigate the possible risks. This is a lengthy task – you may choose to prioritise by focusing only on tasks that have a safety risk.
- Record the details as you go.
Part B: Planning for implementation

- Review the results – what seems to come up again and again, does anything not come up at all, is anything not captured?
- It may also be useful to look at the selection criteria for the role and these should reflect important skills and behaviours on the job.

The NTS behavioural markers should also be reviewed by SMEs and tweaked as necessary to best reflect observable behaviours for that role.

**Non safety-critical roles**

Some interest has been expressed in the application of NTS to non safety critical roles. For these roles, some NTS will help explain the difference between levels of performance, and so some companies may choose to invest in the training for this reason.
3 Training for managers

3.1 The key role of managers

Managers set the tone and influence the motivation of employees to engage in ongoing development such as NTS. They also play a key role ‘back on the job’ in reinforcing the messages of the training through their feedback and measurement sessions with their staff.

It is important that managers know how to effectively observe, measure and provide feedback on NTS.

As part of the T869 non-technical skills project, trainers, managers and front line staff involved in the development of the training materials were asked to reflect upon the skills needed by managers to support development of NTS.

The list of skills produced is shown in Table 2.
Table 2 - Skills needed by managers to support NTS development

<table>
<thead>
<tr>
<th>Knowledge / Skills / Attitude</th>
<th>Further explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td></td>
</tr>
<tr>
<td>Knowledge of safety critical NTS and their</td>
<td>Explains what each NTS is and how this relates to their staff's role.</td>
</tr>
<tr>
<td>relevance to the role</td>
<td></td>
</tr>
<tr>
<td>Knowledge of what should be documented and</td>
<td>Consistently documents their staff's NTS using company forms.</td>
</tr>
<tr>
<td>how</td>
<td></td>
</tr>
<tr>
<td>Self-awareness</td>
<td>Shows awareness of own communication style and own NTS challenges.</td>
</tr>
<tr>
<td>Objective observation</td>
<td>Objectively evaluates their staff's NTS</td>
</tr>
<tr>
<td>Prepared and organised</td>
<td>Provide clear and well structured feedback on NTS.</td>
</tr>
<tr>
<td>Good listener</td>
<td>Through active listening, shows that they are keen to understand others' rationale</td>
</tr>
<tr>
<td></td>
<td>for actions and behaviour.</td>
</tr>
<tr>
<td>Clear communication</td>
<td>Puts points across clearly and without jargon so that they can be understood by others.</td>
</tr>
<tr>
<td>Flexible</td>
<td>Adapts own feedback style to the individual.</td>
</tr>
<tr>
<td>Motivational skills</td>
<td>Uses managerial skills to motivate others to perform safely.</td>
</tr>
<tr>
<td>Assertive</td>
<td>Provides feedback in a constructive way.</td>
</tr>
<tr>
<td>Attitude</td>
<td></td>
</tr>
<tr>
<td>Positive approach to NTS and keen to promote</td>
<td>Demonstrates commitment to promoting the importance of NTS.</td>
</tr>
<tr>
<td>their relevance and value</td>
<td></td>
</tr>
<tr>
<td>Keen to contribute to the ongoing development</td>
<td>Demonstrates commitment to developing the NTS competence of own staff.</td>
</tr>
<tr>
<td>of NTS within the organisation</td>
<td></td>
</tr>
<tr>
<td>Takes a learning approach to mistakes</td>
<td>Treats mistakes as an opportunity to learn rather than blame.</td>
</tr>
</tbody>
</table>
3.2 Who should train NTS in managers?

The same recommendations made in the 'who should train NTS in front line staff' section apply here - please refer to section Part B, Section 2.2.

3.3 Materials

The managers' course consists of the same core course content as the front-line staff course, but features additional modules that explore the important role of the manager, and how to effectively observe, measure and feedback on NTS.

The assets provided in the RSSB course include simulator video clips for managers to view and then observe the NTS and plan a feedback session.

A list of modules and a summary of each is provided in Table 3.

<table>
<thead>
<tr>
<th>Module</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>An introduction to the aims and objective of the course and what the participants can expect.</td>
</tr>
<tr>
<td>2A. What makes a good safety-critical member of staff?</td>
<td>The relevance of NTS to the role is explored through group discussion.</td>
</tr>
<tr>
<td>2B. What makes a good manager?</td>
<td>Managers are given an overview of the key components of their training course. The requirements of them as managers in measuring and providing feedback on NTS are explained, and key tools are provided. Measurement challenges and pitfalls are discussed and the five stages of feedback are introduced.</td>
</tr>
<tr>
<td>3. Action Model and what can go wrong</td>
<td>A brief overview of human factors is provided. The Action Model represents the four basic stages people go through when carrying out an action: 1. Observing / noticing information 2. Understanding it 3. Making a decision about what to do 4. Carrying out the action This module outlines the generic risks that occur at each stage, and uses a case study to demonstrate what this can look like in practice.</td>
</tr>
</tbody>
</table>
Part B: Planning for implementation

Table 3 -

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Workload Management and Self-Management</td>
<td>These NTS underpin all other NTS so their value is explored early on in the course. The managers also discuss the motivation of their staff, and the importance of safety culture.</td>
</tr>
<tr>
<td>5. Observe / Notice</td>
<td>Relating to the first stage of the action model - observation - the human limitations that can impair it, and the NTS that can enhance it are explored. Managers put effective observation, measurement and feedback into practice.</td>
</tr>
<tr>
<td>6. Understand</td>
<td>A similar approach to that taken in the observe/notice module.</td>
</tr>
<tr>
<td>7. Decide</td>
<td></td>
</tr>
<tr>
<td>8. Act</td>
<td></td>
</tr>
<tr>
<td>9: Measurement+ and feedback +</td>
<td>This is the final part of the course for managers and should take place once managers have had an opportunity to go out and measure their staff. It provides the chance to consolidate what has been learnt and to address any issues that may have arisen in putting the course into practice. There is also further opportunity to put effective observation, measurement and feedback into practice.</td>
</tr>
<tr>
<td>10. Summary</td>
<td>Course summary</td>
</tr>
</tbody>
</table>

3.4 How should the materials be delivered?

The manager course features various assets to complement each module, including handouts, video clips and practical tools (including generic measurement form and feedback guides).

As with the front-line staff course, the materials are flexible. The manager course is longer than the front line staff course because of the additional objectives, and so will take a total of approximately three days to deliver.

The measurement+ and feedback+ module is designed for delivery after the managers have had the opportunity to put some of the course principles into practice and have used the tools. For
3.5 Adapting materials to suit individual companies and learners

In addition to the guidance provided in Section 2.6, part of the manager course involves an introduction to the company-specific forms that should be used for measurement and the company strategy for how performance should be managed and what records should be kept. The facilitator should be familiar with this information, and incorporate it into their customisation of the course delivery.

3.6 Adapting the materials for managers of other roles

Please see the notes under Section 2.7; the same principles apply.

this reason, we advise a break in the delivery of this course that allows sufficient time for managers to do this.

The exact period of time will depend on individual companies and the frequency of opportunities to put this into practice with the front line staff.
Part B: Planning for implementation

4 Integrating NTS across the competence management system and other company processes

4.1 Introduction

To optimise the benefits of the NTS training, NTS should be integrated across the organisation. This will ensure that messages from the training are reinforced throughout the life cycle of staff members (i.e., from initial recruitment through to ongoing performance development), and that value from the training can be realised in other areas of the company.

A formal training programme is just one element of staff competence development. The following supporting processes should also be informed by NTS:

- Recruitment and selection
- Ongoing competence measurement
- Incident investigation

To ensure that their position was clear, and that NTS were integrated effectively, Northern Rail produced an NTS integration strategy document based on discussions among key internal personnel. This covered areas such as the recruitment, training, assessment and incident investigation for drivers, conductors and other safety critical staff. An extract of this document is provided in Appendix 1.

4.2 NTS in selection

Certain skills and behavioural preferences are important determinants of performance on the job. These are the skills that differentiate between a 'very good' and 'less strong' performer.

As NTS underpin the effective implementation of technical tasks, NTS should have parallels with selection criteria. For example, in drivers, the NTS 'maintain concentration' can be linked to one of the selection criteria which measures candidate's ability to demonstrate a basic level of ability in maintaining concentration and vigilance, and the NTS 'positive attitude to rules and procedures' links to the selection criterion 'rule compliance'.
Skills and behaviours can be developed on the job, but at recruitment, minimum standards of these skills and preferences are used as ‘selection criteria’ when recruiting for suitable staff.

RSSB has been working on a project to review the existing selection process for train drivers, and is satisfied that the driver selection criteria and tests it will recommend do relate to the NTS required in the driver role. The full list of driver selection criteria and recommended tests will be published in an updated Rail Industry Standard.

It is recommended that this approach is reflected in the recruitment of other safety critical staff.

Checklist:

- Are the staff who are responsible for setting the policy on recruitment and selection in your company aware of NTS?
- Do the selection criteria applied for each safety critical role in your company reflect the NTS required to carry out the role?

