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The photographs in the guide appear courtesy of ATOC/Paul Bigland, Network Rail, Ant Davey

RSSB
Block 2 Angel Square,
1 Torrens Street, London EC1V 1NY

www.rssb.co.uk

Tel: 020 3142 5300
Fax: 020 3142 5663
Email: enquirydesk@rssb.co.uk
What is RSSB?

RSSB facilitates the resolution of difficult cross-industry issues and builds consensus.

RSSB delivers a unique mix of products and services to the industry – supplying knowledge, analysis, a substantial level of technical expertise and powerful information and risk management tools.

RSSB is a not-for-profit company owned by major industry stakeholders, working together to:

- Continuously improve the level of safety in the rail industry
- Drive out unnecessary cost
- Improve business performance

The company is limited by guarantee and is governed by its members, a board and an advisory committee. It is independent of any single railway company and of their commercial interests.
A key part of RSSB’s product range is the research and development (R&D) programme that it manages on behalf of the railway industry. The programme is funded by the Department for Transport (DfT) and aims to assist the industry and its stakeholders in achieving key objectives:

- Improving performance in terms of health and safety, reliability, and punctuality
- Increasing capacity and availability
- Reducing cost
- Integrating all of these to compete effectively with other transport modes (or complement them as appropriate) and deliver a sustainable future for the railway

The RSSB-managed rail industry research programme focuses on industry wide and strategic research that no individual company or sector of the industry can address on its own. The programme is also instrumental in supporting the development of a future vision that can best be delivered. In addition, RSSB manages the rail industry strategic research programme which has been specifically developed to support industry and its stakeholders in the delivery of ‘step changes’ in industry strategy in 10, 20 and 30 years time – as outlined in the Rail Technical Strategy.

Key Contact:
Michael Woods
Head of Operations and Management Research
Phone: +44 (0) 20 3142 5439
e-mail: michael.woods@rssb.co.uk
Operations and management research covers seven major research topics, which are:

- Health
- Road-Rail Interface
- Operations
- Public behaviour
- Workforce development and competence
- Sustainable development
- Safety policy and risk management (SPRM)

This booklet focuses on the area of RSSB research covering safety policy and risk management:

- Informing you about research that has been done
- Showing you where to find the results of the research
- Encouraging you to find out more including registering to receive the RSSB R&D e-newsletter

The R&D programme has generated substantial knowledge, information and resources – all specifically designed to support the rail industry’s day-to-day operations, at senior level and on the front line.

This booklet provides only a brief insight into projects - the best way to find out more information about each project is to go to the Research and Development section of the RSSB website - www.rssb.co.uk - where you can find more details including links to the reports and outputs.
The scope of the SPRM topic includes research supporting safety management and culture as well as policy and risk management. The delivery of the outputs from all completed research in this topic is a priority.

One of the main activities in this topic has been work in support of the remit of the ‘Safety Decisions Programme’ (SDP). This is primarily concerned with providing a better understanding of what is legally expected from the industry and what commercial freedom exists for decisions that impact on safety within the framework of UK and European law, to enable a consistent approach across the industry.

With the publication of Taking Safe Decisions, the R&D contribution to the SDP is now complete. The fruits of this research have supported the publication and the finalisation of the outstanding issues relating to the SDP. For the future the emphasis of research under this topic will be to help industry understand the output from Taking safe Decisions and through that to support the decision-taking framework.

The risk management tools developed within the SPRM topic will assist the industry by providing an understanding of risk, and providing evidence on the wide-ranging costs and benefits associated with the operation and management of the railway for which duty holders have individual or shared responsibility.

The scope of this topic therefore includes the following:

- **Risk modelling** - modelling the magnitude of the risk arising from hazards to help duty holders determine appropriate use of resources.

- **Estimating costs** - estimating the costs of accidents and of safety measures to help dutyholders identify cost drivers.
• Supply chain - The industry has set up a supplier assurance sponsor group to achieve the following vision:
  ‘To establish a world class industry wide supplier assurance framework that enables customers and suppliers to achieve their full potential’.

• Safety management and culture - examining how safety is managed, and the safety culture that exists within the industry. This includes the development of tools to help with training and with preparation of safety policies, and to help respond to externally set targets in a way which is positive rather than which skews our management inappropriately.

The SPRM topic can have links with other research topics within the R&D programme:

• ‘Risk Modelling’ links with work in the Engineering and Road-Rail topics.

• The work on ‘Estimating Costs’ might contribute to the sustainable development topic.

• ‘Safety culture’ links with the workforce development and competence topic.
Safety policy and risk management

SPRM consists of five areas which include:

• Area 1: **Measuring the values** that people attribute to safety and their concerns about safety to help railway companies identify their business interests and legal duties

• Area 2: **Developing good practice** for the rail industry to promote rational, legal, and consistent decision taking

• Area 3: **Modelling the magnitude of the risk** arising from hazards to help duty holders determine appropriate use of resources

• Area 4: **The identification of cost drivers** in safety management to assist in setting out industry CBAs

• Area 5: **Analysing the management of safety** as a whole to help companies in the railway develop safety management systems and deal with safety culture and training
Safety Risk Model

RSSB builds industry-wide consensus and facilitates the resolution of difficult cross-industry issues. We provide knowledge, analysis, a substantial level of technical expertise, powerful information and risk management tools. This site is dedicated to railway risk and in particular the risk resources provided by RSSB. Our goal is to be a centre of expertise in this area. To register and gain access, please visit:

www.safetyriskmodel.co.uk

The Safety Culture Toolkit

This site is RSSB's one-stop-shop for safety culture assessment, improvement and good practice exchange designed for the rail industry.

It provides organisations with a safety culture self-assessment package, guidance on safety culture improvement and the opportunity to share good practices on all aspects of safety culture across the industry. RSSB provides additional help and guidance for railway group members. At the present the use of the toolkit is limited to RSSB members only. Launched in March 2008, it can be found at:

http://rssb.info-exchange.com/
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SPRM projects published

T044  Wider sources for safety information (WSOSI)

Description  An investigation into the rail industry’s requirements for access to wider sources of safety information, to provide enhanced safety intelligence and thereby enable improved rail safety decisions to be made.

Abstract  A wide range of railway safety information is held by different organisations, in different systems. This study, undertaken by FGG, investigated the possibility of broadening RSSB’s access (on behalf of the industry) to safety data available from this extensive array of sources. The key objectives of the WSOSI Project were to identify the types of data required from key rail industry systems, prepare a draft framework for managing the exchange of the data and ascertain the requirements of the data-sharing participants. The research suggests that access to these wider sources of information could provide enhanced safety intelligence and thereby enable improved rail safety decisions to be made. However, further consideration of the costs and benefits to the industry is needed before the concept can be taken forward.

Published  September 2004

Current Position  It was recommended that further consultation with senior representatives of the rail industry should be undertaken to gauge whether there was sufficient interest and commitment to the required data exchange and sharing and all that would entail. If it appeared there was sufficient interest and commitment, then it was further recommended that a full feasibility study for the system be undertaken to clarify the requirements, evaluate and recommend a technical solution, undertake a cost benefit analysis, and define an incremental development and implementation strategy. The meeting of the working party considered this project and made a decision not to take this work any further.
## T114 Measurement of safety culture in the rail industry

### Description
Developing methodologies to measure safety culture in the rail industry, and using these to promote cultural development at organisational and industry levels.

### Abstract
This research, carried out by The Kiel Centre, addresses the issue of how to measure safety culture in the rail industry in Great Britain and how to further cultural development at organisational and industry levels. It evaluates a number of methods employed to date by the industry to measure safety culture. In particular, it identifies what has been measured and the quality of the results obtained, how good safety culture traits vary within the organisations, and what initiatives have worked (or not worked) in the past. The results help to establish a common understanding of the subject, its terminology, and tools to assess what opportunities exist for change, leading to improvements in safety for railways.

### Published
October 2004

### Current Position
The main findings of this project were that the ideal safety culture assessment tool should include as an output initial recommendations for improvement actions; companies have a requirement to be able to compare the results of their own assessment against some form of baseline, and the applicability of assessment methods used in the rail industry should be improved for non-TOC organisations. This project fed into **T397 Developing practical self assessment tool for measuring and managing safety culture.**
**T126  A survey of current practices in safety-related decision making**

**Description**  
Surveying current practices in safety decision-making to identify and promulgate good practice, and to identify training needs to support decision makers in the railway industry.

**Abstract**  
Every day, decisions are taken which impact on the safety of the railway. These range from those that have an immediate short-term impact to those with a longer-term, strategic, or indirect impact; safety may be the primary motivation for the decision, or it may be a contributory factor. Formal criteria for taking safety decisions exist within safety cases, but the practicalities of how these are implemented in different parts of the industry have a significant influence on the effectiveness of the industry in delivering a safe railway. A D Little carried out a web-based questionnaire survey of current practices in safety related decision-making, with follow-up interviews for further insight. Key messages from the report are that there is much good practice in practical safety decision-making, and that there is also scope for building on this to assist decision makers through focused training, information, tools and other resources.

**Published**  
April 2005

**Current Position**  
This work fed into subsequent stages of the Safety Decisions Programme, in particular research project **T431 Informing the development of a Decision-Taking Framework for the rail industry.** It is considered that it may be sensible to re-run the survey in the future in order to establish what impact the publication of Taking Safe Decisions has had on industry decision making practices.
T127  A statistical review of the RSSB Safety Risk Model

Description
Reviewing the statistical basis of the Safety Risk Model and analysing how it treats rare events.

Abstract
It had been suggested that the RSSB Safety Risk Model (SRM) may overestimate the absolute level of risk in certain areas. SRM is a mathematical representation of 122 hazardous events that could lead directly to injury or fatality on the mainline railway. This research independently reviewed the statistical basis of SRM (Work Package 1) and then looked at ways of improving the model (Work Package 2). WP1 aimed to understand the origins of the differences between SRM and the analysis of fatality data relating to train collisions and derailments carried out by Professor Evans, then of University College London. WP2 takes three of the methods from WP1 and develops them for application within SRM: pooling data to give better estimates of low frequency events, mathematical techniques for predicting casualties in accidents, and procedures for structured expert judgement. This work has ensured that SRM is able to reflect actual experience and has proposed better ways for handling the statistics of rare events.

