The Layout Risk Method (LRM) was first developed by Railtrack in response to the accident at Newton in 1991, and the last version was developed in 2002. Although the LRM tool is no longer used, some of the research that went into developing it has been reused in other industry risk tools, in particular Network Rail's signal assessment tool (SAT).

This research project has reviewed and updated some of the LRM research, taking into account the changes in the industry SPAD profile in the last five years, and also industry's improved understanding of various aspects of SPADs. The objective of the work has been to allow RSSB, and the industry in general, to develop an improved understanding of signal overrun risk and train collision consequence modelling. In particular, the research is applicable to the next generation of signal overrun assessment tool (SORAT) that is being developed for implementation in 2011.

In addition to supporting the SORAT development project, the outputs of this research project has benefits in improving the accuracy of other SPAD risk assessment work and collision consequence modelling, resulting in greater accuracy and consistency of risk assessments across the rail industry. Where possible the information derived by this project will be incorporated in future developments of the RSSB Safety Risk Model, especially as part of investigation into new simulation modelling techniques. The project results will also be reviewed in the context of future enhancements and revisions of the SPAD Risk Ranking methodology.

The work was arranged around the following basic objectives:

- Review and update of the Variable SPAD Probability Model (VariSPAD) currently used in Network Rail's signal assessment tool.
- Development of SPAD scenarios for use in SPAD data analysis and assessments (eg, the next generation of signal overrun assessment tool, SORAT).
Analysis of SPAD incidents to facilitate signal overrun assessments
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- Review and analysis of latest SPAD incident data.
- Review and development of the Accident Consequence Model (ACM).

Deliverables

This research project produced a range of deliverables presented in the form of a final report, with associated data and spreadsheets for use in further analysis. The following is a summary of the main deliverables.

- As part of the review of the current VariSPAD questions in the Variable SPAD Probability Model the opportunity was taken to extend the set of underlying checklist prompt questions, to make it more comprehensive.
- A new set of SPAD scenarios was developed for use in SPAD analysis and particularly as an input for the development of the SORAT.
- Following analysis of recent SPAD data, an average national profile of the SPAD scenarios was developed; as well as a comprehensive SPAD dataset for use in SORAT and other SPAD assessment activities.
- A set of SPAD probability weighting factors, or 'comparative likelihood factors', was developed for each of the VariSPAD likelihood modifying factors in each of the different SPAD scenarios.
- The research project resulted in review and improved understanding of the Accident Consequence Model. A lookup table was produced which combines consequence results for all ACM collision scenarios with closing speeds in the range of 0-240 mph.
- A list of 'consequence modifiers' was developed which can be used to account for the effects of certain railway features in the collision model, such as tunnels, bridges, stations, etc.

Benefits

Many of the deliverables from this research project will have a direct and immediate use in the development of algorithms for the industry's new signal overrun assessment tool that is being developed by Network Rail on behalf of the industry. The use of SORAT will lead to improved efficiency in calculating signal overrun risk assessments, for example in re-signalling projects, as well as allowing greater accuracy in understanding the geographical distribution of signal overrun risk. The more accurate risk figures will allow improved targeting of risk control
measures, more efficient allocation of resources, and a cost-effective reduction of signal overrun risk.

The project output has also resulted in an improved understanding of the causes and consequences of SPADs, which can be used in other industry assessment activities, such as the RSSB Safety Risk Model and the industry’s SPAD Risk Ranking methodology. Both of these tools are maintained, and regularly reviewed and updated, by RSSB on behalf of the GB rail industry, and, as such, the results of this research project will enable improved accuracy of these methods based on latest data. The new analysis results and associated data can also be used by RSSB to investigate better and novel ways of modelling aspects of SPAD risk.

The review and enhancement of the ACM will feed directly into the development of SORAT. It will also provide a platform for improved accident consequence modelling in other areas. With the knowledge gained in the review of the ACM it will now be possible to make future enhancements to it and the data it produces, such as, for instance, the modelling of new rolling stock types, to improve the accuracy of collision modelling results.

The full report is available to RSSB members and can be ordered through enquirydesk@rssb.co.uk.

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