Selection is about identifying a candidate’s existing level of skill, and using that as an indicator of their potential in the job. Once in the job, NTS measurement can be used to understand how the individual’s skills are developing within the role.

Network Rail agrees that it is essential that NTS should be integrated throughout the whole people management cycle. NTS should be taken into account when assessing people’s suitability for selection and promotion. If you don’t recruit or promote the right sort of person the costs involved in managing them later (both to the individual and the organisation) can be significant.

Network Rail is currently revising its signaller selection process to include more robust assessment of decision making skills, being conscientious and the skills involved in remaining calm under pressure and working with others.
Part B: Planning for implementation

4.3 Ongoing competence measurement

4.3.1 Building NTS into competence standards

Competence standards - the standards required of individuals in their role - and the more specific performance criteria that underpin them, should have a clear relationship with the task-based requirements of the role, and the risks that must be mitigated within that role.

As explained above, NTS underpin all technical tasks and can help individuals to identify, manage and mitigate risk. This means that NTS should form an important part of competence standards and performance criteria.

4.3.1.1 Mapping NTS to competence standards

When beginning to integrate NTS, it can be very helpful to see a clear mapping of NTS onto every technical task, to competence standards and performance criteria. This is because:

- It demonstrates the relevance of NTS to every technical task, performance criterion and competence standard in general. This is useful for building a business case for NTS integration, particularly if there is a lack of buy-in to NTS within the company.
- It highlights what to look out for when measuring each performance criterion.

Suggested steps for mapping NTS to technical tasks and higher-level competence standards are provided below:

**How to identify which NTS are relevant**

1. Map NTS to each task in the role.

- A process of mapping NTS to generic driver tasks has already been completed as part of the RSSB NTS and T718 projects. This can be used as a starting point to demonstrate the relationship between technical tasks and NTS.

- In order to map NTS onto tasks not included in this analysis (i.e., non-generic tasks that are specific to drivers working in specific environments / companies, or for non-driver tasks), bring together a group of subject matter experts (front line staff and managers) to discuss how a task needs to be carried out to maximise safe performance.
This is something that both companies involved in the T869 pilot project have chosen to do - they have revisited the RSSB generic driver task list, and then brought the information together at a higher level to show which NTS are applicable to each performance criterion.

For each of their driver performance criteria, Northern Rail identified underpinning knowledge, key NTS and areas of occupational safety.

When collating the NTS required at the performance criterion level, they made a judgement call about which are the most likely NTS to be required when a driver is carrying out each task. For example, for performance criterion 'Going on or near the line', part of competence standard 'personal track safety', Northern have mapped the following:

1.5 Anticipation of risk
2.1 Systematic and thorough approach
2.2 Checking

Completing the training in NTS will help build a thorough understanding of the relationship between tasks and NTS, and assist with this identification process. A thorough understanding of NTS is very beneficial at this stage, as it enables people to understand that the complexities of an individual situation (eg environment, preceding events, other people) can influence the NTS needed to safely carry out a task.

2 Bring this information together at the higher level to show which NTS are applicable to each performance criterion and competence standard

- Once you have identified which NTS relate to each task, this will inform the link between performance criteria relating to that task, and the relevant NTS.
- It will then also be possible to show which NTS are important to the higher-level competence standard.

a. A copy of the T718 / T869 task inventory is available on request from the research department at RSSB: enquirydesk@rssb.co.uk.
Part B: Planning for implementation

2.3 Positive attitude towards rules and procedures
4.1 Effective decisions
4.2 Timely decisions
4.3 Diagnosing and problem solving
6.1 Multi-tasking and selective attention
6.2 Prioritising
6.3 Calm under pressure
7.3 Maintain and develop skills and knowledge

Arriva Trains Wales is now in the final stages of implementing a new CMS built from the work carried out on T718 (RBTNA) and T869. This has included a consideration of the risks being performed, and mapping on knowledge requirements and key NTS.

4.3.1.2 Challenges to mapping NTS to performance criteria and competence standards

The process of mapping NTS to technical tasks is recommended as a way to sense-check the RSSB list of NTS and markers, and as a basis for a business case (see Part A). However, as for extending this mapping to competence standards, as well as being a time consuming task, there are some particular challenges to trying to map NTS to tasks, performance criteria, and competence standards:

- The list is likely to become very repetitive.
- It will never be possible to provide an exhaustive list for each task, performance criteria, competence standard. The precise NTS required in a situation depend upon the circumstances, and a list of mapped NTS does not allow for this flexibility.

Within the aviation industry, no attempt is made to list the NTS associated with individual tasks for these reasons.

Repetition

In mapping the NTS to tasks and performance criteria the list is likely to become very repetitive. Some NTS (eg situational awareness) are likely to be relevant in virtually every job task!
This begins to call into question the value of mapping NTS to every performance criterion and competence standard.

**Flexibility**

Some companies have tried to get around the issue of flexibility in NTS according to situation by mapping only the key NTS that will apply in virtually every situation. However, there is always the risk that managers using the list will begin to see it as being more prescriptive than it really is.

A more flexible approach than listing the related NTS would be to map performance criteria to the more generic stages of the Action Model (observe - understand - decide - act). These are stages that we move through in carrying out an action, and each stage relies upon particular NTS for successful completion.

It is important that flexibility is recognised by people responsible for producing CMS documentation, and by the managers using it. Managers should not see the mapped NTS as a prescriptive list.

To help get around this, all performance criteria could be introduced with the caveat 'and apply the NTS required to anticipate and respond to risks that arise'. Then, the impetus is on the managers to have the level of knowledge and understanding to recognise what these risks and NTS could be.

This is one example of why manager training in NTS is essential. It also highlights that with practice, managers may build sufficient understanding of the inherent nature of NTS in technical tasks to know where and how NTS apply.

An alternative option is to reword performance criteria as appropriate, to read like behavioural markers. These criteria can be based upon one or more of the behavioural markers on the NTS list, and should be focused on the risks associated with performing any given task. This means that performance criteria can be reworded using NTS language in a technical context - highlighting how exactly NTS are making performance of the criterion possible (and, as applicable, why performance might be substandard, or might exceed the standard).

For example, for performance criterion 'going on or near the line' performance standards could include:
Part B: Planning for implementation

- Applies correct rules and procedures, showing an understanding of why they are appropriate eg uses official walking routes.
- Anticipates what hazards could occur, and constantly on the lookout for dangers eg takes the safest walking route, facing oncoming trains where possible.
- Shows heightened alertness and vigilance, taking an unhurried systematic and thorough approach, checking information and actions eg identify Sectional Appendix glossary for type of running line/direction of travel maximum speed.

These suggestions include examples which, although useful for making clear what is meant, do make the standards rather long, and should not be interpreted to mean that the examples provided constitute the only possible evidence.

Companies should consider the options for linking NTS to performance criteria, bearing in mind the pros and cons of the different approaches, and the level of understanding and buy-in of their staff.

4.3.2 Periodic revision of performance criteria and corresponding competence standards

Each company should revise their performance criteria at regular periods to ensure that they are based upon the latest understanding of managing risks in the role. If performance criteria are being amended or re-written this will provide an opportunity to integrate some of the NTS terminology (ie the wording used in the NTS indicators) into the performance criteria.

4.3.3 Building NTS into measurement procedures

Once the link between performance criteria and NTS is documented, the next stages are to build NTS into measurement procedures, use as a point of reference in assessment, and establish whether and how to record an individual's NTS competence.

The RSSB NTS course for managers provides tools that can be used as a template for measuring and recording NTS, and for facilitating a feedback discussion.

It is the intention that these tools will be used to assist and coach staff, so they can recognise where they would benefit from improved NTS, and what they could do to develop in this area.

Measurements can be taken on the job (ie when the member of staff is being observed by a manager) or in a simulator. There are
pros and cons of each approach, with the on-the-job measurements perhaps being more realistic, but the simulator scenarios allow for more unusual and challenging situations to be practiced. For ideas on suitable simulator scenarios, refer back to the original mapping exercise to see what tasks are likely to elicit the opportunity to demonstrate certain NTS.

### 4.3.4 Assessing NTS

The same tools can be used as part of formal assessments to help the assessor and the assessed gain the most from the session. NTS should be used to help explain good / poor performance and how improvements could be made.

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. In other words, it will not be possible for a member of staff to fail their assessment based on NTS performance alone.

To constitute a fail there must be some kind of technical issue. Please refer to Part B section six for advice on the management of less positive performance.

### 4.3.5 Storing and using the NTS results

RSSB provides recommended measurement forms as part of the Manager NTS Toolkit. These measurement forms are for use when managers are building their understanding of NTS measurement and how it links to the technical tasks of the role.

Decisions about what to record and what to store (ie if NTS measurements should be held on file, and how long for) should depend on the level of risk associated with that area of competence and on how the information will be used.

Once the performance criteria are mapped to NTS / revised to reflect NTS, progress can be recorded against performance criteria. The enhanced understanding that managers will have of NTS following the training means that they should be better able to explain the implications for NTS according to performance against the standard. The advantage of keeping these records is that it will be possible to track an individual's development over time and build a picture of strengths and weaknesses.

