Safety Management System

CASE STUDY

Overview

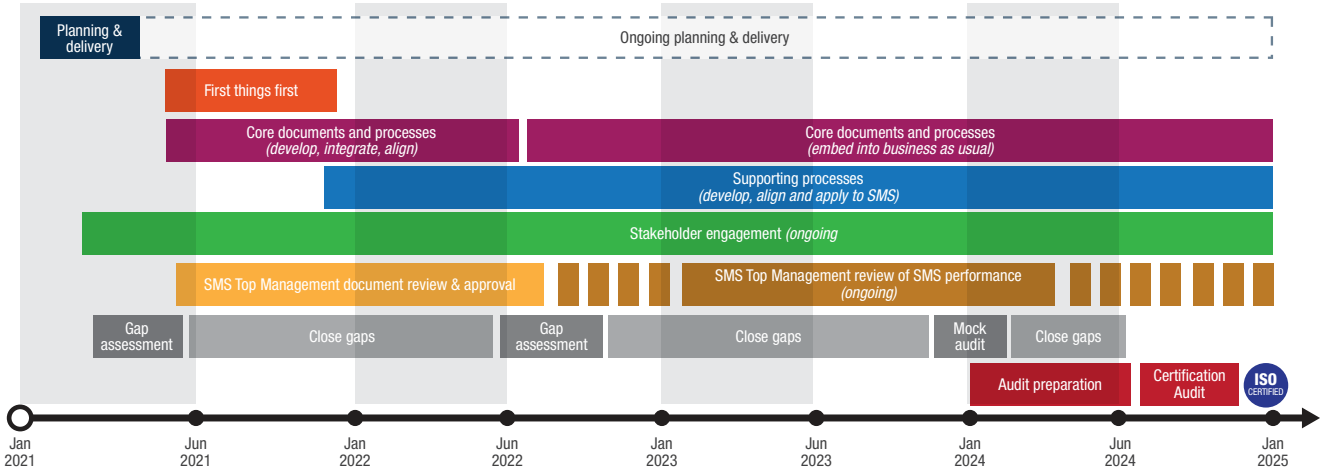
Since 2003 Vertex has provided support to develop many Safety Management Systems to both owners and operators of fixed infrastructure and rolling stock in Europe, Australia and North America.

Our output has been provided in accordance with industry best practise and both generic and rail related standards such as the current UK Regulations, EU Commission Implementing Regulations, ISO55001 and 45001, European Norms for rail such as EN50126, EN50129 and Technical Specifications for Interoperability.

We provide the complete solution from the development of the safety management system to critical review and project hand back, aligned as necessary with processes such as ISO55001 and 45001 following the Plan, Do, Check, Act methodology. You will see in this case study a number of process diagrams taken from our proprietary models and recent projects that describe how the Plan, Do, Check, Act process is applied to both Safety and Asset Management Systems. Vertex capability also enables it to undertake the work under challenging timescales, this was the case for several the examples detailed.

This case study also details our Asset Intensive Business Architecture (AIBA) tool which is used to assess organisations management systems against requirements such as Safety Management Systems. The tool is also used to benchmark organisations against other comparable operators and industries, and for rail includes benchmark data for many of the world leading operators.

Example plan for a Safety Managemet System and certification to ISO45001.



Planning & Delivery

- ISO core team
- Consultant support
- ISO work plan
- ISO work plan monitoring
- ISO clause owners
- Gap closure plans
- Stakeholder plans
- Org. Change Management

First things first

- Organisational and stakeholder assessment (4.1, 4.2)
- SMS Scope (4.3)
- SMS Top Management group (5.1)
- SMS Governance (5.3)
- SMS roles (5.3)
- SMS working group (5.3)

Core documents and processes

- SMS Policy (5.2)
- HAzards, risks and plans to address (6.1)
- Safety objectives and plans to achieve (6.2)
- Hazard elimination & risk reduction (8.12)
- Management of change (8.13)
- Emergency Management (8.2)
- SMS performance evaluation (9.1)
- Management review (9.3)
- Corrective action (10.2)
- Continual improvement (10.3)