Published
September 2004

Current Position
This work contributed to the refining of the Safety Risk Model, to reflect actual experience and to propose better ways of handling rare events.
T139  Risk assessment training course

Description
Developing a course to assist in the formulation and maintenance of risk assessments for railway safety cases.

Abstract
Those running trains on Network Rail infrastructure were at the time of this research required to have a Railway Safety Case (RSC). RSSB commissioned A D Little to develop a training course to assist in the formulation and maintenance of risk assessments for the purposes of railway safety cases, based upon the Railway Group guidance note GE/GN8561 ‘Guidance on the Preparation of Risk Assessments within Railway Safety Cases’. The course enabled operators to use the guidance note effectively and to make use of the RSSB Safety Risk Model, which lists and quantifies 122 hazardous events on the GB rail network.

Published
September 2004

Current Position
The research developed a training course that was successfully run for the industry. The course content was associated with the Railway Safety Case Regulations that constituted a part of ROTS – Railways and Other Transport Systems (Approval of Works, Plant and Equipment). The training course enabled safety practitioners to act in accordance with Railway Group guidance note GE/GN8561, through being better able to develop suitable risk assessments for safety cases and, consequently, to implement safety improvements on a more robust basis. ROTS has now been superseded by Railways and Other Guided Transport Systems (Safety) Regulations 2006 (ROGS) so the course is no longer being run.
### Description
Providing information on how to manage interfaces across organisations with different safety cultures, which is increasingly important as Europe strives for increasing interoperability.

### Abstract
Organisations will be increasingly required to interface with each other as European railway companies strive for interoperability between their systems. Safety could be affected if organisations with different safety cultures interact. The UIC Safety Culture at Interfaces (SCAI) project, conducted by SINTEC, therefore aimed to: understand current differences in safety culture management across European rail companies, develop a clear understanding of the safety issues that arise when different organisational cultures interface with each other, devise practical techniques to enable organisations to predict/counteract any problems that could arise as new interfaces are created between cultures or assess the influences of different safety cultures in multiparty incidents, develop a desired vision/characteristics for improved cultural interfaces, and provide support for addressing interface problems to the European Safety Directive. The tools developed by this project will help individual organisations to work in greater harmony and to understand how to manage safety culture more effectively.

### Published
October 2004

### Current Position
The methodology was deployed in workshops in Paris and Oslo, and in three pilot studies in Hungary, Sweden and the United Kingdom. The feedback was very positive and resulted in a few changes being made to the original methodology. Some of the organisations involved in the pilot studies used the information generated in these exercises to implement practical solutions to the safety culture interface issues identified during the pilot trials. This work also played a part in the development of the Railways and Other Guided Transport Systems (Safety) Regulations (ROGS), a key principle of which is that operators have a duty to work together across interfaces to make sure the transport system is run safely.
T155 Modelling the implications of changes to a safety requirements regime

Description
Investigating the feasibility of developing a model to assess the implications, such as safety performance and financial cost, of changes to a safety requirements regime.

Abstract
This research constituted the second phase of work to consider the feasibility of developing a model to analyse the implications of changes to safety requirements regimes. The objectives of the model are to determine the level of safety a particular level of investment would deliver for the rail network, and also to be able to assess the investment required to deliver a particular level of safety. The research assessed the preferred platform for the development of the model and proposes its final structure. It also provided an outline strategy and an estimated cost for the collection of suitable data to populate the model. Finally, and subsequent to the development of a possible pilot model, it demonstrated that it is possible to select and prioritise mitigation measures according to a strategy (either cost or safety benefit) to a fixed budget over a period of time.

Published
September 2004

Current Position
The project produced three primary outputs: a proposed structure for the model; proposals and estimates for populating the model and the development of a pilot model. The issue that the model was trying to address (the adjustment of spending priorities according to changes in the safety requirements regime) was taken up by the Safety Decisions Programme and a number of the associated projects, notably: T224 A review of principles of decision-making in the rail industry; T430/T616 The Value of Preventing a Fatality (VPF), Phase 1; T431/439 Informing the development of a Decision-Taking Framework for the rail industry; and T440 The Weighting of Non-Fatal Injuries.
### Description
Generating practical ways to improve the safety decision-making competence of people with different roles and in different sectors of the rail industry. This project and T265 were merged to produce one set of publications.

### Abstract
The rail industry is under pressure to reduce its operating and maintenance costs, whilst improving performance and meeting high public expectations on safety. Making safety decisions in this context is difficult, whilst the consequences of making a poor decision can be significant. A D Little examined how safety-related decision-making could be improved. Gaps in training and information materials were identified, including some relating to two recommendations from an earlier survey into current practices in safety decision-making (‘A survey of current practices in safety-related decision making’). The report identified eleven proposals, covering a mixture of training and information materials, addressing the needs of junior through to senior management, safety professionals, line managers and commercial managers. In some cases the proposals for training and information materials are complementary, whilst others are freestanding.

### Published
In conjunction with T265, November 2006

### Current Position
The primary outcome of this project was a series of proposals for information materials and training which would enhance the competence and effectiveness of people faced with making safety-related decisions. The follow-up action to the proposals was discussed with stakeholders at the Practitioners Working Group (PWG). The PWG concluded in 2006 that this work should not be taken any further.
### T168 Development of the history of accident and fatality records

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Identifying fatal accident data for recent decades, and analysing its trends, to inform wider debate about railway safety.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>This small project, conducted by Professor Andrew Evans, then of University College London, explored the extent to which it is possible to identify all fatal accidents from 1946 to the present day and the total number of fatalities during that period. Fatal accidents in this case include all those involving members of the public and the railway workforce; it is therefore an extension of the data already compiled by Professor Evans covering fatal train accidents in the period 1967 - 2002. The results, demonstrating the great improvement made over several decades, provided a contribution to wider debates about railway safety.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>August 2009</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>This project produced authoritative databases of train accidents, multiple fatality accidents, fatality counts and railway activity data from 1946 to 2002. The emphasis of the project was on accurate data collection rather than analysis. The aim was to assemble high-quality datasets that could be used, with confidence, for future analysis. The results from this project fed directly into the Safety Risk Model and have also been used subsequently in analysis for the compilation of the Annual Safety Performance Report. The figures were instrumental in showing a gradual improvement in railway safety since 1946. The output from this project provided an incident analysis approach to complement the risk analysis approach of the Safety Risk Model.</td>
</tr>
</tbody>
</table>
Reviewing literature on management systems and their failures, identifying lessons and proposing a way forward for the railway industry.

This research, conducted by Anser Conspectus, examined how management failures can contribute to safety risk. The aim was to improve understanding in this area as a contribution to the improvement of risk assessment of management systems in the railway industry. As a first stage, a feasibility study was undertaken to judge the viability of generating an appropriate model. The results demonstrated that there were considerable difficulties in developing such a model at present, and the remainder of the project was not taken forward. However, the useful ideas that were generated could form the basis for further research in the future, and the review of the available literature has been published.

September 2004

The project report discussed the opportunities for creating workable tools to capture how management failures can contribute to safety risk. Following the research, RSSB took the view that it was unlikely that a quantitative approach to assessing safety risk caused by management failures could be developed and a decision was taken not to proceed any further with this. The project produced a bibliography of material on this topic. Research idea R22 ‘The feasibility of establishing a High Reliability Organisation culture in GB rail’ derived, in part, from this project and was incorporated into project T847 High Level Safety Management Systems guidance and good practice.
<table>
<thead>
<tr>
<th><strong>T191  Supply chain safety management</strong></th>
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<tr>
<td><strong>Description</strong></td>
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<tr>
<td><strong>Abstract</strong></td>
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<td><strong>Published</strong></td>
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<td><strong>Current Position</strong></td>
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</table>
### T192 Supply chain safety management - test case 1: wheelsets

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Investigating safety management in the supply chain relating to wheelset procurement.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>This research formed one of several work packages within the overall Supply Chain Safety Management (SCSM) programme that had been established as part of the industry’s response to Recommendation 24 of the Ladbroke Grove Railway Inquiry Report, Part 2. It focused on the procurement of wheelsets, and examined several sample procurement contracts, thereby covering a wide range of the diverse factors that affected this process. The investigation, carried out by Atkins, comprised a series of visits to, and discussions with, the companies involved in the contractual chains, with key strengths and weaknesses of the supply chain for wheelsets being identified.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>September 2004</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The research identified some areas defined as ‘quick wins’, where a fast benefit response can be made at a low cost. The research did not delve into the contractual side of wheelset procurement; however the report provides a reference for stakeholder consideration.</td>
</tr>
</tbody>
</table>
### T193 Supply chain safety management - test case 2: track circuit relays

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Investigating safety management in the supply chain relating to track circuit relay procurement.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>This research project was one of several work packages within the overall Supply Chain Safety Management (SCSM) programme. The research, conducted by Atkins, focused on the procurement of track circuit relays, and understanding the associated supply chain routes and their characteristics. In particular, the study identified and documented issues, risks, limitations, failures, version/variation management and best practices within the supply chain, and assessed the prevailing safety culture within the organisations involved. The total supply chain and the supply life cycle up to the point of use (including operation and maintenance) were also examined.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>September 2004</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The research did not delve into the contractual side of track circuit relays procurement; however the report provides a tool for stakeholder reference.</td>
</tr>
</tbody>
</table>
# T194 Supply chain safety management - test case 3: contract line-side staff

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Investigating safety management in the supply chain relating to trackside labour.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>This research project was one of several work packages within the overall Supply Chain Safety Management (SCSM) programme. It focused on the procurement of trackside labour, a volume service, which could therefore exhibit different characteristics from those of the other two test cases, dealing respectively with rolling stock components (wheelsets) and infrastructure components (track relay units). Competence Assurance Solutions carried out the work, defining the supply chain for the contracting and supply of trackside labour, and analysing it using benchmarking and assessment processes to determine good and bad practice. They reported on supply chain arrangements for the provision of P-Way staff and identified quantitative measures that could be used as indicators of safety performance across the supply chain.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>September 2004</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The research identified the various contractual arrangements in use and posed several recommendations for stakeholder consideration. The report provides a tool for stakeholder reference.</td>
</tr>
</tbody>
</table>
# T195  Supply chain safety management - existing accreditation schemes

## Description
Investigating industry supplier accreditation schemes for the supply of safety critical products and services, and developing a set of guiding principles for such schemes.