If the company has a particular interest in a certain area of NTS, or are keen to monitor the success of their implementation of the NTS course, they may wish to keep a record of the specific NTS
Part B: Planning for implementation

4.4 NTS in incident investigation

measurement form (included in the manager toolkit) as this will help to ensure that a certain level of detail is recorded.

The outputs of these measurements should be used to inform future training programmes. If, for instance, it becomes clear that calmness under pressure is a particular area for development across a group of drivers, it would make sense to provide more of a focus on this in future training sessions.

Incident investigation should always consider factors at every level that could have contributed to the incident; individual, workplace and organisational. NTS are part of the consideration of the individual level factors.

It can be helpful to use the RSSB NTS list and markers, and the questions in the managers toolkit as a checklist to identify what went wrong and why at the individual level. The successful identification of the relevant issues will lead to more effective action plans and other recommendations being put in place following any operational safety incident.

The development advice provided in the manager toolkit, along with development tips suggested on the course can then be used to proactively target areas for development.

The collective outputs of incident investigation should be used to inform company strategy, including training priorities.

---

7 More information on how to carry out effective incident investigation is available on the RSSB Human Factors Awareness training course for incident investigators. For more information please visit http://www.rssb.co.uk/EXPERTISE/HF/Pages/HumanFactorsAwarenessforIncidentInvestigators.aspx
Part B: Planning for implementation

5 Success factors: A supportive learning culture and gaining buy-in

5.1 Importance of a supportive environment

The learning environment is vital to the success of any training programme. In his book The New Learning Architect\(^8\), Clive Shepherd states that the following have biggest impact on transfer of learning:

- The learner's manager in setting expectations before the course
- The trainer's role before the course in getting to know the needs of the learners
- The manager's role after the intervention

The success of training is also dependent upon the learner's attitude and willingness to take ownership of his or her development.

This chapter outlines the aspects of the culture and learner approach that are important to the success of NTS integration.

5.2 NTS and the competence culture

There are several 'principles' of a positive competence culture that are required to gain maximum benefit from NTS integration:

- Competence as a continuum
- Recognising human vulnerability
- Investment in 'less visible' competence
- Ownership of competence
- Demonstrable commitment

**Competence as a continuum**

NTS integration challenges the traditional approach to competence within the railway industry in that it moves beyond compliance with rules and procedures and promotes expertise. Competence should be regarded as being on a continuum\(^9\). The integration of NTS redefines the standards of what is expected in the front line staff and manager roles by making them more explicit.

---


Part B: Planning for implementation

This demands a change in professional culture so that staff recognise that compliance is not the end goal, and that they should seek to become both compliant and experts in their role. This motivation will translate into engagement in competence development, and ‘getting out what you put in’.

**Recognising human vulnerability**

The understanding and appreciation of human factors has increased in recent years. The NTS work builds on this understanding by encouraging companies and their staff to acknowledge risks that everyone can face - no matter how many years of experience they have - in carrying out their roles.

Some people can be reluctant to question their own competence or human vulnerability.

Some managers can lack the understanding or motivation to explore the causes of errors made by staff on the front line and this can lead them to concluding that it is due to a lack of competence in that individual.

To facilitate competence development, staff must aspire to open and honest discussions about challenges in their various roles and how they might be overcome.

Complacency in competence - the conviction that you have done enough to be effective - is challenged by the idea of competence as a continuum, and by recognising human vulnerability. No person is immune to errors, and even once a level of competence is attained, it will be subject to skills fade\(^{10}\). In line with this, training courses should not be regarded in isolation or as a one-off tick-box exercise. Time should be allowed for professional discussion, reflecting on experiences including near misses, and promoting the positive application of NTS.

**Investment in 'less visible' competence**

The case for technical training is clear - without the knowledge of rules and procedures, safety critical staff would not be able to perform their jobs.

It may be difficult to gain buy-in to NTS across the company if staff do not immediately understand the relevance of NTS, and see

Part B: Planning for implementation

NTS more as a nice to have, or 'soft skills'. This is where mapping NTS to tasks and creating a business case is especially helpful.

Ownership of competence

Staff need to want to develop, and to proactively seek development opportunities, rather than regard them as something that is being ‘done’ to them. Active engagement in the NTS development process, and taking the initiative to explore development opportunities outside of formal company processes should be encouraged. A front line staff log book is provided on the RSSB NTS course for this purpose - to encourage staff to reflect on their competence, rather than depend purely on managers measurements.

Demonstrable commitment

These principles of a positive competence culture should be portrayed consistently across the organisation by all the key players - leaders, managers (before and after their staff attend the course), and facilitators.

Northern Rail wanted to raise awareness of NTS across the company, and of its role in the T869 research project. They set out to do this by briefing staff through safety briefing days, training relevant staff, discussing incidents where NTS have played a part and the using the RSSB NTS terminology and markers. The strategy and support thereof from directors was essential to help build buy-in.

At Northern, they aim to ensure that there is a 'just culture' within the management of operational safety. By using NTS, this can be achieved by better training and briefing of employees making them more aware of the reasons why incidents occur. They aspire to open and honest discussions about challenges in the various roles and how they might be overcome. Better identification of reasons for incidents will also lead to more effective remedial action being taken, and over time this should be reflected in less safety of the line incidents.

NTS need to be embedded into everything we do in competence to help lead to a positive culture. In this culture, people are motivated to follow rules and procedures (as they understand the risks if they do not), and they recognise where they may be prone to human error, applying the NTS techniques as coping strategies.
Part B: Planning for implementation

5.2.1 Safety culture within the company, how to measure readiness

An indication of the readiness of a company to embrace some of these principles can be gained by using a specific tool. In the pilot study, individual's perceptions of various aspects of work (including understanding of human vulnerability, team working, openness and morale) were measured using a 57-item questionnaire\(^{11}\). Perceptions of the company's attitudes to safety were measured using a 20-question safety culture self-assessment questionnaire\(^{12}\). Copies of both questionnaires are included in Appendices 2 and 3 respectively.

For a more thorough evaluation of company safety culture, please refer to RSSB's Safety Culture Toolkit\(^{13}\) which can be used to measure a wider array of safety culture factors.

The company can use the results of these questionnaires as an indication of areas for improvement. Issues raised in these questionnaires may limit the success of NTS training.

These or similar measures can be used to obtain a benchmark before delivering NTS training, and the measures should be reissued following the training to examine whether there is any change in results. Please refer to Part B section seven for more information on evaluation techniques.

---


12 A questionnaire adapted by RailCorp in Australia from an earlier survey developed by Professor James Reason for the purpose of evaluating the nature and strength of an organisation's safety culture.

13 For more information on RSSB's safety culture toolkit please visit: http://www.rssb.co.uk/EXPERTISE/HF/Pages/HFTOOLSANDRESOURCES.aspx
5.3 Gaining buy-in to NTS implementation

5.3.1 Taking a phased approach

Given this cultural context, the integration of NTS should be regarded as a long-term strategy and be part of a phased approach.

Northern Rail’s strategy to a phased approach included:

- NTS elements in safety briefings and articles in their Cabs magazine, a constant process of information being fed in gradually building up.
- A programme of refresher briefing and/or on the job coaching for experienced staff will also be developed to maintain awareness.
- Building NTS into CMS so that therefore basic awareness of NTS is topped up with ongoing coaching and support.
- Ultimately, the integration of NTS into the CMS for all safety critical grades.

5.3.2 Involving Trade Unions and employee representatives early on

In the RSSB T869 project union representatives were involved from the start so that a clear understanding was achieved of how NTS related to the driver role, the aims and objectives of the courses and how the courses were developed.

RSSB also met with union representatives to discuss potential challenges in the implementation and integration of NTS training. Please see Part B section six for a list of challenges and proposed responses.

5.3.3 Involving staff across the company

As recommended in Part B, Section 4, a company-wide approach should be taken to NTS integration. The earlier a range of staff are involved, the more likely they are to buy-in.

In using the RSSB NTS training materials and tools, we recommend that companies seek to integrate these within their own company processes, and involve managers, union representatives and trainers in the customisation of the materials.

5.3.4 Sharing good practice and communicating progress

To enhance the buy-in to NTS, good practice should be shared and progress should be communicated across the company. This open approach will help reassure any staff who might have misperceptions on how NTS will be used within the company.
Part B: Planning for implementation

Possible methods include:

- Posters, eg lists of NTS
- Company magazines eg examples of where NTS have been applied and successfully mitigated a safety risk
- Safety briefing days eg including case studies, or inviting staff to come and talk about their experience of NTS

5.3.5 Identifying champions

Although NTS is recommended for every safety-critical grade, for logistical reasons every company will have to prioritise who within their company will be the first to receive / deliver the training.

To help with buy-in, it is recommended that each company involves enthusiastic ‘champions’ in the initial roll-out. The involvement of enthusiastic and knowledgeable facilitators, managers and front-line staff is of key importance. Word of mouth about the effectiveness of the training and related activities will act as a powerful incentive for others to want to be involved.

Arriva Trains Wales note that their approach of keeping everyone informed meant that they have really noticed an overall change in attitudes towards development of drivers both from their own personal viewpoint but also from their managers.