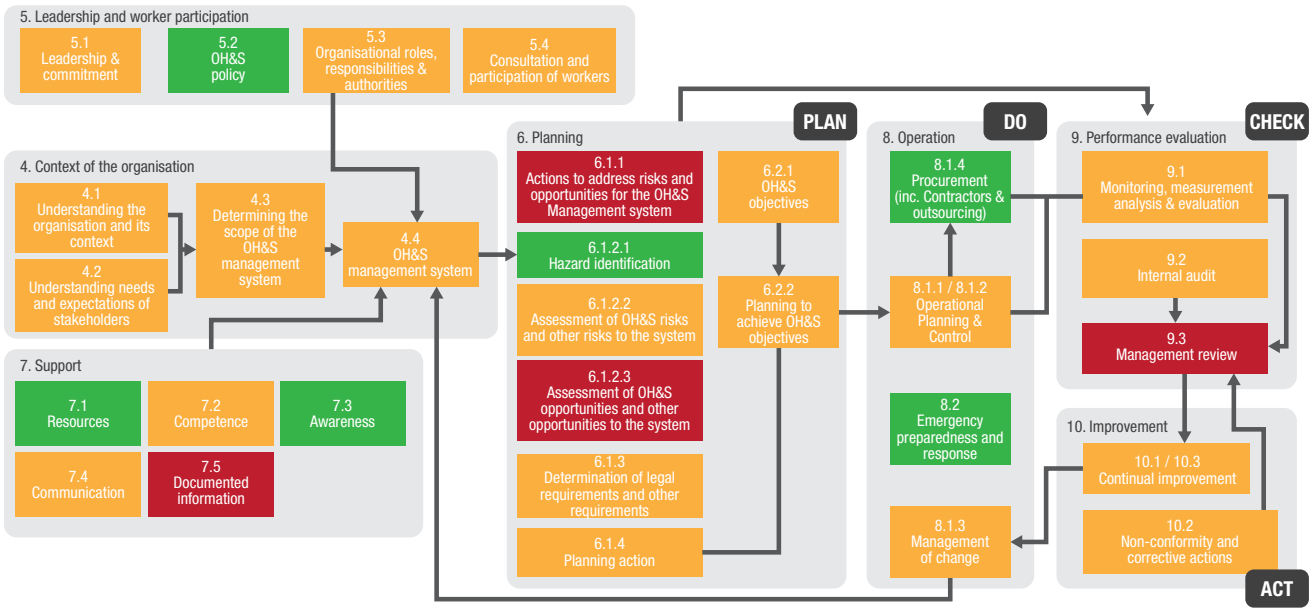
Supporting processes

- Enterprise risk framework (6.1)
- Workforce planning (7.1)
- Competence development (7.2)
- Awareness & communications (7.3, 7.4)
- Document information controls (7.5)
- Configuration change boards (8.1.3)
- Procurement and outsourcing (8.1.4)
- Business intelligence / MBR (9.1)
- Intenal audit (9.2)

Stakeholder engagement

- Asset Management (incl. AMF)
- Audit
- CIO
- Communications
- DECM / PSO
- Finance (incl. procurement)
- HR
- Operations
- PEPD (incl. ESMS)
- Procurement
- Risk
- Stragegic Business Office