## Abstract
This research project was one of several work packages within the overall Supply Chain Safety Management (SCSM) programme. ABB carried out the work, analysing existing safety-critical accreditation and assurance schemes currently in use in the UK across a range of industries, as well as those under development. Existing schemes included within the scope of this project were CMM, LinkUp, and the ATOC Code of Practice, together with other schemes in use by the industry - at the time estimated to total around 18. This analysis informed the development of a set of guiding principles for effective supplier accreditation schemes.

## Published
September 2004

## Current Position
The findings from the research demonstrated that the impact of the Interoperability Directives would be significant and any supply chain accreditation/certification scheme needed to be complimentary to the requirements. Additionally, there are many models of supply chain clusters, which need to be understood by industry and stakeholders. The report provides a reference point for future direction of research.
Description
Establishing what is current best practice in supply chain accreditation methods and systems for safety critical industries other than the national rail industry.

Abstract
This research project was one of the work packages within the overall Supply Chain Safety Management (SCSM) programme. EQE carried out the work, making a comparative analysis of the accreditation schemes and systems in use in safety-critical industries other than the national rail industry. The project had two elements, the first being the identification of the industries and organisations to be considered within the survey (other rail sectors - metro and light rail, and London Underground in particular - aviation and marine services, the automotive industry, the defence industry and the oil and gas and petrochemical sectors). The second element was a review of good (and weak) practice. The findings form part of the knowledge base for use in formulating a strategy to improve supply chain accreditation systems for the rail industry.

Published
June 2007

Current Position
The findings from the research identified other industries from which the rail industry supply chain could benefit. It encouraged the industry and stakeholders to consider specific areas within other industry schemes, which have set them ahead of the rail industry and what lessons are to be learnt. The report provides a reference point for future research.
**T197 Supply chain safety management - review of GB and EU standards**

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Reviewing GB and EU standards and codes of practice relating to supply chain management in the rail industry.</th>
</tr>
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<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>This project was a survey of the approaches taken in other countries in respect of assurance and supplier accreditation schemes for safety-critical supplies. DNV investigated supply chains and associated accreditation systems that were in place in France, Germany, Italy, Sweden, Norway, and Denmark (and, at a high level, North America) for both rolling stock and infrastructure. They reviewed GB and EU Standards and Codes of Practice relating to the supply of safety-critical products and services and assessed the strengths and weaknesses of the various supply chains investigated. The research identified lessons that can be learned from the various approaches, how they related to existing GB systems and standards and therefore what areas of improvement might be feasible for the GB rail industry.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>September 2004</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>Findings from this research contributed to the industry deciding to do further research under <strong>T514 Development of supply chain approval processes in the rail industry</strong> and <strong>T833 A review of potential efficiency and effectiveness improvements in rail industry supplier assurance.</strong></td>
</tr>
</tbody>
</table>
## Description
Analysing accident reports to evaluate the efficacy of the safety assurance processes currently in place within the railway industry.

## Abstract
A fundamental aspect of the railway industry’s Safety Management System involves learning lessons from accidents and ensuring, as far as is reasonably practicable, that similar accidents cannot occur in the future. This study examined five accident reports, three from the rail industry and two from other industries for comparison, and sought to establish the efficacy of the assurance processes currently in place within the rail industry. The analysis of the accident reports, along with interviews with key managers from a small cross section of the rail industry, identified the need to develop assurance processes further. The final report included recommendations and identified areas for further research, aimed at improving the development, cascade and delivery of a common assurance approach within the industry.

## Published
September 2004

## Current Position
The final report included recommendations and identified areas for further research, aimed at improving the development cascade and delivery of common assurance approaches within the industry. These provided indicators for research topics, which have been followed up including:

1. Training and competence (including risk awareness)
2. Contractor management
T220  Railway Group Standards and DNV’s approach to the development of Ship Rules

Description
Testing whether DNV’s approach to the development of Ship Rules could enhance RSSB’s method of developing and maintaining Railway Group Standards.

Abstract
A series of European Directives have become applicable to railways in Great Britain with the intention of simplifying and normalising rule making. This project sought to test whether the adoption of an approach similar to that used by Det Norske Veritas (DNV) in the development of Ship Rules, using Formal Safety Assessment (FSA), could enhance RSSB’s method of developing and maintaining Railway Group Standards (RGSs). DNV believed that RSSB would benefit from a thorough consideration of DNV’s current approach since the standards have had a similar historical development to the technical rules for ships. DNV tested both the FSA approach and the approach used to develop RGSs against a common model containing four stages: topic selection, hazard identification, risk analysis and cost-benefit assessment. Recommendations for improvement were made, which could assist the industry by allowing identification of ways to ensure continued process improvement leading to improvements in safety.

Published
September 2004

Current Position
The report recommendations provided input into the review of RSSB’s group standards process undertaken in 2004/5 leading to the Strategy for Standards Management.
T224  A review of principles of decision-making in the rail industry

Description  Investigating key issues in safety decision-making covering the precautionary principle, the removal of risk controls, good practice, and conflicting legislation.

Abstract  This project examined several contentious aspects of safety decision-making. It reviewed the meaning of the term ‘precautionary principle’ and found that it should be used as a way to move issues forward, rather than to do nothing, in the face of imperfect knowledge of risks. It produced guidance on the legal and operational basis for decisions to reduce risk controls. It concluded that the adoption of accepted good practice was often strong evidence of, but not conclusive proof of, risk being ‘as low as reasonably practicable’ (ALARP). Finally, it found that there were few examples of legislation imposing conflicting requirements on the industry - most of those cited being based on misunderstandings - although there are often tensions between different laws which require management effort to resolve. These conclusions will be used to provide practical guidance to the rail industry on these aspects of safety decision-making.

Published  June 2004

Current Position  This work formed the initial phase of the work which lead to the Safety Decisions Programme and the publication of:

- ‘How safe is safe enough?’
- ‘Valuing Safety’
- ‘Decision Taking Framework’
- ‘Taking Safe Decisions’
- ‘Route to Taking Safe Decisions’

The project was closely aligned with a recommendation from a separate research project that was published in parallel, T126 A survey of current practices in safety-related decision making. Further research was undertaken: T430 The value of preventing a fatality (phase 1), T436 Engaging stakeholders in safety decision making and T517 Modelling ‘societal concerns.’
T226  The use of neural networks in the rail industry

Description  Investigating the strengths and weaknesses of neural networks and suggesting possible applications within the rail industry.

Abstract  A neural network is a way of processing information that mimics the operation of the human brain, based on learned experience, which has advantages, notably speed and accuracy, over more mechanical methods. This research, carried out by Bellwether, explained more fully the concept of neural networks and their strengths and weaknesses, and examined how they might be used to address and solve problems and their potential value in a range of rail industry applications. The project concluded that, while neural networks did offer possibilities for processing large amounts of imaging data quickly, the large amount of time needed to train a neural network and the cost of system development were prohibitive.

Published    October 2004

Current Position  RSSB concluded that it was not practicable to support the extension of their use in the industry.
<table>
<thead>
<tr>
<th><strong>T227 Safety Management Systems: improving the efficiency of safety case development in the railway industry</strong></th>
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<tbody>
<tr>
<td><strong>Description</strong></td>
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<tr>
<td><strong>Abstract</strong></td>
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<tr>
<td><strong>Published</strong></td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
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</tbody>
</table>
T229 Railway Safety Case risk assessment: guidance for operators of on-track plant

Description
Collating and analysing a comprehensive schedule of hazardous on-track plant events, and publishing a ‘Risk Bulletin’ to enable this kind of risk to be managed better.

Abstract
This project was designed to collate a comprehensive schedule of hazardous events relevant to on-track plant (OTP) and to determine the associated safety risk for OTP workers. Atkins, who carried out this work on behalf of RSSB, produced information that has been distributed to Safety Managers within the industry as an OTP ‘Risk Bulletin’ along with templates to support these managers in setting out their safety cases. This should enable OTP operators to address the risk to their operation and to the workforce.

Published
December 2004

Current Position
A practical tool which enables operators of OTP to improve the effectiveness of their risk assessments and, consequently, their management of risk was produced and subsequently incorporated into the main safety risk model.
T230a Ethical basis of rail safety decisions

Description
A review of ethical considerations underlying public opinion regarding railway safety and decision-making.

Abstract
This work complimented the published report ‘Railway safety and the ethics of the tolerability of risk’, and addressed some fundamental issues regarding the contribution that ethical considerations can make to how decisions on safety and safety investment are taken with regard to Britain’s railways. Additionally the research investigated the need for establishing a permanent advisory group on ethics. Pitchill Consulting and TTAC’s research approach focused upon interviewing a wide cross-section of people interested in and knowledgeable about ethics, including key railway safety staff. In addition a detailed literature review of research was conducted. The report illuminated the industry’s need to develop criteria and tools to improve safety decision-making and to engage the public to ensure that decisions are made in a way that they consider reasonable. The recommendations did not propose the establishment of any permanent advisory group.

Published
March 2005

Current Position
This project fed into the Safety Decisions Programme which then produced a range of related projects including:

- **T430 The Value of Preventing a Fatality (VPF), Phase 1**
- **T431/T439 Informing the development of a Decision-Taking Framework for the rail industry**
- **T440 The Weighting of Non-Fatal Injuries**
- **T616 The Value of Preventing a Fatality**

And also other projects:

- **T517 Modelling ‘Societal Concerns’**
- **T644 Modelling Public Attitudes to Risk**

All this work has now been finished and summarised in ‘Taking Safe Decisions’. For further information, please visit:

[http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx](http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx)
# T230b Railway safety and the ethics of the tolerability of risk

## Description
An investigation into the apparent divergence in public attitudes to railway safety in that the public perceives the railway as a safe form of transport, but conversely appears to require large investments in future safety improvements.

## Abstract
This report addressed the ethical issues at the heart of the public debate concerning safety on the railway network of Great Britain (GB) and was undertaken by Professor Jonathan Wolff of WCA Consulting and University College London. At the time a divergence in public attitudes existed where on the one hand railways were perceived to provide a very safe form of transport, whilst on the other hand the public apparently wanted additional, often high, levels of money to be invested in further safety improvements. By investigating the regulatory background to rail safety in GB, analysing risk from an ethical perspective and considering both the psychological and sociological aspects of risk, the report provided an approach and mechanism or tool for facilitating a structured debate amongst all stakeholders.