This has been evident since the pilot course where they have seen managers on several occasions ask the training department if they will help devise driver action plans that incorporate NTS development. This is particularly impressive because it's not only been the managers involved in the RSSB T869 pilot who are asking for this. So far the enquiries have come from managers who have not been trained but have heard about the benefits of NTS from their colleagues who have. This suggests that staff are taking a positive and proactive view to NTS development.
Part B: Planning for implementation

6 Potential challenges and misperceptions

Throughout the project RSSB has been keen to engage with and build support across the industry. A collection of frequently asked questions has been devised, based on some of the questions that have been asked during this process. These are grouped into the following themes:

- Resourcing issues
- Misuse or exploitation of NTS development by managers
- Impact on the manager role
- Effectiveness of NTS development interventions,
- What will happen if specific areas for NTS development are identified
- Keeping records

6.1 Resourcing issues

How am I supposed to find the time to release all of my staff for this training?

Given that the front-line course lasts two days, and the manager course three days, it is a large undertaking to train up all staff in the company. This means that it is necessary to prioritise who should receive the training by considering which are the most safety critical roles.

Training does not need to be delivered in blocks. The training can be broken down and integrated into existing training programmes or at periodic safety briefing days.

NTS will require resource time but as explained in Part A this should be regarded as an investment that is part of the company’s safety strategy.

Due to resourcing issues, Northern Rail have prioritised training by offering it to assessors and instructors (rather than all drivers), and integrated NTS into the training of new trainee drivers. Union representatives are also invited on these courses as they are recognised as key opinion-formers within the driving population.

Other drivers will be introduced to NTS through safety briefs, and on-the-job coaching from their manager / instructor. Over the next two to four years Northern will gradually bring their drivers’ knowledge of the revised assessment procedure to a higher level through coaching and briefing. Articles in the company magazine will also be used to raise awareness. A series of depot based Q & A surgeries on NTS, delivered jointly with local managers and union representatives, will also be advertised.
Part B: Planning for implementation

ATW report that they plan to deliver training to drivers in a staged manner through their Safety Training and update days (3 days) over the course of a year.

6.2 Misuse or exploitation of NTS development by managers

Might management make reference to the NTS training after an incident to ‘prove’ that they have done all they could, and then claim this means it must be the driver at fault?

Effective incident investigation will consider the whole spectrum of factors that could have contributed to the incident (including organisational and workplace factors). If shortcomings in NTS are identified, it is the responsibility of the manager / company to arrange further training for that driver and will probably be factored into the drivers’ competence development programme.

Although NTS is not pass/fail, managers will know if a driver has done ‘badly’ - what if they cannot wipe this from their minds, this could influence management’s attitude later?

Managers will be trained in how to make objective assessments, avoiding bias. Feedback will be evidence-based rather than being based upon a ‘feeling’ that a manager has about any particular driver. The whole process involves everybody being on board and sufficiently trained to adopt NTS. It should actually help to improve the relationship between drivers and their managers.

Do all managers have the skills and motivation to do this properly?

Managers are likely to have already been considering elements of NTS in an implicit way before the training. The managers’ course is designed to help develop the skills and motivations of managers to objectively and effectively observe and coach their drivers.

Potentially, some managers could be resistant to change or may treat it as a tick box exercise. As the culture improves within an organisation this will become less likely. In the future, it is also possible that applicants for manager positions can be measured against the manager competencies included in the course and all new managers are trained in these skills from an early stage.
Part B: Planning for implementation

What would happen if a driver disagrees with what is written on his/her measurement form?

The measurement form should include a space for the driver to comment on his / her performance (this also reinforces the message that individuals should take ownership of their development). Each company should have an appeals procedure in place (just as they would have for a formal assessment).

As a manager, I wonder if I should 'cover my back' by writing negative evidence. If I don't and an incident occurs it may reflect badly on me.

The purpose of NTS measurement is to provide proactive advice to help develop your drivers' NTS. Any measurement is a 'snapshot' of performance and should only be treated as such. Writing negative evidence for the sake of it means that the driver will be provided with inaccurate information, which could lead to confusion and de-motivate the driver - which in themselves could compromise safety. The information recorded and feedback should be objective and without any agenda. A culture of mutual respect is required and there should be no attempts to pin blame on others.

What happens if managers are not doing this properly? How will we know?

As explained above, staff should be able to discuss and if necessary, challenge manager's measurements of their NTS. Companies may choose to offer recurrent training to ensure that manager's skills are kept up to date, and could even put an audit process into place if required.

During the T869 pilot courses, Arriva Trains Wales found that drivers were sceptical thinking that NTS would be used as an assessment tool and therefore a possible 'Big Stick'. To overcome this, Arriva and RSSB made an extra effort at the pilot stage to explain the safety and development benefits to the delegates. This approach worked well and the group really bought into the pilot course showing much less scepticism towards NTS, in fact it seemed to motivate them greatly. Arriva report that it was at that stage they realised that their strategy of communicating and informing our managers and drivers would be of key importance to the successful implementation of NTS to the greater population.
Part B: Planning for implementation

### 6.3 Impact on the manager role

**Will managers complain that this adds to their role and they are entitled to something for this?**

The tools enable managers to more effectively fulfil the same role that they have always had. It brings more structure and objectivity to what they were already doing. Although the measurement and feedback process may initially feel like extra work, in due course this should lead to a reduced amount of time dealing with safety incidents.

**I barely have time to feedback properly after a standard assessment, how am I supposed to have time to cover NTS too?**

Some Arriva Trains Wales managers involved in the T869 pilot had concerns around additional workload and the amount of time feedback would take regarding NTS. While both were valid concerns, during the managers course they were able to see that with practice, the first issue around the time measuring NTS may add to their workload would be negligible as it would simply integrate into technical assessments. As to the second concern, feedback can take longer when NTS are integrated. This can pose a challenge because the feedback session is often at end of a shift and the driver wants to go home, break patterns in drivers’ shifts don’t easily allow for additional feedback time.

One suggestion was to provide drivers feedback when they are next free to discuss. Whilst this may work, it runs the risk that the feedback is potentially less effective and this is an area Arriva Trains Wales will closely monitor in line with the changes they are making to their competency standards which will include NTS.

RSSB recommends that companies look into arranging time to enable fully effective feedback sessions and where this is not possible, encourage managers to focus on key points / risks.

**Do managers have the skills to be measuring NTS?**

This is why manager training is essential. Without training in effective observation, measurement and feedback they may be ineffective and lack confidence in what they are doing.

Network Rail did not initially offer manager training, and instead integrated NTS straight into assessments. They found that managers did lack confidence in what they were doing, and so now intend to offer specific training courses for managers and
Part B: Planning for implementation

sufficient guidance, making use of the outputs from the RSSB NTS project.

6.4 Effectiveness of NTS development interventions

Why should experienced drivers with long incident-free careers have to undergo this training? Might they feel affronted?

This is why managers are receiving training in how to carry out the observation and feedback discussion. It is important to build a culture where no person is complacent or thinks that he or she is resistant to human error or skills fade. This is a key part in building a just culture not a blame culture.

Why not just cut the 'long hours culture' instead?

As explained, the training course begins by putting NTS in context, and explains how a number of factors can contribute to incidents and accidents, and this is one proactive step that a company can take to help improve safety. NTS should not be regarded as a 'silver bullet' that will solve all problems, and a holistic approach should be taken to safety. RSSB is not suggesting that NTS training is the only intervention that a company needs to make to improve safety.

Is this just 'psychobabble' with no basis in the real world?

There is a large amount of evidence from incidents and accidents that NTS have played a key contributing role. This is backed up with research evidence from a range of safety critical industries. The NTS course is about formalising what drivers already do, and is based on observable behaviours and competence. Evaluation evidence suggests that there can be a significant reduction in human error incidents following this kind of training.

6.5 What will happen if areas for NTS development are identified?

What should we do as a company if we observe that a safety critical member of staff has poor NTS?

For a realistic appraisal of performance, NTS should not be measured in isolation, but always through the performance of technical tasks.

It is not possible to justifiably say that you have observed poor NTS without also providing evidence of how this has affected the performance of the technical task. If NTS performance is poor but technical performance is good this suggests that there is some
Part B: Planning for implementation

issue with the measurement of the NTS which may suggest further manager training is necessary.

The NTS guidance provides the company with tools to use to establish what underpins poor technical performance. These should be used to understand a) why technical performance is not as good as it should be and b) what the development focus should be.

Sometimes, the staff member may meet the basic technical performance standard but also display some areas for NTS improvement. Provided the basic technical performance standards are met, it is more appropriate to focus on development opportunities than remove the staff member from duty.

For example:

- Talk with the member of staff to help understand what is happening and why. Remember to consider the bigger picture - are a few staff members showing the same problems? This could indicate an issue with existing training or the working environment.
- Discuss tips and techniques that should aid development. Enable the staff member to proactively develop, allow him or her to practice applying these methods in a safe environment (e.g. on a simulator).
- Pay particular attention to the relevant NTS in future assessments.

If someone does not perform well on the NTS could a formal action plan be put into place?