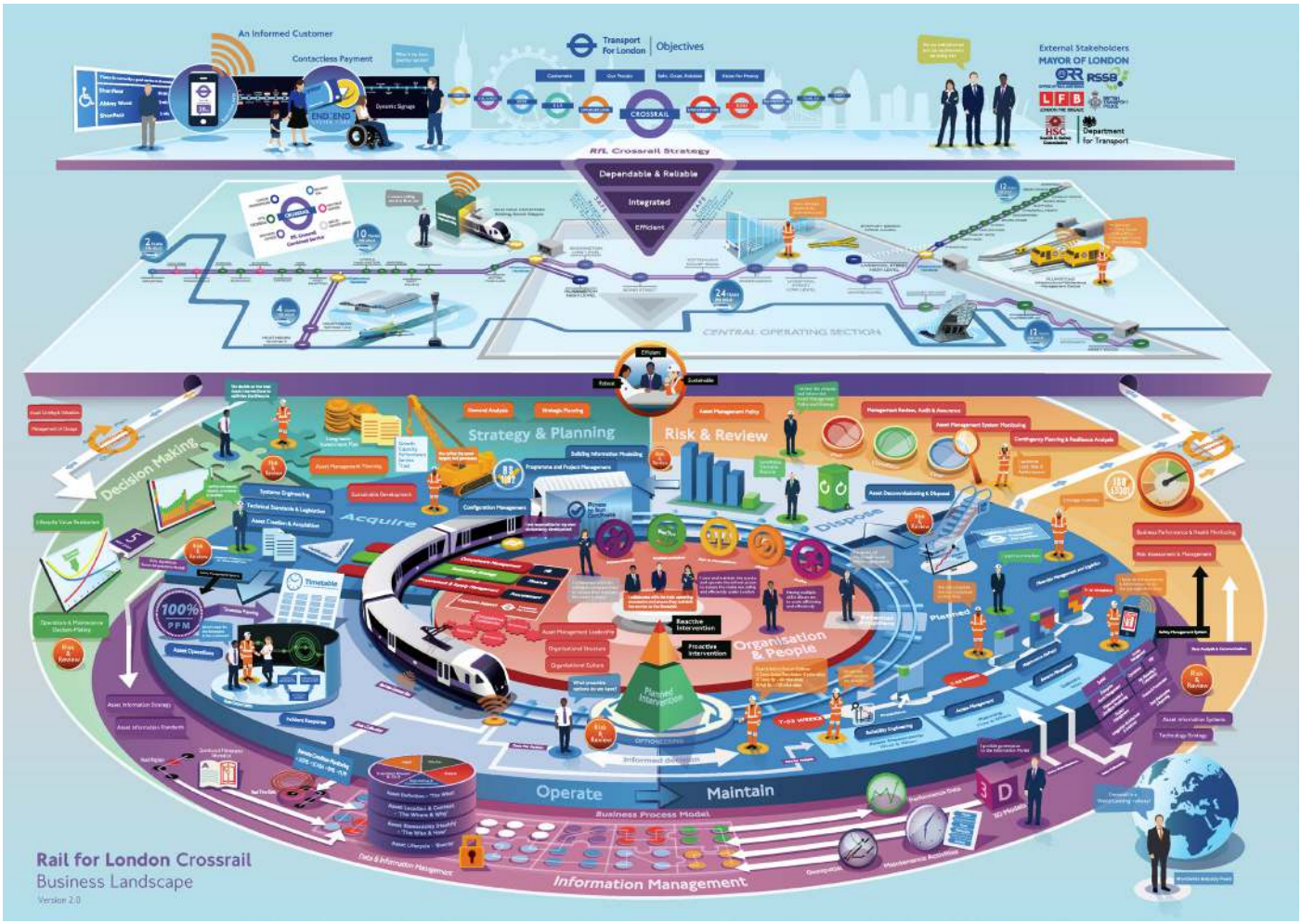
Example of how the Plan, Do, Check, Act has been applied for a recent rail client organisation.



We have supported all sizes and types of rail businesses, from national operators to train service operators to equipment suppliers to small organisations. We always apply the same principals of sound management and common sense to our works, backed up by our significant depth of railway operation, maintenance and major to minor new works experience. A management system must be something which adds real value to a business and that can work on an everyday basis – this is what we provide. We adapt how we use our gap analysis tools and experience to match the client's needs, for example there is a clear difference between the needs of a new operator that has to provide its Safety Management System for approval by a regulator to a single train operator that is undertaking recertification. Examples are where we adapted a passenger train operator existing Safety Management System to include authorisation to undertake infrastructure change, to the adaption of Network Rail and the majority of UK train operators SMS to enable the fitting of Fugro RILA to passenger trains.