## Published
March 2005

## Current Position
Findings from this project fed into the Safety Decisions Programme and, in particular, the publication of ‘How safe is safe enough?’ in February 2005. ‘How safe is safe enough’ contained a section headed ‘Ethical responsibilities’ which considered the issues raised by this project. **T436 Engaging stakeholders in safety decision making** followed up on the question of finding ways of engaging the public, both as customers and as citizens. Other research projects that drew on this work:

- **T430 The Value of Preventing a Fatality (VPF), Phase 1**
- **T431/T439 Informing the development of a Decision-Taking Framework for the rail industry**
- **T440 The Weighting of Non-Fatal Injuries**
- **T517 Modelling ‘Societal Concerns’**
- **T616 The Value of Preventing a Fatality**
- **T644 Modelling Public Attitudes to Risk**

All this work has now been finished and summarised in ‘Taking Safe Decisions’. For further information, please visit:

[http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx](http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx)
# T255 Analysis of the ‘May peak’ in SPAD data

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Investigating the seasonal peak in SPADs experienced in May during recent years, and searching for correlations with causal factors.</th>
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</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>SPAD data for the previous seven years showed a small but consistent peak in spring, usually around May. Human Engineering identified the reasons for this phenomenon and proposed management strategies to reduce the incidence of these SPADs. These strategies were developed and validated with stakeholders and have been rolled out through the National SPAD Focus Group (NSFG) now Operations Focus Group (OFG), enabling industry parties to take corrective action to reduce the May peak.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>March 2005</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The following areas were identified for practical SPAD management actions:</td>
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<tr>
<td></td>
<td>• Action on multi-SPAD signals</td>
</tr>
<tr>
<td></td>
<td>• Management of drivers following a SPAD</td>
</tr>
<tr>
<td></td>
<td>• High-risk times of day</td>
</tr>
</tbody>
</table>

Initial responses from the SPADRAMs (now OPSRAMs) and the National SPAD Focus Group (now Operations Focus Group) were positive and supportive towards these action plans. They included

• A SPAD alert card/poster for high-risk times of day

• A poster campaign for drivers returning from holiday

• A guidance note for the management of drivers who pass signals at danger

• A survey of driver dynamic visual acuity (DVA) - the ability to see an object while in motion - across age
T266 Decision-making practices and lessons from other industries

**Description**
Investigating the safety decision-making practices of other UK based industries, identifying any transferable lessons that can be adopted by the railway industry.

**Abstract**
The objective of this work was to investigate other UK-based industries in order to identify transferable safety decision-making practices that would be beneficial to the railway industry. A D Little conducted the project, which included a literature review and in-depth discussions with staff from other industries. Particular themes explored included ‘Relationships with customers’ and ‘Practical considerations following an incident’. The recommendations described how such practices could be applied in the context of a railway environment.

**Published**
December 2004

**Current Position**
Eight recommendations were made and the Safety Decisions Programme (SDP) steering group, the Think Tank, requested that those research recommendations pertinent to the SDP should be incorporated into the programme. The project report is referenced in the SDP document ‘The route to ‘Taking Safe Decisions” and informed the thinking that supported the publication of ‘Taking Safe Decisions’. For further information, please visit: http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx
Taking Safe Decisions

For further information, please visit: www.rssb.co.uk
**T306 Managing uncertainty in the safety risk model**

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Providing a theoretical and practical basis for the development of ‘uncertainty analysis’ and its use in the safety risk model.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>Given the wide application of the Safety Risk Model (SRM) as a tool to aid safety decision-making and safety justification, it is important that sufficient resources and commitment are applied to the continued development of the model. This work undertaken by Strathclyde University ensured that the SRM continued to be a sound foundation for risk assessment in the industry. An important area of future development is the identification, assessment and management of uncertainty. This project aimed to provide a theoretical and practical basis upon which ‘uncertainty analysis’ can be built, providing a more robust statistical basis for the SRM.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>January 2010</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The methodology derived under this research project is now being applied to the SRM. The uncertainty of two hazardous events have been assessed and it is anticipated that the method will be rolled out to the other hazardous events in due course. The future development work will be undertaken in-house within RSSB so that a full understanding of the methodology and its application is established within the SRM update process.</td>
</tr>
</tbody>
</table>
T397  Developing a practical self-assessment tool for measuring and managing safety culture

Description  Developing an enhanced self-assessment safety culture measurement tool and guidance on how to implement best practice solutions for continuous cultural improvement. This tool has been trialled by rail group members and found to be robust and credible.

Abstract  The railway industry recognises that an effective organisational culture, with a safety focus, is essential to achieve continuously improving safety performance. With an effective culture measurement tool, movements in safety culture can be tracked and strategic adjustments made to ensure that improvement continues. This research followed on from T114 ‘Measurement of safety culture in the rail industry’ begun in 2003 to investigate the merits and shortcomings of tools available and to produce an industry guide to safety culture measurement. The objectives of this research, T397, were to develop an enhanced self-assessment safety culture measurement tool, guidance on its use, and guidance on how to manage the results and on implementing best practice solutions for continuous cultural improvement. The resulting tool was trialled by RSSB members.

Published  May 2008

Current Position  This work built on T114 Measurement of safety culture in the rail industry. The primary outcome of this project was the production of a web-based practical self-assessment tool for measuring and managing safety culture. The web-based tool was launched in March 2008 after extensive testing and piloting with several rail companies. The Safety Culture Toolkit can be found at: http://rssb.info-exchange.com/ and is available for members use, or non members use subject to agreement.
<table>
<thead>
<tr>
<th>Description</th>
<th>Investigating the suitability of using a single ‘value of preventing a fatality’ in safety decision making by identifying if all loss of life on the railway is viewed similarly, and if not, to determine the range of VPFs that should be considered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>The ‘value of preventing a fatality’ (VPF) is the common measure by which proposed safety improvements on the railway are assessed. RSSB is conducting research into the VPF in two phases. The first phase, completed as project T430 and conducted by Oxford Risk Research and Analysis (ORRA), involved establishing a definition of what is and is not included in the VPF, and for what purposes it may or may not be used. It also considered the range of factors that contribute to determining the VPF. The second phase, T616 The value of preventing a fatality (published in July 2008), tested the application of then current VPF by exploring and comparing stakeholder and public views of the VPF in a number of different accident scenarios.</td>
</tr>
<tr>
<td>Published</td>
<td>January 2006</td>
</tr>
<tr>
<td>Current Position</td>
<td>The primary output of this research project was a definition of what the VPF is (and is not) and for what purposes it may be used. This was part of the work that contributed to the development to ‘Taking Safe Decisions’. For further information, please visit: <a href="http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx">http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx</a></td>
</tr>
</tbody>
</table>
This research informed the development of a ‘decision-taking framework’ designed to assist decision takers in the rail industry. It provided supporting case studies and guidance as to what factors should be considered when taking safety-related decisions.

Decisions taken by the railway industry that involve the consideration of costs and benefits (either qualitatively or quantitatively) are often complex. This project, presented as a suite of three volumes, established: 1) A process to characterise all decisions taken by, or affecting, the railway industry, (taking as a starting point the decision framework developed by the United Kingdom Offshore Operators’ Association (UKOOA) for the offshore oil and gas industry); 2) A set of practical case studies from the rail industry that demonstrated good practice and illustrated the framework’s benefits in decision-making; 3) Guidance on issues such as: good practice in decision-making, the approach that should be taken in the analysis of costs and benefits, the ‘As low as reasonably practicable’ (ALARP) principle, what differences in approach should be applied when risk is shared and the effect that addressing costs and benefits in the context of sustainable development could have on the way that decisions are made. This work then formed the basis of the RSSB discussion document ‘Decision-Taking Framework’ (February 2006) which was circulated throughout the industry for comment.

November 2008

The project report formed the basis of the RSSB discussion document ‘decision-taking framework’, published in February 2006 and circulated throughout the industry for comment and feedback. The discussion document and the feedback were then used as part of the process that led to the publication of ‘Taking Safe Decisions’. For further information, please visit: http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx
T436 Engaging stakeholders in safety decision-making

<table>
<thead>
<tr>
<th>Description</th>
<th>This work provided guidance to the industry on stakeholder engagement particularly with regard to safety-related decisions as a means of helping to secure and maintain its ‘informal licence to operate’.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>The railway industry recognises that securing and maintaining its ‘informal license to operate’ is dependent upon safety-related decisions being in line with the expectations of its stakeholders - including customers, taxpayers, and neighbours. The work on value of preventing a fatality and societal concerns (T430 and T517) both explored ways in which the industry can understand stakeholders’ views. By building on the understanding developed in these projects, it should be possible to ensure a proportionate response is made to most rail-related risk. However, there are likely to be a limited number of occasions upon which it is important to consult on specific issues through targeted engagement. Project T436 was carried out for RSSB by Galson Sciences and reviewed the Safety Decisions Programme’s work in this field to date and provided helpful insights as to the alternative approaches that might be available. The results were to be used in considering how best to engage stakeholders in the Safety Decisions Programme itself and also as a starting point for helping the industry generally to engage more effectively with stakeholders where necessary.</td>
</tr>
<tr>
<td>Published</td>
<td>January 2006</td>
</tr>
<tr>
<td>Current Position</td>
<td>This project fed into T517 Modelling ‘Societal Concerns’ and T644 Modelling public attitudes to risk which contributed to the development of Taking Safe Decisions.</td>
</tr>
</tbody>
</table>
This research informed the development of a ‘decision-taking framework’ designed to assist decision takers in the rail industry. It provided supporting case studies and guidance as to what factors should be considered when taking safety-related decisions.