The ethos behind NTS development is about building motivation to become an expert in the role. Given the resistance to formal action plans within the industry, and their association with drivers who have had an incident, the introduction of formal action plans is likely to de-motivate staff. It could also lead to the perception that NTS are associated with assessment rather than the day to day role of the driver. Instead, a coaching approach should be taken whereby the driver and manager discuss options for development, and options are made available to drivers who are keen to improve e.g. provision of further information in safety briefs. Drivers are unlikely to have poor NTS if they have consistently good technical performance. If technical performance does not meet assessment standards at
Part B: Planning for implementation

competence then NTS will form part of a wider development plan for that driver.

Might this undermine the confidence of an experienced driver, who ‘fails’?

There is no pass or fail on NTS. The aim of the feedback session is to encourage and reinforce effective behaviour, and if there are issues of concern, to identify these before they could contribute to an incident or accident. The feedback sessions should build a drivers’ confidence in what he or she is doing well.

Will we end up with the same situation as the old SMD, with some companies having entire depots on ‘points’ - will it lead to loads of drivers being on ‘development plans’?

The system will not be designed to allocate a ‘points’ system to those individuals who fail to reach the top level of NTS. If areas for development are identified further training / development activities will be offered.

Could it have a negative effect on Competence Development Plans (CDP)?

No. The NTS process will actually inform the CDP where NTS have been identified as having been a contributory factor, as should already be happening now, on a more informal basis.

6.6 Keeping records

Should we rate NTS on a scale?

When consulted as part of the RSSB T869 project, ASLEF Executive Committee requested that a rating was not included on the generic measurement form.

A 1-4 rating was included on the driver measurement form for the purpose of the pilot to enable RSSB to see if driver performance differed before and after the course (eg a 1-4 scale from ‘only positive markers’ to ‘only negative markers’). Feedback from the pilot courses and ASLEF EC suggests that the use of a rating during general implementation could leave the process more open to misuse (if managers are allowed to use the form without evidence to back up their ratings), and serve to de-motivate staff. For this reason RSSB recommends that this kind of scale is not included for general implementation of the form. However, other options for rating scales could be explored with local union representatives eg a scale that highlights an individual’s relative strengths and weaknesses.
Network Rail does use a rating form and has recently amended it to make it clearer how it should be used. It is a simple scale that allows the manager to highlight where development action is required.
Part B: Planning for implementation

7 Evaluation of NTS integration

7.1 Introduction

Training programmes, as part of overall competence management systems, should be continually reviewed to ensure that aims and objectives are being met\textsuperscript{14}. To inform future training strategy, it is important to monitor the effectiveness of NTS training.

7.2 Measuring success against KPIs and related factors

This section links back to the business case section within Part A - NTS integration should be evaluated against the factors related to the specific KPIs that it was introduced to address. These are likely to be:

- The number and severity of safety incidents
- The return on investment - resulting cost of incidents vs money invested in NTS integration
- The skills level of staff (required to deliver the improvement in safety)
- The knowledge and attitudes of staff (required to deliver the improvement in safety)

The KPIs listed above reflect the four levels of the Kirkpatrick\textsuperscript{15} model of training evaluation, as well as 'return on investment' (a stage added to the Kirkpatrick model by Phillips in 2003\textsuperscript{16}).

Companies can use their existing records to measure the number and severity of safety incidents. To measure the financial return on investment, companies will need to keep a record of monies invested in NTS integration (eg time of the job for participants, time to revisit the CMS) and compare this to any reductions in cost (eg incident costs reduced, insurance costs avoided). This may involve pulling together records from various departments across the company.

The skills levels of staff can be measured back on the job by their manager, or through their own self-reflection. These

\textsuperscript{14} RSSB (2011). T762 Training as an investment Good Practice Toolkit


measurement forms are included in the T869 NTS course materials.

The knowledge of staff is measured throughout the course by means of question and answer sessions at the end of each module. Alternatively, companies could measure knowledge using a specific questionnaire based on the content of the course.

Staff attitudes can be measured by the two questionnaires mentioned earlier in the document - the attitudes questionnaire and the safety culture questionnaire. Both are included in the Appendices 2 and 3.

Participant reactions to the training courses are also useful as an immediate source of feedback. Module evaluation forms are included in the T869 NTS course materials.

7.3 Timing of evaluation

These measurements should be taken before the integration (to establish the base level) and at regular period after that. The evaluation process should be continual, as the risks faced by the company and the needs of the company and the individuals within it may change. Measurements of the KPIs and the factors that contribute to them should be taken at various time points to measure for skills fade, and to allow time for changes in knowledge, skills and attitude to impact the higher level KPIs. Collected over time, these measurements will also help to build a clear picture of what exactly is contributing to the changes in KPIs.

7.4 Sharing evaluation results

In order to gain maximum benefit from training evaluation, it would be helpful to share lessons learnt across the industry. Companies are encouraged to discuss their findings and to learn from the experience of others.

Note:

For more information on models of training evaluation, and on good practice in establishing return on investment please refer to the T762 training as an investment good practice toolkit

1 Part C Introduction

This chapter provides an outline of the RSSB T869 project methodology. This includes information on:

- Design and development of the NTS course materials
- The piloting of the driver and driver manager courses
- Evaluation methodology and results

2 Design of the NTS course materials

2.1 Situation analysis

2.1.1 Requirements

The project began with a number industry workshops designed to establish the existing levels of non-technical skills training and reinforcement activities across the industry. Pockets of good practice were identified, but it was agreed that the industry lacked a formalised approach to NTS (see Part A).

The next step in the project was a thorough process of identifying the NTS relating to the train driver role (likely to be relevant to many other safety critical roles), and in developing an NTS list with corresponding behavioural markers (examples of good and poor behaviour). The details of this methodology are provided in the first publication from this project.

There was a strong consensus that the industry would benefit from guidance and training in how NTS relate to job roles, how they can be enhanced, and how managers can provide objective measurement and meaningful feedback.

2.1.2 Analysis of the target audience

As with all projects, it is important to understand the target audience when designing and delivering training and development initiatives. To fulfil this need, working groups were set up consisting of trainers, drivers and other front line staff.

Discussions with the working groups confirmed that trainees and front line staff across the industry have varying levels of understanding of human factors and NTS. Accordingly, it was decided that the materials should include a basic overview of human factors and make no assumptions about existing levels of knowledge.

---

18 RSSB (2012). Non-technical skills required in the train driver role: skills, behavioural markers and guidance notes (v2.0)
understanding. The facilitator materials encourage the facilitator to establish existing levels of understanding at the start of the course and adapt his / her approach accordingly.

In line with good practice in training\(^\text{19}\), it was also agreed that the materials should include lots of practical examples of NTS (eg case studies) and opportunities for discussion that draw on participants existing skills. Rather than the training being delivered in a traditional classroom-based, one-sided manner, the course should aim to engage all participants and provide material in a variety of formats to satisfy, as far as possible, the range of adult learning styles.

The course should not be dependent upon having any particular technology eg a simulator, so that it is possible for each company in the industry to use the materials.

The scope of the project was to develop materials relating to the train driver role that could also be applied to other front line roles in the industry. To ensure that other roles were represented and could provide input and guidance on materials, appropriate representatives were invited to each of the development and review meetings.

2.1.3 Review of practical constraints and opportunities

There were a number of practical constraints to the work. These included the need to deliver the project within the agreed timescales, work to a predefined budget, and run pilot courses with a limited number of drivers and managers.

However, there were also a number of opportunities that were central to the success of the work. These included the release of training staff and front line staff from across the industry to provide valuable input into the development of course materials, the chance to pilot the courses with two TOCs, and RSSB’s contacts with people in other countries and other industries who could

provide advice based on their own implementation of similar schemes.

2.2 Method of development

Following on from the identification of a list of NTS and behavioural markers which had been validated against the driver role, the first step was to form working groups of trainers and front line staff to clarify the requirements of the work.

14.2.1.1 Course for front line staff

The same group members were then invited to attend a workshop lasting a few days to share ideas about how each of the NTS on the list could be explored within a training course for front line staff. RSSB provided background information on human factors and NTS, and members of the group shared their suggestions of relevant case studies and activities that would engage participants. The group also discussed the requirements of facilitators running the course and what materials and information facilitators would need.

Following the workshops, RSSB pulled together a training course incorporating suggestions from the group, and the group met again to review all the materials. Minor amendments were then made, ready for the pilot courses.

2.2.1 Course for managers of front line staff

RSSB drafted the content of the course for managers of front line staff using the core course content generated for the front line staff and existing information on how to manage and engage staff, avoid bias in measurements and conduct effective feedback conversations.

Practice for managers in measuring and feeding back on NTS is a key part of this course and so RSSB liaised with trainers at Arriva Trains Wales who offered the use of their simulators and staff time to help produce simulator clips to be used in training.

These course materials were then reviewed by a review group of trainers and managers to gain their feedback and suggestions for improvement. Suggestions for improvement were incorporated ready for the pilot courses.