Below is a summary of recent and current projects Vertex is providing Safety Engineering support. A number of these have been in progress since the worldwide Covid -19 pandemic started early 2020. Vertex has adapted its working practices to ensure all deliverables are provided even though face to face working is not possible.

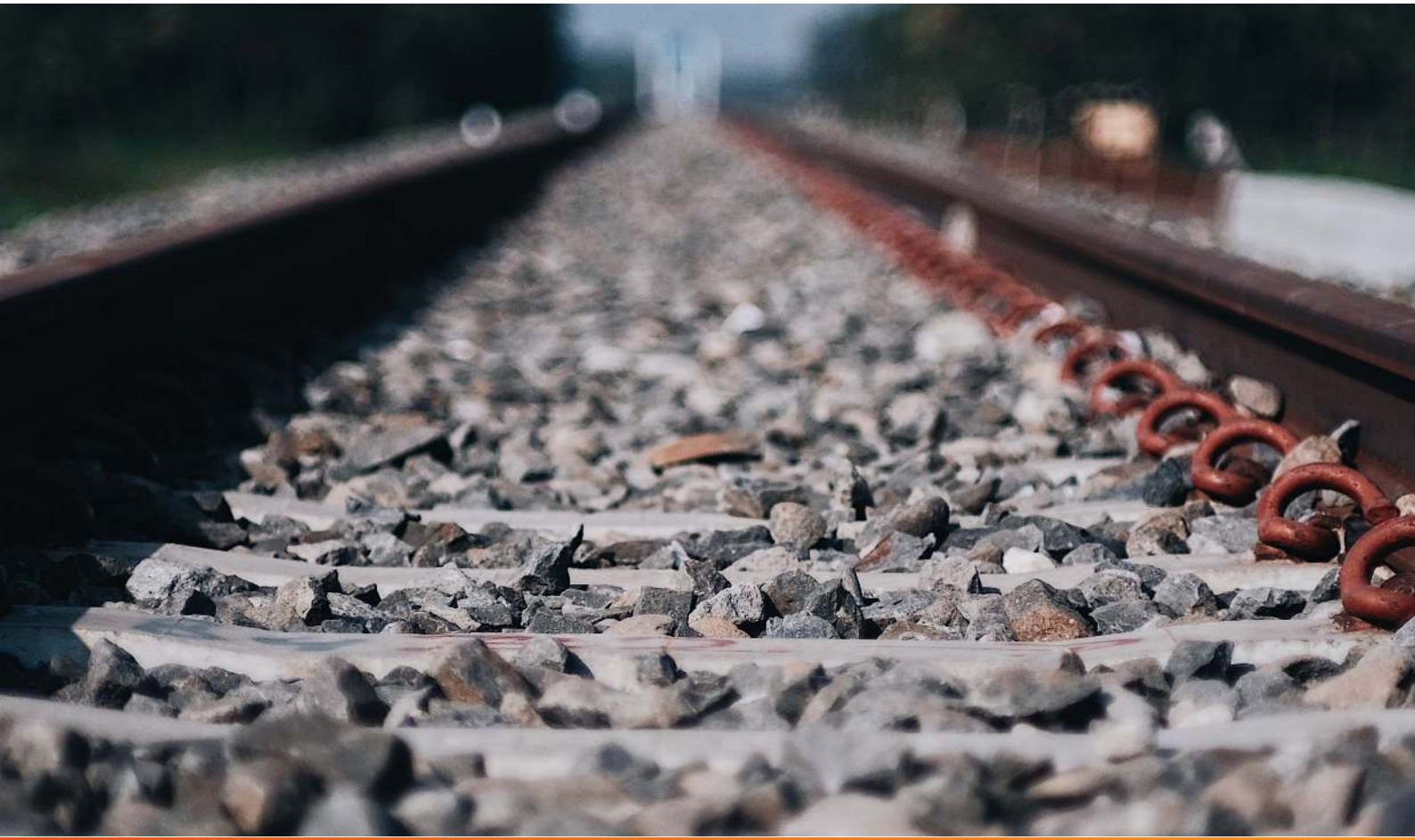
Railway / Organization / Process	Project Summary
Australian Rail Track Corporation	Freight and passenger operations, major shutdown process, Safety Management System.
Common Safety Method and Engineering Safety Management (note, both original 'Yellow Book and now International Engineering Safety Management)	Network Rail, High Speed One, High Speed Two, ProRail, Abellio, First Group, DB, railway suppliers such as Thales, Siemens, Bombardier plus others. Railway areas assessed: Development of Safety Management System Track & Civil (slab, ballast, in road, highway) Vehicles Depots Traction Signalling Operations Maintenance Power Tunnels Access control systems Emergency Protection systems Telecoms Control systems (traffic management, possession management, incident management)
Abellio, Greater Anglia (AGA)	Complete replacement of the existing fleet, with the delivery of 1,043 new carriages and many existing vehicles will be refurbished ahead of the arrival of the new fleet. The works also include investment to improve stations, upgrades to depots, new maintenance facilities and route infrastructure upgrades such as power, level crossings and gauging to facilitate the new rolling stock. The clients Safety Management System had to be enhanced to enable AGA to be approved by the regulator to be the proposer of change to infrastructure as well as the new fleet. Vertex provided the adaptions to the SMS and a full suite of engineering and asset management controls required to meet the requirements of the adapted SMS.



