Railway networks are a vital part of many economies, playing a critical role in public transportation and also allowing for rapid, cost-effective movement of freight. Demands for increased levels of efficiency from the rail industry inevitably lead to a requirement for increased utilisation of the railway. Trains are becoming faster and heavier, and hence the capacity for transporting both goods and passengers is increasing. However, this places a significant burden on an ageing railway network. Increased usage brings an increase in the level of asset deterioration. Add to this the fact that the number of opportunities to perform maintenance falls as usage rises, and the available maintenance windows become shorter and the achievement of acceptable levels of performance within the network becomes a major challenge. Clearly, the reliability of the various assets within the network is key to ensuring the efficiency and reliability of rail services. From day to day, passenger discomfort and inconvenience and customer dissatisfaction are perhaps the major measures of network performance. However, the consequences of unreliability can be far more severe than simple disruption or loss of service. History gives many examples of the potential for catastrophe with significant loss of life. Therefore, it is vitally important that future rail systems are designed with safety and reliability in mind, and that tools are available to accurately model the reliability, risk and safety associated with the various elements of the railway network. These tools will be vital for evaluating network performance and for providing information to support reasoned, objective decision making in the design, operation and maintenance of the railway. This special section contains a number of articles that are focussed on railway risk and reliability.

The article by Parkinson offers a perspective on risk assessment and risk acceptance in the railway industry. The article by Aguirre et al. considers how to account for human reliability in the analysis of a railway system. A method is presented that can be used to take account of human, organisational and technical factors in the risk analysis of railway systems. The authors propose a combined fault tree and evidential network model and demonstrate the use of the model through application to a potential accident scenario. Balaji Rao et al. present a procedure for estimating the probabilistic fatigue life of steel plate railway bridge girders. Two case studies are presented and the use of the results in evaluating network performance is discussed. Schaebe and Braband perform a critical analysis of an approach used by the European Railway Agency to monitor the performance of railways in the European Union member states. The article by Bouillaut et al. proposes a decision support tool to evaluate, compare and optimise maintenance strategies. The developed model takes a modular, Bayesian network approach, and is focussed on the prevention and detection of broken rails in a metro network. Together, these articles provide an insight into some of the latest developments in the field of railway risk and reliability.

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