The materials for both courses were then reviewed and approved by the steering group.
3 Pilot courses

3.1 Delivering the courses

A total of three driver pilot courses and two manager pilot courses were run as part of the project. Trainers from Northern Rail and Arriva Trains Wales delivered each course to staff from within their own company. An RSSB human factors specialist and workforce development specialist attended each course to observe the delivery, support the facilitator where required during delivery, and gather feedback from participants and the facilitator. The manager courses were delivered first so that the managers would have sufficient awareness and knowledge to support their drivers prior to and following the driver course.

3.2 Who participated in the pilot courses

Nine managers attended the Northern Rail pilot course, and three managers attended the Arriva Trains Wales pilot course. The average years in the railway for the manager sample was 20.42 years and the number of years in their current position was 4.46 years.

A total of 29 drivers attended driver pilot courses; 10 at the first Northern Rail course, 11 at the second course, and 8 at the ATW pilot course.

Of the 27 drivers for whom background data was available, the average years on the railway for the sample was 12.3 and the number of years in their current position was 9.4. There were 19 experienced drivers and eight inexperienced drivers within the sample.

3.3 Refinements following the pilot courses

Using the feedback collected during the course (see Part C, Section 4), and information from meetings set up by RSSB six months following the course (with trainers and participants involved in the pilot), RSSB made some further refinements after the pilot course.
4 Evaluation of the pilot courses

4.1 Evaluation methodology

RSSB was keen to move beyond the simple ‘feedback sheets’ that are usually used to evaluate the success of courses, and so aimed to collect data relating to each stage of the Kirkpatrick model of evaluation (Kirkpatrick & Kirkpatrick, 2006).

Table 1 -

<table>
<thead>
<tr>
<th>Stage</th>
<th>Data collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Reactions</td>
<td>Module feedback sheets: key successes as well as areas for improvement*</td>
</tr>
<tr>
<td>2 Learning: Attitudes and Knowledge</td>
<td>Managers’ of their NTS and managerial knowledge, skills and attitude (a 1-5 rating scale based on coverage of behavioural indicators)*</td>
</tr>
<tr>
<td></td>
<td>Managers’ and drivers’ ratings of their own attitude to safety [this form is available in the appendices]</td>
</tr>
<tr>
<td>3 Behaviour</td>
<td>Managers’ ratings of their drivers’ NTS (1-5 scale using behavioural indicators as a benchmark, to be measured during cab rides with their drivers)*</td>
</tr>
<tr>
<td></td>
<td>Drivers’ ratings of their own NTS (1-5 scale using behavioural indicators as a benchmark)*</td>
</tr>
<tr>
<td>4 Organisational</td>
<td>Managers’ ratings of their company’s safety culture [this form is available in the appendices]</td>
</tr>
<tr>
<td></td>
<td>The pilot companies were also encouraged to track safety incidents over time.</td>
</tr>
</tbody>
</table>

* Copies of these forms are included in the T869 training materials.
Part C: Further information on the T869 project methodology

This information was collected before, one month after, and six months after each course to test for any initial changes following the course, and for whether these changes lasted over time.

The pilot companies were also encouraged to take note of their incident and accident levels before the courses, so that this could be compared with levels following the courses. It is not expected that the impact of these courses on incident and accident levels will be immediate.

4.2 Evaluation results

4.2.1 Analysis overview

In analysing the evaluation data, it was expected that improvements would be found for each of the dimensions (self-reports of NTS, attitude to safety, and (for managers) manager KSAs, and manager reports of driver NTS and safety culture).

It was not possible to analyse this information on an individual-by-individual basis as much of the information had been collected confidentially and some data was missing for the later time points. Instead analyses were conducted at a group level.

4.2.2 Manager reactions

Manager reactions to the course were generally very positive. Overall the manager course received an average rating of 4.25 on a one to five scale of 1 = not very useful, and 5 = very useful, a score of 4.25 for relevance (1 = not at all, 5 = very) and a score of 4.42 for how interesting the course was (1 = not at all, 5 = very).

An average rating of 2.23 also indicated that there was a reasonably good balance between theory and practical exercises on the course (1 = too much theory, 5 = too much practical), with a slight lean to too much theory.

Comments provided on the feedback form included:

'It provides a new way / slant on looking at things'

Comments signifying areas for improvement included:

'Would like more case studies and examples'

'Was a bit too long with some duplication'

Or, conversely

'Course should be longer'

This demonstrates some individual differences in perceptions of the course.
Since the pilot, the course has been reduced by a restructure which addresses duplication, and to allow more time to be spent on discussing observation, measurement and feedback. There are also now more rail-based video clips and related activities on the manager course.

As with the manager reactions, driver reactions were generally very positive.

Overall the driver course received an average rating of 4 on a one to five scale of 1 = not very useful, and 5 = very useful, a score of 4.17 for relevance (1 = not at all, 5 = very) and a score of 3.83 for how interesting the course was (1 = not at all, 5 = very).

An average rating of 2.97 also indicated that there was a good balance between theory and practical exercises on the course (1 = too much theory, 5 = too much practical).

Comments provided on the feedback form included:

'The recognition that this area [NTS] has been 'overlooked' in the past and now provides the greatest scope to improve safety in the future'

'I enjoyed the SPAD video clip and going over the reasons why it happened, in relation to human factors'

'It has been useful to identify and 'label' areas of competence/incompetence, Have previously been doing most of these things without realising!'

'Very useful I feel I got the tool to improve myself'

Other comments signified areas for improvement. These included:

'If this is to be rattled out to all drivers it will need to be pruned to maintain interest to the point of being 'dumbed down' in some areas'

'Simulator training programme to reinforce learning'

These comments from managers and drivers were taken into account in refining the training materials prior to publication, and in writing the guidance included in this final report.
4.2.4 Manager attitudes and behaviour - NTS and KSAs

The analyses showed positive results with significant improvements seen across manager NTS and managerial skills (as perceived by managers themselves). Across the sample (n = 11) the average ratings had shown an improvement for all of the NTS categories and 'Manager Knowledge, Skills and Attitude' (KSA) at sixth months. Significant improvements were reported for 'Maintain concentration' (Z=-2.449, p=0.014), 'Effective decisions' (Z=-2.449, p=0.014), 'Knowledge of safety critical NTS and their relevance to the role' (Z=-2.449, p=0.014) and 'Knowledge of what should be documented and why' (Z=-2.919, p=0.004).

A small average improvement was seen in ratings of attitude to safety (71% total score before the course compared to 72% after the course, n = 12), but these improvements did not reach statistical significance.

4.2.5 Driver attitudes and behaviour - NTS

Data collected before the course, and then six months after the course was compared. The analyses showed positive results with significant improvements seen across driver NTS (as perceived by managers and drivers).

Using the behavioural markers when observing their drivers, the managers rated their drivers significantly higher on the situational awareness (Z = -2.506, p = .012, n = 16), workload management (Z = -2.032, p = .042, n = 16) and conscientiousness categories (Z = -2.527, p = .012, n = 16), and for a number of sub-skills.

Ratings provided by managers before the driver course, one-month after the course and six months after the course showed that experienced drivers were not rated, on average, any higher or lower than inexperienced drivers in any of the NTS categories, or overall.

In the drivers' own ratings, they rated themselves higher on all NTS at one month after the course than before the course (n = 26), and all ratings further improved at six months (apart from self management which although higher than pre-course levels did drop slightly down from the 1 month measurement). At six months (n = 17), significantly higher ratings were found for 'Situational awareness' (Z = -3.316, p = .001), 'workload management' (Z = -2.926, p = .003), 'Decision making and action' (Z=-2.939, p=.003), 'Conscientiousness' (Z = -3.016, p = .003) and 'Co-operation and Working with Others' (Z = -2.897, p = .004).
A small average improvement was seen in ratings of attitude to safety (69% total score before the course compared to 71% after the course, n = 18), but these improvements did not reach statistical significance.

4.2.6 Managers' perceptions of safety culture

It was expected that there would be improvements in safety culture, as the training should enable drivers and managers to talk more frankly about the challenges they face and to learn from near-misses.

Improvements were seen in ratings of attitude to safety and safety culture, although these improvements did not reach statistical significance. The safety culture scores were already high before the NTS training (an average score of 80%, rising to 86% after the course, n = 11) and so it is thought that this could be why the improvement did not reach significance.

4.2.7 Incident and accident rates

The pilot courses were delivered in spring/summer 2011 and at present it is too early to judge what impact the courses have had on the level of incidents and accidents among the sample from each of the pilot companies who attended the course.

4.3 Summary of evaluation

The evaluation process provided some useful feedback that was then used to inform the final refinements to the NTS training course. Changes included a restructure and shortening of the course, and the managers tools were made more usable.

The evaluation data suggests that the course did have a positive impact on the demonstration of NTS on the job. Managers felt their own skills and knowledge had improved, and there were small (but not significant) improvements in safety culture.

Due to the small numbers of drivers and managers involved in the pilot these results should be used only as an indication of the possible impact of NTS training. Also, the results may differ for different companies depending on a number of factors eg the competence of the trainer, how well the training is integrated in NTS strategy, the existing safety culture of the company.