Business and Safety Management landscape determined using the AIBA tool, this supported authorisation by the regulator for main line operation.

Railway / Organization / Process	Project Summary
Crossrail, UK	Framework supplier of Safety Engineering services for the Crossrail programme. Currently supporting the configuration controls and transition from Trial Running into Trial Operations.
Docklands Light Railway, UK	Passenger operation changes, Safety Management System, application of new systems from SIL0 to SIL4
ETCS Level 1 to Level 3 including L3 Hybrid, Europe	Freight and passenger operations, new systems, new procedures, incidents, regulatory approvals, major shutdown process, new standards, Safety Management System, testing and rollout of ETCS L1 to L3 Hybrid. Review of maintenance strategy and reliability centred maintenance approach.
Fugro, Netherlands RILA use in UK and template for other countries	We developed the Safety Management System, process and Safety Case for the operation of RILA equipment across the UK rail network. A Safety Case was required for the infrastructure operator and a template operators safety case was provided for use by numerous train and freight operators. We staged the applications to match the risks from initial demonstrations to trials and then full unconstrained operation.

Railway / Organization / Process	Project Summary
High Speed One, UK	Framework supplier of Safety Management services since 2015 to date. The works have included assessment of maintenance to Cyber Security.
High Speed Two, UK	Development of safety requirements required for the Phase 1 and 2A new railway Development of maintenance requirements for the new infrastructure assets
LUL, UK	Change in operational processes, standards and impact to workforce
Metrolinx, Canada	Safety management controls as part of the provision of new Target Operating Model for all rail infrastructure and Fleet operations, maintenance and capital works
Network Rail, UK	Safety Assessment of the Great Western Electrification
NR High Speed, UK	Numerous safety cases and safety assessments of changes to the control system and changes to the operation and maintenance practices
Perth Transport Authority, Australia	Assessment of safety controls associated with the maintenance of signalling, track, facilities and plant
ProRail, Netherlands	ETCS L3 Hybrid safety case. Assessment of major system change programmes.
Rail for London Infrastructure	Providing change assurance services and controls to meet the requirements detailed by the Main Line Authorisation application for the Safety Management System. A highly experienced team has been supplied to deliver the outputs required for the client, the scope includes developing the client's capability over the project duration.
Stadler, Switzerland	Flirt trains for Abellio and associated operational changes and new depots