Decisions taken by the railway industry that involve the consideration of costs and benefits (either qualitatively or quantitatively) are often complex. This project, presented as a suite of three volumes, established: 1) A process to characterise all decisions taken by, or affecting, the railway industry, (taking as a starting point the decision framework developed by the United Kingdom Offshore Operators’ Association (UKOOA) for the offshore oil and gas industry); 2) A set of practical case studies from the rail industry that demonstrated good practice and illustrated the framework’s benefits in decision-making; 3) Guidance on issues such as: good practice in decision-making, the approach that should be taken in the analysis of costs and benefits, the ‘as low as reasonably practicable’ (ALARP) principle, what differences in approach should be applied when risk is shared and the effect that addressing costs and benefits in the context of sustainable development could have on the way that decisions are made. This work then formed the basis of the RSSB discussion document ‘Decision-Taking Framework’ (February 2006) which was circulated throughout the industry for comment.

The project report formed the basis of the RSSB discussion document ‘decision-taking framework’, published in February 2006 and circulated throughout the industry for comment and feedback. The discussion document and the feedback were then used as part of the process that led to the publication of ‘Taking Safe Decisions’. For further information, please visit: http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx
### Description

This research project aimed at developing, with clear robust justification, equivalent fatalities weightings for the GB rail industry.

### Abstract

In the early 1990s, British Rail (BR), in consultation with the Department of Transport (DoT) now Department for Transport (DfT), devised ‘equivalent fatality’ ratios to assess risk and carry out cost-benefit analysis. An equivalent fatality was deemed to be one fatality, ten major injuries or 200 minor injuries. Although these ratios were applied by BR and the DfT, no transparent justification could be attributed to these ratios. RSSB commissioned a research project to review the justification for the weightings. From the research, RSSB’s subsequent review, and discussion by the RSSB Board it was agreed that the following injury definitions and weightings should apply:

- Ten major injuries to one fatality
- 200 RIDDOR reportable minor injuries to one fatality
- 200 Class 1 shock/trauma injuries to one fatality
- 1000 Non-RIDDOR reportable minor injuries to one fatality
- 1000 Class 2 shock/trauma injuries to one fatality

These changes resulted in a 23% reduction in the evaluation of the overall risk for the GB mainline railway. The new weightings support the objective of directing safety expenditure towards incidents which lead to higher levels of risk, while taking account of the more frequent but less severe minor injuries and shock/trauma incidents.

### Published

March 2008

### Current Position

The significant change from this project report’s findings, agreed and accepted by the RSSB Board in early 2008, was the introduction of the two weightings for shock/trauma (class 1 and class 2) and the revision of the weighting for non-reportable minor injuries. This work demonstrated that the move to revised ratios was valid. It informed the ‘Safety Decisions Programme’ and was included in the publication ‘Taking Safe Decisions’. For further information, please visit: [http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx](http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx)
Description

An investigation into the change in train drivers’ dynamic visual ability (DVA - the ability to detect visual details when moving) with age and train speed.

Abstract

This project, conducted by Human Engineering, investigated the effects of age on train driver visual ability (DVA). Previous research had shown that drivers have a reduced ability to detect or recognise a lineside object as the train speed increases. Static visual acuity has been well researched, and testing is widely practiced in driver medical assessment. However, it has not been understood whether it is necessary for the railway industry to assess drivers’ dynamic visual ability in addition to their static visual acuity, and how their dynamic visual ability may change with age. This project investigated the change in DVA with age, and explored the possibility of any coping strategies that may evolve with driver experience. This research could potentially have implications for driver training methods across the industry as well as for strategies on driver vision screening. The preliminary report is available on the RSSB website.

Published

November 2005

Current Position

This project was originated by the National SPAD Focus Group, now Operations Focus Group (OFG), at a time when SPADs were a principal topic. The idea at the time was to cover all the angles relating to SPADs and their possible causes. However, since that time the rate of SPADs has declined and the subject has dropped down the priority list. This project was, in essence, a feasibility study to identify how the issue could be explored further. OFG continues to keep SPAD rates and trends under continual review.
**T504  Investigation of Common Safety Methods**

<table>
<thead>
<tr>
<th>Description</th>
<th>Developing common safety methods that comply with the provisions of the European Safety Directive.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>This research was conducted by Backmans Verkstader, and jointly funded by RSSB along with the Swedish and Finnish rail administrations; it was aimed to develop common safety methods that comply with the provisions of the European Safety Directive. In particular, it assessed their conformity with the Common Safety Targets (CSTs), which define the minimum safety levels that must be reached by different parts of the railway system and by the system as a whole. The project offered a grounding in the concepts of risk assessment and risk tolerability, and contained detailed information on the approaches taken in Europe, to these concepts as at the time. The results of this project were submitted to the European Rail Agency (ERA) as an input to their work programme on the development of Common Safety Indicators (CSIs), Common Safety Methods, CSTs and Common Safety Methods (CSMs).</td>
</tr>
<tr>
<td>Published</td>
<td>November 2005</td>
</tr>
<tr>
<td>Current Position</td>
<td>The project report identified that the development of common safety methods should consider the following three aspects: the common safety targets; mechanisms that enable comparison between risk measures and risk acceptance criteria for those groups of people listed in the safety directive; the use of risk models, which provide a coherent framework for describing contributors to risk on a system level and thus allow all contributors to risk to be compared and consequences studied in a structured way. The project proposed that CSM should be based on the analysis of risk by accident type, with the possibility of further analysis by functions or hazards being incorporated. It provided a proposal on how accident types should be analysed, and how they can be combined with a hazard cause model. The project report was submitted to the ERA as an input to their work programme on the development of CSIs, CSTs, and CSMs and acted as a briefing document for GB Rail in their discussions with the ERA.</td>
</tr>
</tbody>
</table>
This work developed tools to support RSSB in preparing the annual Strategic Safety Plan for the national rail industry by using a ‘business case’ approach - making financial cases for how we manage safety and for implementing safety improvements.

RSSB now publishes an annual document known as the Strategic Safety Plan (SSP) for the national rail network. This document replaced the previous Railway Group Safety Plan. The SSP describes the nature of safety risk on the railway and the work being done to address this risk, demonstrating the commitment of the industry to ensuring that risk is reduced to levels that are ‘as low as reasonably practicable’ (ALARP). This research project has developed a prototype tool with the aim of augmenting RSSB’s expertise in risk modelling and cost-benefit analysis, to help deliver the annual SSP. This tool and the work that led to it was provided as an input to a wider programme of work that will support RSSB and the Safety Policy Group in the production of future SSPs.

The project helped to assess the potential impact of any proposed safety initiative by considering not only the safety related benefits, but also the associated performance and cost benefits.
### T 514  Development of supply chain approval processes in the rail industry

<table>
<thead>
<tr>
<th>Description</th>
<th>To support the supply chain approval working group by assisting in the development of system requirements, processes and governance documents.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>The Rail Industry Supplier Approval Scheme (RISAS) working group has developed the requirements and governing documentation of an approval process. The four key documents are: Principles of the Railway Industry Supplier Approval Scheme (formerly known as the Core Module), Arrangements for the Board of the Railway Industry Supplier Approval Scheme, Accreditation of Approval Bodies within the Railway Industry Supplier Approval Scheme, Railway Industry Supplier Approval Scheme Supplier Assessment Module. This project has supported the working group in developing the system requirements, processes and documentation. In turn this is expected to deliver safety and cost-efficiency benefits to the industry by reducing duplication in the auditing and assessment of suppliers of critical materials and services.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>July 2006</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The principal output from this project was the ‘Rail Industry Supplier Approval Scheme’ (RISAS) which was devised by a cross-industry working group and presented to, and endorsed by, the industry at a workshop in September 2005. This work built a consensus within the industry about what processes and documentation were required for the supplier approval scheme. It is expected to deliver safety and cost-efficiency benefits to the industry by reducing duplication in the auditing and assessment of suppliers of critical materials and services.</td>
</tr>
</tbody>
</table>
**Description**
Validating, testing and strengthening the spreadsheet-based societal concerns model in real focus group environments. The focus groups were run in two sets, one comprised of members of the general public and the other of industry members.

**Abstract**
The HSE guidance document Reducing Risks, Protecting People introduced the concept of ‘societal concern’ as a factor that the HSE concluded they would use in determining whether or not an organisation is managing safety appropriately ie it is a factor in determining whether risk is as low as reasonably practicable (ALARP). This idea has been taken forward by HMRI (now part of ORR) in their guidance on reasonable practicability. In response to this, RSSB commissioned Risk Solutions to carry out research into how evaluation of societal concerns could be incorporated into the railway industry’s safety decision-taking framework. The model developed in this study built on previous research done for HSE and helped gauge what the level of societal concern is for a particular issue, and could be used by the railway industry to compare and contrast societal concerns associated with different issues.

**Published**
January 2006

**Current Position**
This work built on [T244 A review of principles of decision-making in the rail industry](http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx) and developed a tool to model societal concerns. The industry’s current position on safety decision-making is set out in ‘Taking Safe Decisions’. For further information, please visit: [http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx](http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx)
### T518 Development of a web-based bibliography of railway research

**Description**  
This project developed a web-based bibliography of railway research ([www.railwayresearch.org](http://www.railwayresearch.org)). It fills an important gap in the dissemination of and access to railway research knowledge.

**Abstract**  
The railway is a complex system, and the railway industry can benefit from a wide range of different realms. There are many relevant academic and industry-based journals and numerous bodies and institutions carrying out relevant research. However, finding published material on railway research and development can be difficult largely because of this multiplicity of sources. This project provided a system to bring together information from different agencies and make it easily available through the Internet. The University of Birmingham, through Rail Research UK (RRUK) and on behalf of Rail Safety and Standards Board (RSSB), developed a searchable web-based bibliography of railway related references. The bibliography will contribute in reducing duplication of research effort and reduce the time and effort required in conducting railway related literature searches. To access the bibliography go to [www.railwayresearch.org](http://www.railwayresearch.org).

**Published**  
July 2006

**Current Position**  
The primary output of this project was a website-hosted searchable central database of railway research material. The project was delivered in two parts:

i. The first part developed and populated a searchable database.

ii. The second created a web service and web site, to extract and present the information from the database.

This work oversaw the development of a web-based software application with an underlying database used to record and access assessments carried out under the Rail Industry Supplier Accreditation Scheme (RISAS).