It is recommended that companies engage in an ongoing evaluation process (as explained in parts A and B of this document), and focus on measuring the impact on their own KPIs.
Part C: Further information on the T869 project methodology
Non-technical skills required in train driver role: Developing an integrated approach to NTS training and investment

Appendices

Appendix 1: Pre-course knowledge exercise

Introduction

You have been provided with these pre-course materials as part of the Non-technical skills course that you are attending.

Non-technical skills are the kind of generic skills that you use in your role and your every day life. For example, conscientiousness, workload management and situational awareness are all non-technical skills. This course is about developing these skills and helping to take you from being competent to being an expert within your role.

As part of an introduction to the course, you are being asked to read about a railway incident and think about what you think went wrong. We will be discussing your thoughts during the course.

Incident

Please read through the following description of an incident that has occurred on the railways in the past, and then complete the box below with your suggestions as to what you think went wrong.

Case study 1: Workington Cat A SPAD

A train driver was driving on up Carlisle towards Workington Station on a cold day. The driver stopped at Dalston and on arrival, tried to open the vestibule door and close it again as he was feeling a cold draught coming from the vestibule door. This did not stop the draught so the driver turned the heaters on to full blast.

Just after departing Dalston Station at approximately 08.55 the driver heard a broadcast from Network rail control over the NRN radio. The driver was unsure of the contents of the message due to the poor reception and with the cab heaters on full blast. The driver then received a repeated message and understood that the message was for the 07.44 departure from Carlisle to phone the signaller at Workington no 2 box when it was safe to do so. A couple of minutes later conductor knocked on door and said he can hear broadcast on train. The driver picked up and looked in the repair book between Dalston and Wigton to view the last entry recorded as he suspected a fault with the PA.

The train stopped at all other stations during the journey and the driver tried on another occasion to open and close the vestibule door to eliminate the draught, however this was unsuccessful.

At approximately 09.34 the driver of 2C40 was approaching Workington North temporary station and cancelled the AWS magnet for the fixed distant before bringing the train to stand at the station. After station duties were complete he took power and visually checked the fixed distant a few yards beyond the platform. Between the platform and over bridge 39 the driver cancelled the AWS for the 30mph PSR. He powered up to notch 7 reaching a speed of 39mph and shut off power.
Between over bridge 39 and WN3/42 signal at approximately 09.35 the driver received another broadcast over the NRN radio from Network Rail. The driver was aware that the previous message at Dalston was broadcast over the PA, so tried to turn the volume down and also tried to listen to the message physically moving his head towards the radio set.

The driver received and cancelled the AWS warning at WN3/42 but failed to observe the signal and indication and controlled the train for the 30mph PSR commencing just before Workington station.

The driver came to stand into Workington station and placed the brake to step 3 and set the DRA. The driver was unaware that he passed WN3/42 at danger without authority and completed his reliving duties with a Barrow based driver. He remained unaware of the SPAD until he was informed to contact the controlling signaller from Workington mess room.

Case study 1

What do you think contributed to the SPAD? Please list your ideas in the box below:
Appendix 2: Extract from Northern Rail's NTS integration strategy document

6. Non-technical skills company policy

**Commitment to the Integration of Non Technical Skills (NTS)**

Northern are committed to working to embed the principle of non technical skills and human factors in the competence management system. During 2011 the Head of Operational Safety will lead a review of the recruitment, training, assessment and incident investigation for drivers, conductors and other safety critical staff. Northern recognise this as a proactive measure to assist in the management of human error with the aim of reducing safety of the line incidents through a more informed workforce.

**What Are Non Technical Skills?**

Non-technical skills are generic skills to an individual, such as decision making, workload management and situational awareness. Research has shown that non-technical skills (NTS) underpin safe performance at work for safety critical staff. They enhance technical task performance, and improve safety by helping people to anticipate, identify and reduce the occurrence of errors. Evaluations in a range of safety critical industries suggest that this type of training can result in improvements in knowledge, behaviour, attitudes, and most importantly, safety.

**Setting NTS standards within the company**

Northern intend to work on embedding NTS into the competence management system, by identifying which NTS are applicable to the performance criteria for each safety critical task, and then building these into the training and assessment procedures. It is the intention that these will be used to assist and coach staff, so they can develop their skills and recognise where they need to take responsibility and appropriate coping strategies.

**NTS training for Drivers, Conductors and other Operational Safety Critical Staff**

Northern are committed to developing the training and assessment procedures for all operational safety critical staff and identifying where relevant the non technical skills for each task. The risk assessments that underpin the training will reflect this, and the NTS will be identified against the technical skills for a task. A programme of refresher briefing and/or on the job coaching for experienced staff will also be developed to maintain awareness.
NTS training for Managers

Northern recognise that for successful implementation of NTS, front line managers (assessors) must be adequately trained and given the necessary support to be able to assist in the development of safety critical staff.

The training of these staff will be undertaken by members of the operational standards team who are proficient in human factors and root cause analysis investigation techniques.

Formal Measurement of NTS

It is expected that NTS will be discussed as part of the normal assessment process, to help explain good / poor performance, and where improvements could be made. The intention is to embed this at all stages of competence management. It will not be possible for a member of staff to fail their assessment based on NTS performance alone. To constitute a fail there must be some kind of technical issue. The measurement of NTS will be through manager and/or assessor feedback, and individuals’ self-critique.

NTS and incident and accident investigation

Northern recognise that the identification of NTS can be vital in determining what happened to cause a person to err in an incident. Northern also recognises that the successful identification of the relevant issues will lead to more effective remedial action plans and other recommendations being put in place following any operational safety incident.

Raising awareness of NTS

Northern is committed to raising awareness of NTS by participating in a research project (T869) with RSSB, and briefing staff through Safety briefing days, training of relevant staff, discussion of incidents where NTS have played a part and the use of NTS terminology and markers.

NTS and selection of staff

NTS will be built into our recruitment standards, by using questions on selection of individuals which indicate likely compliance with NTS.

NTS and a Just Safety Culture

Northern aim to ensure that there is a 'just culture within the management of operational safety. By using NTS, this can be achieved by better training and briefing of employees making them more aware of the reasons why incidents occur. We aspire to open and honest discussions about challenges in the various roles and how they might be overcome. Better identification of reasons for
incidents will also lead to more effective remedial action being taken, and over time this should be reflected in less safety of the line incidents.

Evaluation of NTS

Northern will monitor the effectiveness of NTS through feedback from staff, the success of remedial action plans containing NTS, and the number of safety of the line incidents over time.
Appendix 3: Attitudes Survey

Confidential Non-Technical Skills Attitudes Questionnaire

This survey is based on a survey designed as part of a project by Lowe, Hayward and Dalton (2007) to develop Rail Resource Management training (another name for non-technical skills training) for the Australian rail industry.

This survey asks your opinions about various aspects of your work. There are no right or wrong answers; the questions are seeking your personal observations and attitudes. It is not necessary to think about the questions for long - the first answer that comes to mind is usually the best one.

Your responses to the survey are confidential and your name is not required on the questionnaire.

Some basic information is requested about you and your position so that we can compare the opinions of different groups.

Please complete these basic details in the section below.

**Background Information**
1. Gender (please tick)

   - Male
   - Female

2. Years in the rail industry

3. Position (please tick)

   - Experienced driver
   - Inexperienced driver
   - Driver manager

4. Years in current position
5. Company (please tick)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Rail</td>
<td></td>
</tr>
<tr>
<td>Arriva Trains Wales</td>
<td></td>
</tr>
</tbody>
</table>

6. I am completing this form:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Before the NTS course</td>
<td></td>
</tr>
<tr>
<td>After the NTS course</td>
<td></td>
</tr>
</tbody>
</table>

**Part A - Work Attitudes**

Place a tick in one of the five columns to indicate the extent to which you agree with each of the following statements:

"Disagree Strongly"; "Disagree"; "Neutral"; "Agree"; or "Agree Strongly"