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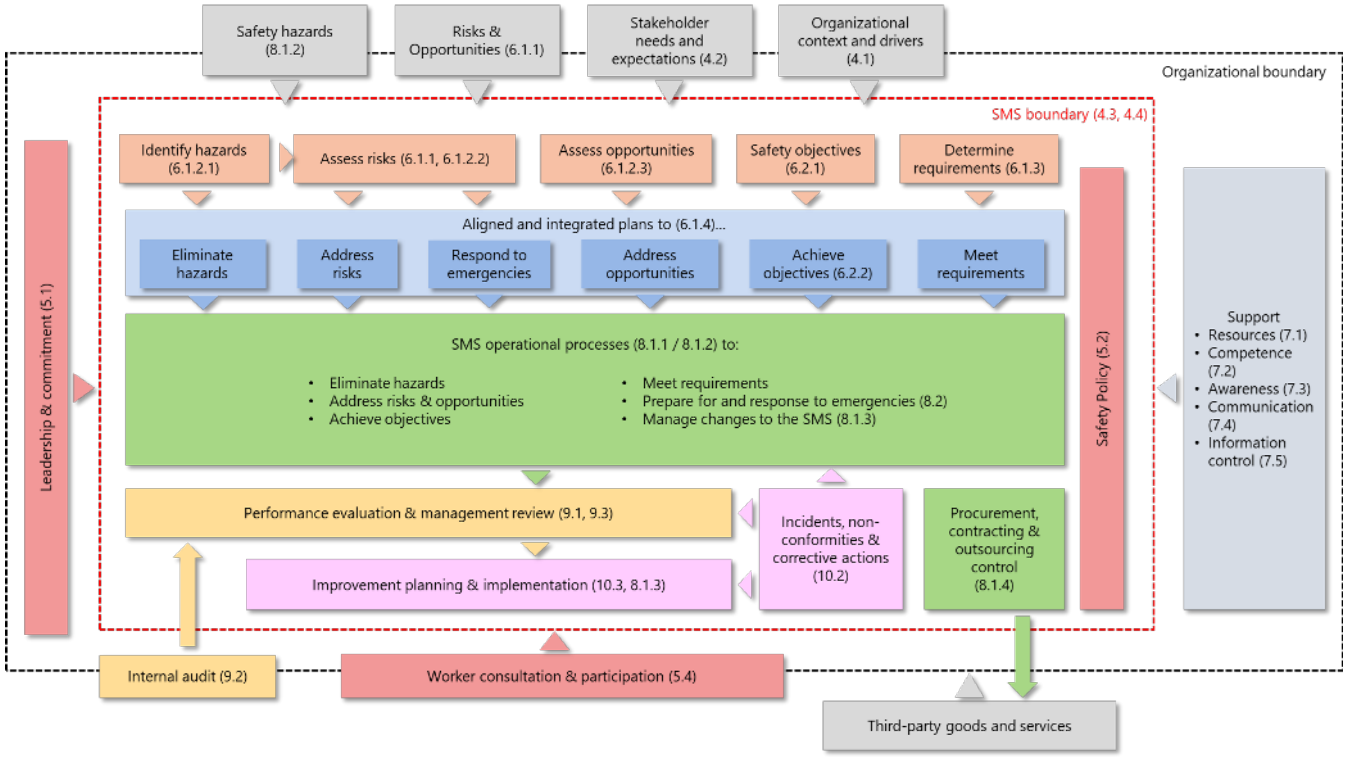
Sound Transit, USA	Development of ISO45001 Safety Management System and best practice from EU Common Safety Method controls
Sydney Trains, Australia	New systems and associated procedures, Safety Management System.
Thameslink, UK	Safety Approval of new equipment associated with the new railway and development of the day-to-day engineering and operational maintenance methodology, this was known as the 'Flight Engineer concept, which has now been rolled out across a number of Network Rail routes.
TfL Metronet, UK	Passenger operations, new systems, new procedures, regulatory approvals, major shutdown process, new standards.
TfL Tubelines, UK	Passenger operations, new procedures, regulatory approvals, major change to the Jubilee and Northern Lines, CBTC approval, shutdown process, new standards.
Transport for Wales,UK	Independent assessment of the developing Safety Management System that will support the transfer of the assets and train operations from Network Rail to the DBFOM entity. Independent assessment of the maintenance and operations strategy that will support the transfer of the assets and train operations from Network Rail to the DBFOM entity.



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