The RISAS was developed by a cross-industry working group. RISAS aims to provide economies of scale to the railway industry by reducing duplication in the auditing and assessment of suppliers of critical materials and services. Initially RISAS focused on the market for the overhaul of assets and components for trains. RISAS will help to ensure that suppliers of critical products to the railway industry have the right systems, processes, competence, resources, and procedures. It was designed to ensure that Railway Safety Case Duty Holders, and other customers such as rolling stock leasing companies (ROSCOs), are able to rely upon common third party assessments, by accredited railway industry supplier approval bodies (RISABs). These RISABs will assess the adequacy of key suppliers’ procedures, practices, and competence to manage risks which arise from the specialist nature of railway industry applications. RISABs will certify suppliers to deliver to the requirements of a specification. In response to the RISAS working group, comprised of industry stakeholders, the RSSB R&D programme developed a web-based software application with an underlying database. The RISAS process, supported by this application was presented to the industry at a seminar in May 2006 and was then launched live on the internet on 31 May 2006. The application and RISAS process can be accessed through www.risas-online.co.uk

The work on this project built on research project T514 Development of supply chain approval processes in the rail industry. At the request of the RISAS Working Group (which is comprised of industry stakeholders) RSSB developed a web based software application with an underlying database to record and access assessments carried out under the Rail Industry Supplier Accreditation Scheme (RISAS). The RISAS process, supported by this application, was presented to the industry at a seminar in May 2006 and was then launched live on the internet.
### T602 Developing method statements as a planning, work prioritisation, and task delivery tool

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>This project examined ways of improving the quality of information being presented in method statements, resulting in a new process and revised documentation.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>This work followed a number of serious accidents that called into question the quality and value of method statements. Through a series of stakeholder workshops, it was recognised that a multi-stage strategy would be required, to deliver a step-change improvement in the quality of information being presented to operatives at a worksite. A new process for creating method statements was developed, involving three types of document: a project level document, where the method statement requirements will be included in the existing Project Health and Safety Plan; a new site level document, called a Work Package Plan; and a new briefing level document, called a Task Briefing. The new documents will fulfil the needs of each of the three classes of method statement users identified: 1) project manager, programme manager and designated project engineer; 2) construction manager and site manager; and 3) on-site supervisor and worker.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>November 2006</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>A replacement for the existing method statement process was developed. The replacement process involved addressing the requirements of the method statements in three levels of document: 1. A project level document where the requirements are included in the existing project health and safety plan. 2. A site level document called a work package plan. 3. A briefing level document called a task briefing. The project was run in conjunction with the Network Rail Project Safety Liaison Group (PSLG) and its contractors. The new process was rolled out by Network Rail across its project activities under the banner of its 'Work Package Planning' initiative.</td>
</tr>
</tbody>
</table>
### Description
This research identified the likely effects of the common safety targets required by the European Safety Directive (2004/49/EC) upon the safety decision making processes of the GB railway, and provided guidance on how best to set and implement them.

### Abstract
The European Safety Directive (2004/49/EC) required the introduction of common safety targets related to the safety performance of European railways. Many texts on performance management present targets as an essential mechanism for driving improvement in performance. However, if media articles are to be believed, the introduction of targets in some other industries (for example the UK National Health Service) has also caused undesirable behaviour. This work established what constitutes good and bad practice in target setting both at the organisation and industry level. This has led to an understanding of the likely effects of the proposed European common safety targets on safety decision making in GB railways. This knowledge could be used to inform decision makers about how to work with targets, and, potentially, to influence debate at the European level. This work was presented to the Practitioner Working Group, the Risk Management Forum and the Safety Policy Group in 2008.

### Published
April 2008

### Current Position
Common Safety Targets (CSTs) set the minimum safety levels that must be achieved by the rail system. They were developed in two sets. The first set is to ensure that current safety performance is not reduced in any member state and will be defined in terms of a set of individual National Reference Values. These were adopted by the Commission in April 2009. From the experience gained with the first set, and reflecting any priority areas where it is determined that safety needs to be improved, a second set will be developed; these have to be adopted by the Commission by the end of April 2011. The report includes guidance on what makes a good performance indicator and target and is available for all those involved in working with the ERA on CSTs.
### Description
This project, and the parallel project T644, aimed to understand how safety risk, and the value of reducing it, is viewed as a function of the circumstances in which the risk arises.

### Abstract
The ‘value of preventing a fatality’ (VPF) is the generally accepted metric by which the safety benefit from proposed safety improvements are assessed as an aid to effective decision-making. This project tested the applicability of the VPF by exploring and comparing stakeholder views of risk reduction in a number of different scenarios. It was conducted in parallel with project T644 (Modelling Societal Concerns), using similar scenarios. The aim of both projects was to understand how safety risk, and the value of reducing it, is viewed by stakeholders. The findings of this project suggested that there is no case for saying that the prevention of a fatality in a multiple-fatality rail accident is different to the prevention of a single-fatality rail accident. This applied both to the case of a multiple-fatality accident resulting from signal failure and to a multiple-fatality accident involving a fire in a tunnel. This research informed the RSSB facilitated Safety Decisions Programme as to how issues around the VPF should be addressed by the industry.

### Published
November 2006

### Current Position
This project built on the foundations laid by research project T430 The Value of Preventing a Fatality (VPF), Phase 1 which clarified the meaning of the VPF, how it was derived and the ways in which it could be applied. This project helped the industry to understand how safety risk, and the value of reducing it, was viewed by stakeholders. In particular it addressed the issue of any differences in view that apply depending upon the circumstances in which the risk arises.
Description

The project developed the safety module for the DfT’s network modelling framework for input into the high level output specification (HLOS) process, based on the rail industry’s safety risk model, which is managed by RSSB.

Abstract

Under the Railways Act (2005), DfT and Transport Scotland must each publish a high level output specification (HLOS) that sets objectives for the rail industry in terms of network capacity, train frequencies, journey times and punctuality etc. To support this, DfT commissioned the network modelling framework (NMF), an integrated suite of models that predict demand, revenues, costs, punctuality and safety performance for different investment strategies. RSSB, with the support of Risk Solutions, developed the NMF Safety Module (version 1) for the DfT. The module is based on a simplified version of the industry’s safety risk model (SRM). A key difference from the SRM is that the NMF safety module calculated safety risk for the number of trains, train speed and passenger loading associated with each of Network Rail’s 300 strategic route sections (rather than for the national average train conditions represented in the SRM). This will enable DfT to quantify the safety implications of changes in train/loading patterns in a way consistent with the SRM but at a local level – allowing changes in safety risk to be considered in the appraisal of alternative investment strategies.

Published

September 2007

Current Position

The primary output of this project was a safety module for the NMF, an integrated suite of models commissioned by DfT to predict demand, revenues, costs, punctuality and safety performance for different investment strategies. DfT and Transport Scotland were provided with version 1 of the NMF safety model for inclusion into the NMF (Version 1.3). A continued relationship between DfT and Transport Scotland and RSSB risk experts will ensure that the model is maintained and updated in a structured environment. RSSB will retain sole responsibility for updating the NMF safety model in line with future versions of the SRM. Research project T760 ‘Update of the Network Modelling Framework Safety Model’ (published May 2009) has updated the model, collating the input files that DfT used to represent the final High Level Output Specification (HLOS) position.
# T623 Joint safety improvement planning - a feasibility study

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>The project developed and reviewed a process of route-based, joint safety improvement planning (JSIP) that shared characteristics with the joint performance improvement planning (JPIP) introduced in 2005.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>In the context of the rail industry Strategic Safety Plan (SSP), industry parties identified the need to develop the effectiveness of cooperative safety planning at local level, and to more accurately quantify the expected benefits of implementing the plans. The objective was that joint planning processes would inform duty holder plans, which could then be amalgamated into the industry’s SSP to create forecasts for risk trends at a national level. The project developed a process of route-based, safety improvement planning that shared characteristics with the joint performance improvement planning introduced in 2005. The new process was successfully trialled on one route and the outcomes were considered by the rail industry’s Safety Policy Group (SPG), which oversees development of the SSP. The most valuable ideas are being considered by SPG members as enhancements to the way that duty holders undertake safety planning.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>May 2007</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>This research project provided lessons from the trial of a joint planning process which supports industry safety planning processes. However, the SPG concluded that the emphasis should remain on the sharing of plans between duty holders rather than the production of joint plans and the aggregation of safety plans into the SSP.</td>
</tr>
</tbody>
</table>
T635 An analysis of formal inquiries and investigations to identify human factors issues

**Description**
This project has analysed data from formal inquiries and investigations to identify human factors issues and helped prioritise RSSB’s work programme on behalf of the industry in the human factors field.

**Abstract**
This project examined formal inquiry and investigation reports to identify human factors (HF) issues. The information populated a HF incident database and helped to prioritise RSSB’s work programme on behalf of the industry in the HF field. The industry’s safety data reporting, through the Safety Management Information System (SMIS) did not always describe the HF elements of accidents in sufficient detail for this purpose; however, formal inquiry and investigation reports provide a much richer picture. Work is under way to improve the use of SMIS in this respect, but it will take time to accumulate data and this project acknowledges the need to understand the HF issues in the near future. This project has analysed inquiry and investigation reports to meet the need for HF intelligence data across all cause types. Alongside the incident review RSSB has developed a training course on behalf of the industry to raise awareness of human factors, to aid the incident investigation process. The roll out of the training course fundamentally underpins this project and the benefits to the industry. Furthermore, this training will also support work being carried out under the SMIS Vision work package, which includes identification of methods to better capture HF causes of accidents. The ‘train the trainer’ courses were well received and a considerable number of industry members have taken responsibility for cascading the training to their own organisations.