**Table 1 -**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree strongly</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Agree strongly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I like my job.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The people I work with listen to others’ opinions and suggestions before deciding what to do.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Employees are willing to challenge somebody else who they think may be acting in an unsafe way.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Team performance issues tend to be addressed as and when they arise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. People I work with comply with rules and procedures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Even when fatigued, I perform effectively at critical times during my working hours.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I am more likely to make judgement errors when working under pressure.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disagree strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Agree strongly</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>----------</td>
<td>---------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>8.</td>
<td>It is better to agree with other team members than to voice a different opinion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Team leaders I work with make an effort to create an atmosphere where all workers feel part of the team.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>I let other people I work with know when my workload is becoming (or about to become) excessive.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>I feel adequately trained to use all available resources (including other workers, supervisors, etc.) in handling difficult or demanding situations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Team members should inform colleagues about any problems that could affect their fitness for work.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I am less effective when stressed or fatigued.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>A truly professional employee does not make mistakes.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Employees always relay important information to others as it becomes available.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Good communication and co-ordination are as important as technical proficiency.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>People I work with are willing to receive constructive advice or suggestions from their colleagues.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>I sometimes feel under pressure to cut corners rather than act safely.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>My opinions are not valuable to crew who are more senior, or have more experience than me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>I have a good understanding of how other employees will act in an emergency or abnormal situation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Team leaders are reluctant to call on other workers for assistance, even when they are able to help.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statement</td>
<td>Disagree strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Agree strongly</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>---------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>22. I have been provided with all the safety-related training I require.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Before commencing a difficult or unusual task, I consider potential problems which may occur and think about how I could solve them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Team leaders currently provide sufficient information (eg., about work conditions &amp; special requirements) to other workers before commencing a task.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. I am proud to work for this organisation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. People in charge of staff carrying out safety-related activities have the leadership knowledge and skills they need.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Rules and procedures should not be broken, even when an employee thinks it is in the company's best interests.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. There is a good level of cooperation and teamwork between train crews and non-train staff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. People I have worked with make an effort to put aside interpersonal conflicts to work as a team.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Other workers use all opportunities to offer assistance to reduce the team leader's workload in an emergency or demanding situation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. A truly professional employee can leave personal problems behind when at work.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. It is important to avoid negative comments about the procedures and techniques of other team members.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. My decision making ability is as good in emergencies as it is in routine operational conditions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disagree strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Agree strongly</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>---------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>34. I am embarrassed when I make a mistake in front of other people.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Written procedures are necessary for all operational situations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. My concentration is as good in the middle of the day as it is in the middle of the night.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. People I work with take the initiative to complete necessary tasks without being instructed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. I have received adequate training in working with others to handle abnormal and emergency situations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. Debriefs are always conducted after a significant event to avoid a mistake or incident next time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. Supervisors who encourage suggestions from team members are not good leaders.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41. Personal problems can adversely affect my performance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. My performance is not adversely affected by working with an inexperienced or less capable team member.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43. I often share my knowledge and experience with others, even if this means that a task takes more time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. People I work with make an effort to create an atmosphere where everyone feels part of a team.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45. It is very clear to everybody who will take control and make decisions in emergency and abnormal situations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46. Shift or other handovers are routinely carried out and in a very professional way.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47. Morale is high in my work area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48. People I work with use correct radio protocols/procedures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The attitudes survey is scored as below:

- strongly agree = 5 (1 for a negatively worded statement)
- agree = 4 (2 for a negatively worded statement)
- neutral = 3 (3 for a negatively worded statement)
- disagree = 2 (4 for a negatively worded statement)
- strongly disagree = 1 (5 for a negatively worded statement)

---

49. Our operations managers listen to us and care about our concerns.

50. I know the proper channels to use if I have concerns about safety practices.

51. I feel comfortable going to a senior manager's office to discuss problems or operational issues.

52. My suggestions about safety would be acted upon if I expressed them to management.

53. Management fully supports my daily efforts as an operational crew member.

54. I am encouraged by my supervisors and co-workers to report any unsafe conditions I may observe.

55. This company has a positive safety culture.

56. I am regularly assessed on the important parts of my safety-related duties, eg. responding to emergencies.

57. Our training has prepared everyone to work as a well-coordinated team.

---

The attitudes survey is scored as below:

- strongly agree = 5 (1 for a negatively worded statement)
- agree = 4 (2 for a negatively worded statement)
- neutral = 3 (3 for a negatively worded statement)
- disagree = 2 (4 for a negatively worded statement)
- strongly disagree = 1 (5 for a negatively worded statement)
Appendix 4: Culture Survey

Safety Culture Self-Assessment

As part of the evaluation of the non-technical skills course you are being asked to complete this confidential survey once before, and once after your NTS training session.

This questionnaire has been adapted by RailCorp in Australia from an earlier survey developed by Professor James Reason\(^\text{20}\) for the purpose of evaluating the nature and strength of an organisation’s safety culture.

**INSTRUCTIONS:**

Tick in the appropriate column to the right of each item, where:

Table 2 -

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is definitely the case in my organisation</td>
<td>&quot;Don't know,&quot; &quot;maybe&quot; or &quot;could be partially true&quot;</td>
<td>&quot;This is definitely not the case in my organisation&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Table 3 -

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. MINDFUL OF DANGER: Top managers are constantly mindful of the human organisational factors that can endanger their operations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ACCEPT SETBACKS: Top management accepts occasional setbacks and nasty surprises as inevitable. They anticipate that people will make errors and ensure employees are trained to detect and recover from them.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. COMMITTED: Top managers are genuinely committed to safety and provide adequate resources to achieve this goal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. REGULAR MEETINGS: Safety-related issues are considered at high-level meetings on a regular basis, not just after some bad event.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. EVENTS REVIEWED: Past events are thoroughly reviewed at top-level meetings and the lessons learned are implemented as global reforms rather than local repairs.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. IMPROVED DEFENCE: After some mishap, the primary aim of top management is to identify the failed system defences and improve them, rather than to seek to divert responsibility to particular individuals.

7. HEALTH CHECKS: Top management adopts a proactive stance toward safety. That is, it does some or all of the following: takes steps to identify recurrent error traps and remove them; strives to eliminate the workplace and organisational factors likely to provoke error; brainstorms new scenarios of failure; and conducts regular "health checks" on the organisational process known to contribute to mishaps.

8. INSTITUTIONAL FACTORS RECOGNISED: Top management recognises that error provoking institutional factors (under-staffing, inadequate equipment, inexperience, patchy training, bad human-machine interfaces, etc.) are easier to manage and correct than fleeting psychological states, such as distraction, inattention and forgetfulness.

9. DATA: It is understood that the effective management of safety, just like any other management process, depends critically on the collection, analysis and dissemination of relevant information.

10. VITAL SIGNS: Management recognises the necessity of combining reactive outcome data (i.e., the near miss and incident reporting system) with active process information. The latter entails far more than occasional audits. It involves the regular sampling of a variety of institutional parameters (scheduling, budgeting, fostering, procedures, defences, training, etc.), identifying which of these vital signs are most in need of attention, and then carrying out remedial actions.

11. EMPLOYEES ATTEND SAFETY MEETINGS: Meetings relating to safety are attended by employees from a wide variety of departments and levels.

12. CAREER BOOST: Assignment to a safety-related function (quality or risk management) is seen as a fast-track appointment, not a dead end. Safety functions are accorded appropriate status and salary.

13. MONEY VS. SAFETY: It is accepted that commercial goals and safety issues can come into conflict. Measures are in place to resolve such conflicts in an effective and transparent manner.
14. REPORTING ENCOURAGED: Policies are in place to encourage everyone to raise safety-related issues (one defining characteristic of a pathological culture is that messengers are "shot" and whistleblowers are dismissed or discredited).

15. TRUST: The organisation recognises the critical dependence of a safety management system on the trust of the workforce - particularly in regard to reporting systems. A safe culture - that is, an informed culture - is the product of a reporting culture that, in turn, can only arise from a just culture.

16. QUALIFIED INDEMNITY: Policies relating to near miss and incident reporting systems make clear the organisation's stance regarding qualified indemnity against sanctions, confidentiality, and the organisational separation of the data-collecting department from those involved in disciplinary proceedings.

17. BLAME: Disciplinary policies are based on an agreed (i.e., negotiated) distinction between acceptable and unacceptable behaviour. It is recognised by all staff that a small proportion of unsafe acts are indeed reckless and warrant sanctions but that the large majority of such acts should not attract punishment. The key determinant of blameworthiness is not so much the act itself - error or violation - as the nature of the behaviour in which it was embedded. Did this behaviour involve deliberate unwarranted risk-taking or a course of action likely to produce avoidable errors? If so, then the act would be culpable regardless of whether it was an error or a violation.

18. NON-TECHNICAL SKILLS: Line management encourages their employees to acquire the mental (or non-technical) as well as the technical skills necessary to achieve safe and effective performance. Mental skills include anticipating possible errors and rehearsing the appropriate recoverable recoveries. Such mental preparation at both individual and organisational levels is one of the hallmarks of high-reliability systems and goes beyond routine simulator checks.

19. FEEDBACK: The organisation has in place rapid, useful and intelligible feedback channels to communicate the lessons learned from both the reactive and proactive safety information systems. Throughout, the emphasis is upon generalising these lessons to the system at large.
### Culture survey scoring instructions

- This is definitely the case in my organization (= 1 point)
- "Don't know" "maybe" or "could be partially true" (= 0.5 point)
- This is definitely not the case in my organization (= 0 points)

The score bands and their implications for implementation of NTS courses are provided in Table 4.

<table>
<thead>
<tr>
<th>Total Score</th>
<th>Score Band</th>
<th>Implications for NTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Jurassic</td>
<td>NTS will fail at this time</td>
</tr>
<tr>
<td>1 - 5</td>
<td>You are very vulnerable</td>
<td>NTS will conflict with existing culture and be of limited value now</td>
</tr>
<tr>
<td>6 - 10</td>
<td>Not too bad but there's still a long way to go</td>
<td>Consider other safety culture enhancements pre-NTS</td>
</tr>
<tr>
<td>11 - 15</td>
<td>You're in good shape but don't forget to be uneasy</td>
<td>Ready for NTS, which should help bridge gaps in safety practices.</td>
</tr>
<tr>
<td>16 - 20</td>
<td>So healthy as to be barely credible.</td>
<td>More than ready - NTS will fit well into existing culture</td>
</tr>
</tbody>
</table>