**Published**
September 2009

**Current Position**
Following the initial work, the ATOC Driver Managers’ Group and the Driver Training Sub-group asked for a training course to be developed to help incident investigators and managers to better understand and manage human factors issues. The result is the Human Factors Awareness Course for Incident Investigators. Six ‘train the trainer’ sessions were held in 2009 to support its delivery across the industry. The training course was developed as a ‘resource kit’, containing a number of different tools and components that trainers can select and use as appropriate. It is a modular course, with a standard introduction and various modules that can be run together or as stand-alone training. For further information, please contact: enquiriedesk@rssb.co.uk
**T644 Modelling public attitudes to risk**

<table>
<thead>
<tr>
<th>Description</th>
<th>This project, and the parallel project T616, aimed to understand how safety risk, and the value of reducing it, is viewed as a function of the circumstances in which the risk arises.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>Within the context of the safety decisions programme which sought to develop industry principles and practice for safety decision making, rooted in sound research and industry agreement, one of the issues explored has been ‘societal concern’. The safety regulator recognises societal concern as an influence on its decision making. This project further developed and tested a model for evaluating public attitudes and determining whether it could be used to influence decision making. The development of the model originated in an earlier project (T517). Testing of the model structure found it to be robust and credible. The tool developed in this work was shown to have a number of potential uses to provide benefit in other business decisions.</td>
</tr>
<tr>
<td>Published</td>
<td>May 2009</td>
</tr>
<tr>
<td>Current Position</td>
<td>This research further developed and validated the societal concern model (initially developed by research project T517 Modelling ‘societal concerns’) for potential use by industry in addressing those business decisions where societal concern is a factor in decision-making. It was found that the model performed well and robustly across all the focus groups and provided input to the development of the ‘Taking Safe Decisions’ document. For further information, please visit: <a href="http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx">http://www.rssb.co.uk/SAFETY/Pages/SAFETYDECISIONMAKING.aspx</a></td>
</tr>
</tbody>
</table>
T677  Generating a train driver awareness campaign - FOCUS

**Description**
Following requests from a number of operators, via the ATOC Driver Manager’s Group, this work was commissioned to ‘convert’ previous research information into a presentation that is able to be delivered to drivers, backed up by a booklet and promotional posters with the common theme of ‘FOCUS’.

**Abstract**
This project extracted information from a number of research projects previously undertaken and published by RSSB, about issues identified by the former ATOC Driver Managers’ Group. It addressed the need to present their findings to train drivers in an appropriate style and format. The previous research identified the need to raise awareness in a number of key safety critical areas relating to driver concentration, attention, and distraction. RSSB Human Factors and Research and Development departments undertook a systematic review of the research which had already been published in these areas, and identified the content for the communication tools to help the industry tackle the reported problems. This project covers the production of tools which include: a presentation, Managers’ Notes, a drivers’ booklet, and campaign posters. These communication tools have been designed to engage with the target audience (drivers and managers) and aim: to increase drivers’ situation awareness; and to raise awareness of the dangers relating to losing concentration and/or being distracted. In addition the tools will communicate techniques that drivers and their managers can use to raise their awareness and concentration levels, and remain ‘FOCUSED’.

**Published**
December 2007

**Current Position**
The primary output from this project was a set of new training resources, designed to help train drivers maintain attention and avoid distractions. The resources include a training course and training notes, designed specifically for trainers to deliver thought-provoking messages. In addition, a drivers’ booklet has been produced to serve as a reminder of the presentation’s key points, and a handy aide memoire on situation awareness. For further information and to request materials, please visit: [www.opsweb.co.uk](http://www.opsweb.co.uk)
### T684 Benchmarking rail approval costs

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>Defining optimal approvals practices, to determine if and how the integrity, timescale and cost of approvals in the GB railway industry could be improved.</th>
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</thead>
<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>There is an opinion within the GB rail industry, particularly amongst manufacturers, that the costs of approvals in GB are much higher than elsewhere. A great deal of expense relating to the approvals process is believed to be attributable to unnecessary, multiple approvals taking place in certain areas within the industry. There is a view that approval of any item, should take you to the point where further approvals are not necessary. This project seeks to investigate good practice in approvals processes, with a view to adopting those practices if they could help to optimise the integrity, timescale and cost to the GB railway industry. The first stage, to identify the true cost of approvals for GB railways, is currently under way. The second stage, if approved, will be to move the industry towards best practice approvals processes.</td>
</tr>
<tr>
<td><strong>Published</strong></td>
<td>November 2009</td>
</tr>
<tr>
<td><strong>Current Position</strong></td>
<td>The findings from this survey conclude that, in the area of signal interlockings, the cost of approvals does not appear to be greater than is necessary, bearing in mind the GB legal historical and commercial environment. The report summarises the interviews and explains how this conclusion was reached but does not explore whether the process costs could be reduced. One finding was that it would not be appropriate to apply these findings to other areas of approvals, because of the particular nature of the processes that support interlocking approvals. However, the interviews also brought to light that the GB approvals regime, while complex and often costly, is increasingly respected because of its rigour. Examples were found where suppliers choose the GB system for their initial approvals because they can more readily be recognised overseas. On the basis of these findings, the steering group considered that the initial remit had been fulfilled – to establish whether approval costs are more than elsewhere – but this conclusion is only clearly valid for Interlockings.</td>
</tr>
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</table>
**Description**  
RSSB and Loughborough University collected anthropometric data from 100 train drivers across Britain and measured a Class 43 train cab to establish a 3D data protocol to improve cab design and assessment.

**Abstract**  
RSSB has developed RGS GM/RT2161 to include best practice in human factors design. To support this aim RSSB purchased a design package called ‘Sammie CAD’ to enable existing (and future) train cabs to be modelled and assessed in terms of their suitability for use by the train driving population in Britain. To prove the use of the tool in the industry anthropometric data from 100 train drivers, located at four sites across Britain, was collected and a Class 43 train cab was measured to provide a case study to establish a 3D data protocol. The tool was shown to be of value in proving cab designs on the drawing board and the anthropomorphic data is now available to the industry. Recommendations were also made that should be considered in any review of GM/RT2161 Requirements for Driving Cabs of Railway Vehicles and any supporting Code of Practice.

**Published**  
February 2008

**Current Position**  
The tool was shown to be of value in proving cab designs on the drawing board and the anthropomorphic data is now available to the industry. Recommendations were also made that should be considered in any review of GM/RT2161 Requirements for Driving Cabs of Railway Vehicles and any supporting Code of Practice.
# T760 Update of the network modelling framework safety model

| **Description** | To update the network modelling framework (NMF) safety model developed originally by project T622, collating the input files that Department for Transport used to represent the final High Level Output Specification (HLOS) position. |
| **Abstract** | Under the Railways Act, Department for Transport (DfT) and Transport Scotland must each publish a High Level Output Specification (HLOS) that sets objectives for the rail industry in terms of network capacity, train frequencies, journey times and punctuality etc. To support this, DfT commissioned the Network Modelling Framework (NMF), an integrated suite of models that predict demand, revenues, costs, punctuality and safety performance for different investment strategies. RSSB, with the support of Risk Solutions developed the NMF Safety Model (version 1) for the DfT under project T622. The model is based on a simplified version of the industry’s safety risk model (SRM). This project (T760) suggested to update the NMF safety model, taking into account the input files which the DfT used to represent the final HLOS position. This work compared the freight services file against the freight growth assumptions in the HLOS, reviewed the SRM loading assumptions against the NMF analysis and undertook a sensitivity analysis of the updated NMF Safety Model. |
| **Published** | May 2009 |
| **Current Position** | This research established a complete set of data files for the NMF Safety Model that are consistent with the published High Level Output Specification (HLOS). This data has then been used within RSSB to improve the assumptions used in the safety risk model (SRM) version 6. The research has also verified the robustness of the results from the NMF safety module, through sensitivity analysis, and suggested some possible improvements and extensions to the model. RSSB is currently investigating ways of building on this research, and developing an improved NMF safety module for predictive modelling of different investment strategies for Control Period 5. |
This research has reviewed supplier assurance arrangements across the rail industry. It has identified significant potential improvements that could be achieved by the development of a supplier assurance framework, which allows suppliers to readily understand the mainline railway industry requirements and demonstrate this through universally recognised evidence and processes.

The Rail Industry Supplier Approval Scheme (RISAS) started in 2006 had been in place for some three years. Designed to provide economies to the rail industry by reducing duplication of the auditing and assessment of suppliers, it was one of many in-house and industry-wide schemes in use. The potential of RISAS had not yet been achieved, so the industry asked RSSB to identify where efficiencies could be found and more effective practices implemented that would allow the industry to benefit from the potential savings to be made. The main aims of this project were to: identify the costs involved in compliance within the industry’s various schemes; identify where duplication could be removed and existing schemes and processes could be made more efficient; identify what potential cost benefits could be realised by the industry; Identify other potential benefits to assist in building a sustainable supply chain for the future. This project produced a report that identified the potential savings available to the industry; the actions needed to realise them; and the barriers to achieving those savings. The report also prioritised the improvement opportunities in terms of realisable benefits. A significant opportunity can be seen in reducing the number of assurance process stages that suppliers have to go through. This could be done by using a common, risk-based approach, and/or by wider recognition of existing assurance scheme compliance activities. This work has been the first stage in a larger process and provided the evidence for the industry to decide how the next steps can be implemented, and savings start to be realised, by the Supplier Assurance working group.
**T833**  A review of potential efficiency and effectiveness improvements in rail industry supplier assurance  *cont.*

<table>
<thead>
<tr>
<th>Published</th>
<th>April 2009</th>
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<tbody>
<tr>
<td><strong>Current Position</strong></td>
<td>The total cost expended in the GB rail industry in supplier assurance was estimated to be £90m to £100m per year, made up of ~1000 person years of effort and direct costs. The study identified a realistic saving of £35m per year. The research findings were utilised in a paper submitted to and agreed by the Board of RSSB as justification for a specific project to develop an efficient and effective supplier assurance framework for the mainline rail industry in Great Britain which is being developed with support from research project <strong>T908 Developing the supplier assurance framework.</strong></td>
</tr>
</tbody>
</table>
# T880 SMIS Vision development

**Description**

This work provided a researched feasibility report to the Safety Management Information System Programme Board to support and initiate a major programme to upgrade and enhance the system.

**Abstract**

The Safety Management Information System (SMIS) is the industry’s national safety recording system and is used by all duty holders to record all safety related accidents and incidents that occur on Network Rail managed infrastructure. Access to good quality safety knowledge and intelligence data is vital in assisting the industry to implement action plans and projects that reduce the number of safety incidents that occur. The SMIS Programme Board asked RSSB to initiate a two year programme to upgrade and enhance SMIS. The programme, known as SMIS Vision, will answer the questions raised by stakeholders during a SMIS workshop held in August 2007. The end goal is to develop SMIS so that it can assist the industry by becoming a learning tool, as well as providing the means for industry to easily view, analyse and extract safety data knowledge and intelligence. The expected benefits from the project are: senior managers and safety analysts will be able to easily view, analyse, and extract validated safety knowledge and intelligence data from one source; enhanced access to good quality safety knowledge and intelligence; potential productivity benefits for the industry, by linking SMIS with Network Rail’s Control Centre Incident Logging system. The research enabled the SMIS Programme Board to identify the financial and time implications of SMIS Vision and initiate the next steps for SMIS 9.

**Published**

January 2010

**Current Position**

Following a review of the feasibility study and business case, the SMIS board has determined what work should be done as the next phase of this project, and SMIS 9 was implemented in the first half of 2010.
This research built on the success of the national incident reporting system, ‘NIR-Online’ (www.nir-online.net) and developed a new web-based front end which provides access to new modules of the safety reporting system.

The rail industry has a number of safety reporting systems. Generally these are related to individual Railway Group Standards (RGS) which are themselves aligned to engineering or operating disciplines. In 2006, the national incident reporting system for RGS GE/RT 8250 Reporting High Risk Defects was converted from a fax- and paper-based system into ‘NIR Online’ which is web-based. This allows urgent safety related reports on rail vehicle faults to be disseminated quickly to fleet engineers and for their responses and actions to be recorded and shared. Network Rail has now funded, developed and implemented a similar system for RGS GE/RT 3350 Communication of Urgent Operating Advice which covers operating incidents. The opportunity has been taken to develop and implement a user interface which would give a common way into the industry’s safety reporting system. Once in the system, users can specify which type of report they wish to make or review and the system then leads them into the appropriate sub system which might be the existing ‘NIR Online’ site, the newly introduced GE/RT 3350 system or future modules. The new Rail Notices system (www.railnotices.net) will encourage the timely and efficient reporting of these events with the opportunity for the industry to learn and avoid events being repeated through lack of appropriate dissemination. The RSSB element of this project was sponsored by Safety Policy Group.

Published

June 2010
The application was launched in October 2009 and the tool went ‘live’ in January 2010. A research brief was published on the RSSB website in June 2010.

For further details please visit:

www.railnotices.net
# SPRM projects in progress

**T270  Enhancement of the HEART human error qualification technique for use in the rail industry**

<table>
<thead>
<tr>
<th>Description</th>
<th>The aim of this research is to develop a process to support human error quantification in railway assessments for train drivers using the Human Error Assessment and Reduction Technique (HEART).</th>
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<tbody>
<tr>
<td>Abstract</td>
<td>The objective of the project was to produce a railway-specific human reliability assessment (HRA) tool to enable HRA to be carried out more efficiently, more accurately, and with more consistency within the rail industry. At present there are over 70 HRA methodologies covering a range of industries. The HEART methodology is a cross-sector tool that is applicable to any domain and has been successfully applied in the rail industry. Stakeholders, such as Network Rail, proposed that the valuable information accumulated from previous phases of this project be used in an adapted version of the HEART methodology. As part of Phase 5 of this work, an integrated guidance document will be produced to show how HRA should be carried out within the rail industry and how to use the developed HEART approach. The project will improve the quality and efficiency of the assessment of train driver error in existing and future systems. This should assist in the predictive assessment of risk in the context of train driving, with subsequent support to industry safety and potentially productivity. The principal client group for this research is the Safety Policy Group.</td>
</tr>
<tr>
<td>Published</td>
<td>Next phase due for publication May 2011</td>
</tr>
<tr>
<td>Current Position</td>
<td>In progress. Previous phases have been successfully completed and published. It is estimated that the phase 5 report will be published in May 2011.</td>
</tr>
</tbody>
</table>
The development of overarching Safety Management System guidance and good practice; which will provide practical and useful support to industry when developing, implementing, and maintaining an SMS.

For some time now, there has been an ongoing debate within Europe concerning the European Rail Agency proposal for the development of a European SMS Standard which would define a common framework for how safety management systems should be developed across member states. This has prompted the industry to work for the development of high-level SMS guidance sharing good practice, to prepare GB rail by informing the development of the forthcoming European SMS Standard and any associated guidance that may follow. The output of this work will provide industry with practical and non-prescriptive guidance and good practice, which will assist organisations with the development of, and continuous improvement to, their safety management systems. This work will be completed in two distinct stages. Stage 1 will focus on providing high-level guidance at the overarching SMS level; Stage 2 will concentrate on the specific sub-level SMS processes and procedures. The development of non-prescriptive SMS guidance and sharing of good practice has the potential to benefit the industry in two respects: to support the continuous development of high quality safety management systems within Britain, and to influence the debate around the shape of the European Standard. There are four key areas where benefits from this project could be seen: cost saving, increasing productivity, increasing revenues, and environmental benefits.

Due for publication December 2010

In progress
### Description
Recent work highlighted a need for the effective deployment of leading and lagging indicators in managing safety. This research explored the development, application, and potential benefits of their use in the railway.

### Abstract
The railway industry relies heavily on failure and incident data to monitor safety performance. Such measures are often referred to as ‘lagging’ indicators. The consequence of this approach is that improvements or changes are only determined after something has gone wrong. Modern safety management practice is for hazards to be managed proactively. Information is also needed to confirm that critical risk controls are in place and are being carried out effectively. These measures are often referred to as ‘leading’ indicators. Progress in the practical application of the theoretical concepts is advancing due to the increased focus resulting from the recommendations of the Baker Report into the Texas City oil refinery accident. In the UK the HSE has published guidance HSG254 on the development of process safety indicators for major hazards industries. This research is exploring the use of leading and lagging indicators in the rail industry and will deliver a guidance note on their application for the rail industry. The potential benefits of this research arise from increased use of active safety performance measures; improved use (for safety purposes) of information collected for other reasons, such as reliability information; and better targeting of safety information.

### Published
Due for publication January 2011

### Current Position
In progress
This research is developing the next generation of signal overrun assessment tools based upon Network Rail’s Layout Risk Method and its Signal Assessment Tool.

The Layout Risk Method (LRM) was developed by Railtrack (now Network Rail) in response to an accident at Newton in 1991. The last version of the LRM (v5) was developed in 2002 and included the predicted effects of TPWS on the frequency and consequence of collisions. Although the LRM tool itself is no longer used, some of the research around developing the LRM methods, T272 ‘Layout Risk Methods Phase 2’, has been reused in other tools, in particular Network Rail’s signal assessment tool (SAT). This research project is designed to review and update some of this research, taking into account the changes in driver behaviour over the last five years. The intention is that this research will be applicable to the next generation of signal overrun assessment tools that is being developed by Network Rail for implementation in 2010. The main benefits from this project will come from greater accuracy and consistency of risk assessments across the rail industry.

Due for publication November 2010

In progress
<table>
<thead>
<tr>
<th>Description</th>
<th>Improving the efficiency and effectiveness of supplier assurance processes and schemes to provide the rail industry an opportunity to save an estimated £35m annually by reducing duplication and avoidable waste.</th>
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<tbody>
<tr>
<td>Abstract</td>
<td>This research takes forward the outputs of T833 ‘A review of potential efficiency and effectiveness improvements in rail industry supplier assurance’. The T833 report recognised an opportunity to save the GB rail industry an estimated £35m annually. The industry subsequently established the Supplier Assurance Sponsor Group (SASG) to fulfil its vision of establishing a world class, industry-wide supplier assurance framework that would enable customers and suppliers to achieve their full potential. The SASG is overseeing this research, which is examining current rail assurance processes and evaluating the best practices from other industries. A process of re-engineering current schemes will be undertaken and a best practice model/framework will be proposed. The T833 report highlighted the potential for cost savings of between 5%-20% in industry procurement by reviewing efficiency opportunities, in addition to a further 20%-50% from effectiveness opportunities across all schemes and processes. The research will support the industry in building a sustainable supply chain process for the future.</td>
</tr>
<tr>
<td>Published</td>
<td>Due for publication May 2011</td>
</tr>
<tr>
<td>Current Position</td>
<td>Several key deliverables have been produced and a project website has been set up. For further information, please visit: <a href="http://www.rssb-safp.com">www.rssb-safp.com</a></td>
</tr>
</tbody>
</table>
Where can I find research?

www.rssb-safp.com
Where can I find research?

All the research outputs that have been published since RSSB began its programme can be found at ‘Research Topics and Projects’:

http://www.rssb.co.uk/RESEARCH/Pages/Research-andDevelopmentTool.aspx

We suggest you filter your search by selecting the SPRM topic area from the pick-list, then scroll down to the bottom of the page for the most recent projects.

If you know the reference number for the project – eg TXXX – you can use the ‘search projects’ facility on the left of the page.

The previous pages in this booklet contain listings of the published and current SPRM projects – correct at the time of publication.

We hope this helps you find the information that is most relevant to you.

If you can’t find what you’re looking for, please contact us at enquirydesk@rssb.co.uk
Each project has a research brief that provides a concise summary.

The full report can be downloaded to drill down to more detail.
More Information

The RSSB R&D e-newsletter is an email bulletin that keeps the industry updated on the latest research projects to be started or published.
To view the most recent edition and to sign up for your own copy, visit:
http://www.rssb.co.uk/RESEARCH/Pages/RANDDE-NEWSLETTER.aspx

If you have enquiries about research – contact the RSSB Enquiries Desk – enquirydesk@rssb.co.uk, tel 020 3142 5400

Annual safety performance report

RSSB’s Annual Safety Performance Report (ASPR) examines the range of risk experienced by passengers, the railway workforce and members of the public, before considering areas that affect us all: train accidents and road-rail interface. We have also included chapters on progress against the Strategic Safety Plan trajectories and other targets, benchmarking railway performance and data quality. For further information, please visit:
http://www.rssb.co.uk/SPR/REPORTS/Pages/default.aspx
Industry shared risk database

The Industry Shared Risk Database identifies shared risk areas which require a collaborative approach to risk control, clarifying the types of operators involved and suggests the most likely duty holder responsible for each main risk area. This database provides industry with a simple user friendly resource which

• Identifies shared risk that affect more than one duty holder

• Clarifies responsibility for each shared risk across 3 stages of accident causation & loss mitigation (Hazard Prevention, Event Prevention and Loss Mitigation)

• Identifies likely control measures

• Provides links to supporting documentation for each control measure to provide guidance on the management of shared risk

For further information or to create an account, please visit: www.isrd.rssb.co.uk